

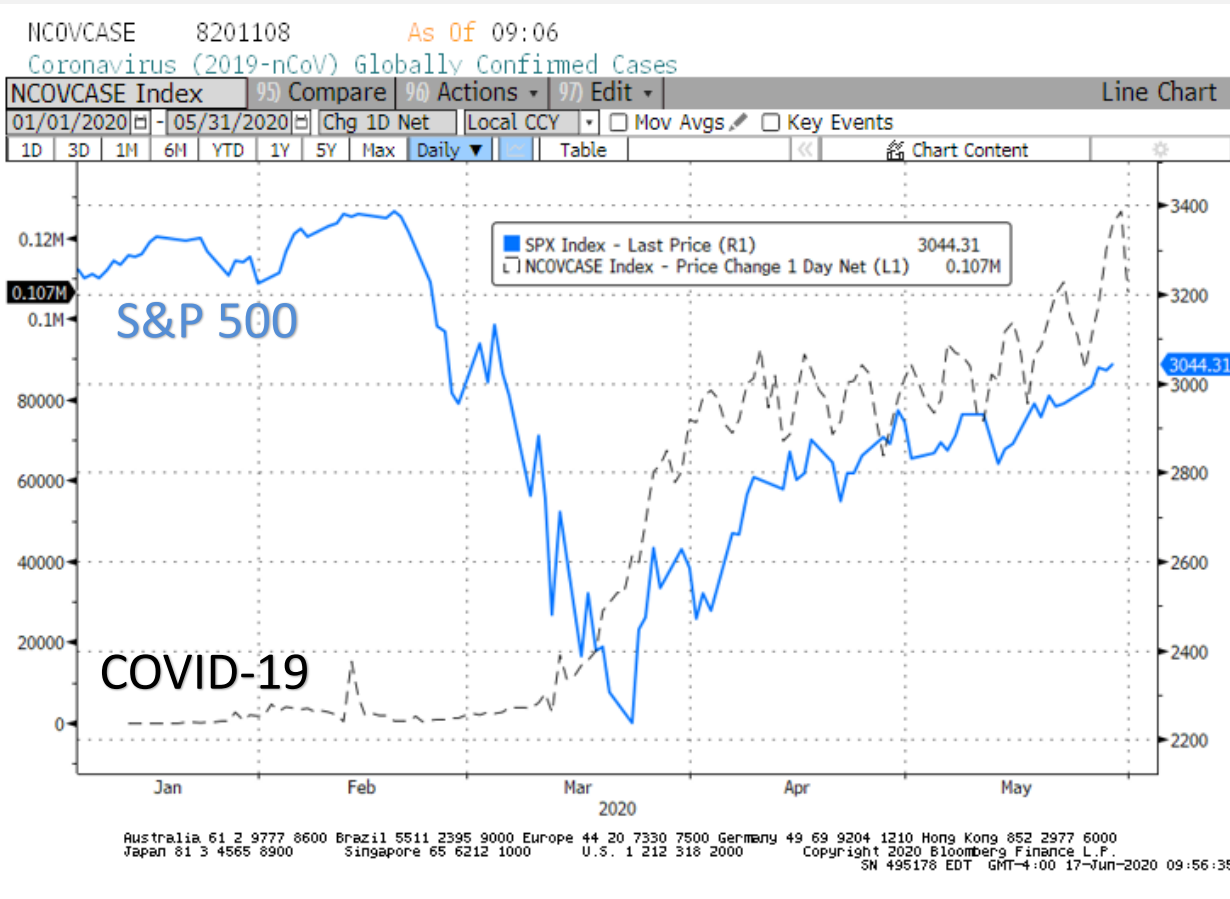
# Financial Markets and News about the Coronavirus

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2020 QWAFAxNEW Seminar

# The S&P500 and COVID-19 case counts



- In February and March, the S&P500 fell 34% and experienced extreme volatility
- On par with the Global Financial Crisis of 2008-09
- Absolute levels of COVID-19 case counts were not yet extreme

# So what drove markets?

- Partly a rational anticipation of the progression of the disease
  - e.g. January 31<sup>st</sup> call with Jeremy Farrar of the Wellcome Trust
- Also lots of media speculation about tail scenarios

## The Early Coronavirus Warning That Woke Up Wall Street

Before Covid-19 upended American life, the head of a \$33 billion U.K. foundation told a collection of money managers how bad it was going to get. The alarm spread through the worlds of finance and business.

 The New York Times

Markets Plunge. Economies Stall. Panic Spreads. It All Feels Very 2008.

The global financial crisis of 2008 presented a textbook case of what happens ... was a show that we had seen before — the panic of 1907, the Great Depression. ... The spread of the coronavirus in China, today the  
Mar 13, 2020




 Washington Post

A market crash was coming, even before coronavirus

While this unprecedented “quantitative easing” probably saved the world from another Great Depression, the central banks never quite got around to sopping up ...

Mar 9, 2020



 Yahoo Finance

Trump's response to coronavirus pandemic may cause the next Great Depression

Yes, you read that correctly, the next Great Depression and on a worldwide scale. ... pricing in a garden variety global recession due to the coronavirus outbreak.

Mar 12, 2020



- Markets buy into the negative narrative (for a while)

# Mechanism

- News series that are not informative about future case counts affect contemporaneous market prices
- The effect of news on markets is higher when the VIX is higher – even though the news are not any more informative
  - Volatility for volatility’s sake
- Bad market prices today lead to bad news coverage tomorrow
  - Negative feedback loops
- Contemporaneous market responses to news systematically get reversed the next day
  - Markets overreact to generally uninformative news
- Evidence of structural break in mid-March, post which markets enter a more “normal” phase
  - Break coincides with strong Fed crisis response

# Topics for today

- ① Text and markets data
- ② What forecasts future case incidence?
- ③ What moves markets?
- ④ What moves news?
- ⑤ Is there evidence of overreaction?
- ⑥ Structural break in mid-March
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# Text and markets data

- I look at daily returns in five markets:
  - S&P 500
  - High-yield bonds
  - VIX index (average implied volatility on short-dated S&P500 options)
  - 2- and 10-year US Treasuries
- Examine 72k Reuters articles containing:  
coronavirus or COVID-19
  - Between January 17 and April 30<sup>th</sup>
  - Will extend to May and June soon
- *How do markets and news interact?*

# News topics

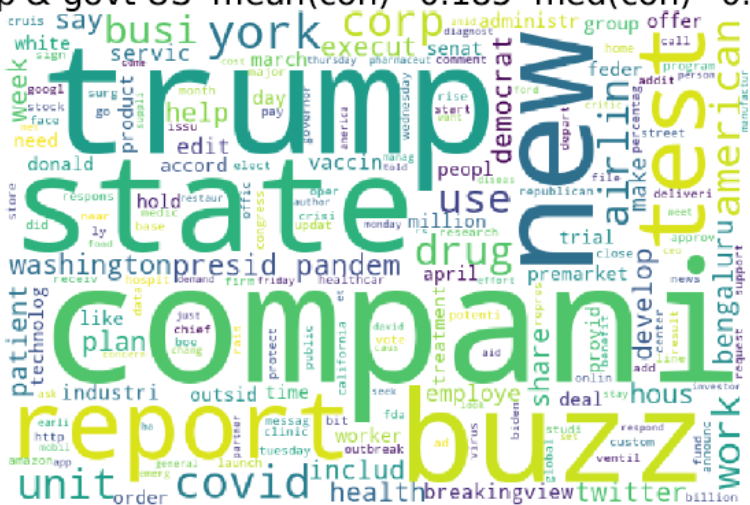
- Classify news flow into 12 topics
- 12 maximizes the trade-off between higher topic number and higher topic *coherence*
  - *Coherence* is a measure of the tendency of words to co-occur in documents
- Table shows daily topic frequency for intraday and overnight news

Average document-topic distribution by time-period

bucket	intra	over
sports	0.049	0.047
central bank	0.107	0.100
markets	0.053	0.075
health	0.201	0.203
europe	0.065	0.066
oil & comm	0.063	0.049
currency	0.068	0.066
credit	0.027	0.017
corp & govt US	0.117	0.085
corp actual	0.122	0.185
corp future	0.090	0.089
credit1	0.036	0.020
sent	-0.020	-0.019
Number	21,640	50,623

# Sample topics

corp & govt US mean(coh)=0.185 med(coh)=0.138



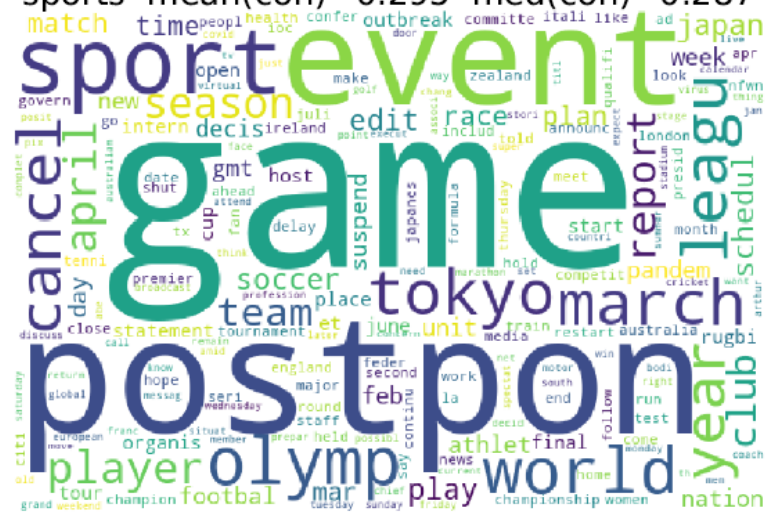
markets mean(coh)=0.358 med(coh)=0.351



credit mean(coh)=0.875 med(coh)=0.927



sports mean(coh)=0.295 med(coh)=0.287





# Text measures

- Calculate article sentiment  $Sent_j$  using Loughran-McDonald (2011) dictionary
- Calculate avg. daily frequency  $f_{t,k}$  for topic  $k$
- Aggregate to 14 daily measures:
  1. Average daily sentiment  $Sent_t$ : higher  $Sent_t$  means better news
  2. Daily sentiment standard deviation:  $Sent\_sd_t$
  3. Daily topical sentiment for 12 topics:

$$Sent_{t,k} = Sent_t \times f_{t,k}$$

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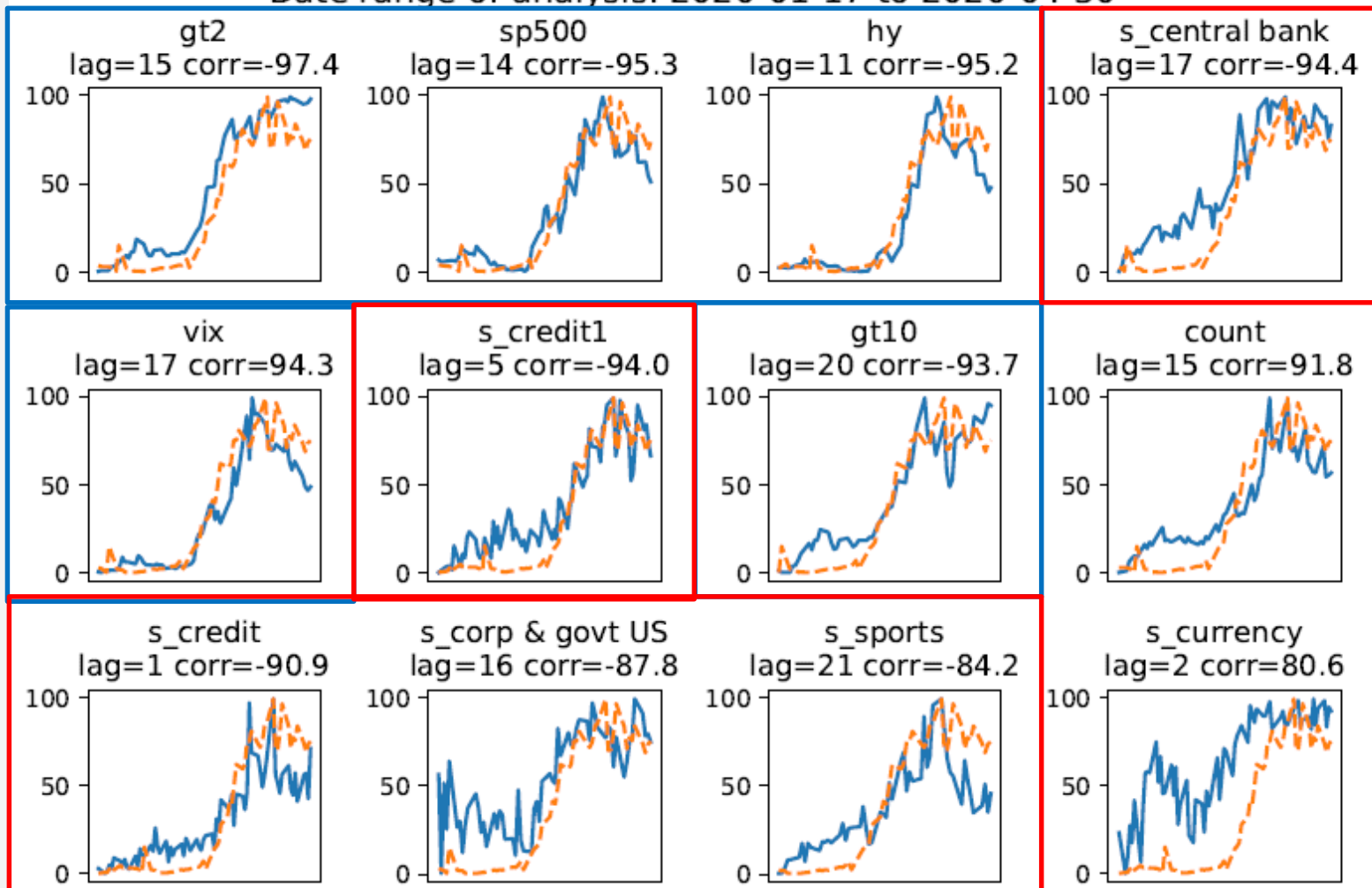
# What forecasts future case incidence?

Do markets or news forecast future case incidence?

- Line up lagged **markets** and **news** series with future **case counts**
- Each of the five markets series is a good forecaster of future cases, at lags of 2-4 weeks
- Some news topics are as well, e.g.
  - *Central bank, Credit, Corp & Govt, Sports*
- Generally markets are better forecasters of future case counts than news series

# Lagged series and COVID-19 counts

Date range of analysis: 2020-01-17 to 2020-04-30



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# What moves markets?

The general specification is:

$$h_{t+1} = \underbrace{b_3 N_{t+1}}_{\text{news}} + \underbrace{b_4 N_{t+1} VIX_t^{10}}_{\substack{\text{news/VIX} \\ \text{interaction}}} + \underbrace{b' X_t}_{\substack{\text{cont-} \\ \text{rols}}} + e_{t+1}$$

Test to see whether:

- News affects contemporaneous returns
- The effect of news is larger when volatility is higher

# What is the sign of $b_3$ ?

- News affects returns through two channels
  - Discount rates, and
  - Cash flows
- Volatility appears to be a third channel
- What is the effect of news?

Market	$Sent_t$ and $Sent_{t,k}$	$Sent$ $sd_t$
S&P 500	+	-
VIX	-	+
HY Bonds	+	-
Rates	+	-

# Question #1

Do the news topics that are informative about future case incidence move markets day-to-day?

- Yes, for some:
  - *Sports!*
- But many of the others don't:
  - *Central bank*
  - *Credit*
  - *Corp & Govt US*



## Question #2

What news topics drive markets?

- *Markets*
- *Health*
- *Europe*
- *Sent<sub>t</sub>*
- *Sent\_sd<sub>t</sub>*

But these are not informative about future fundamentals

- Why do markets respond to news series that aren't informative about future case incidence?

## Question #3

Recall the main specification:

$$h_{t+1} = \underbrace{b_3 N_{t+1}}_{\text{news}} + \underbrace{b_4 N_{t+1} VIX_t^{10}}_{\substack{\text{news/VIX} \\ \text{interaction}}} + b' X_t + e_{t+1}$$

Do  $b_3$  and  $b_4$  systematically have the same sign?

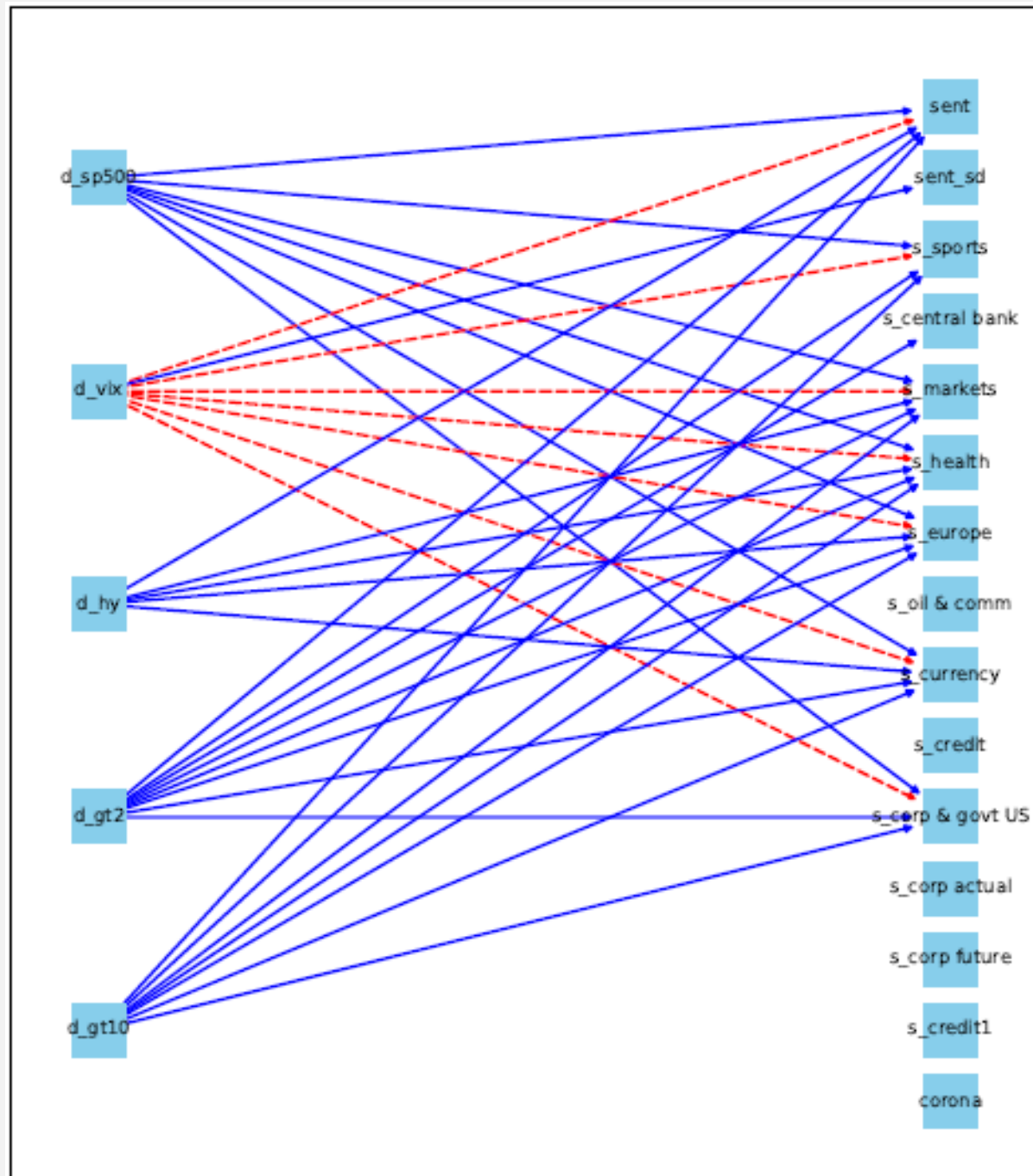
- Yes! The same unit of news, i.e.  $N_{t+1}$ , has a larger effect on returns when volatility is higher
- Not attributable to higher information content because many  $N_{t+1}$ 's are not informative about future fundamentals
- I call this *hypersensitivity*: volatility for volatility's sake

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# What moves news?

- Strong evidence that negative market action on day  $t-1$  forecasts negative news coverage on day  $t$



# Negative feedback

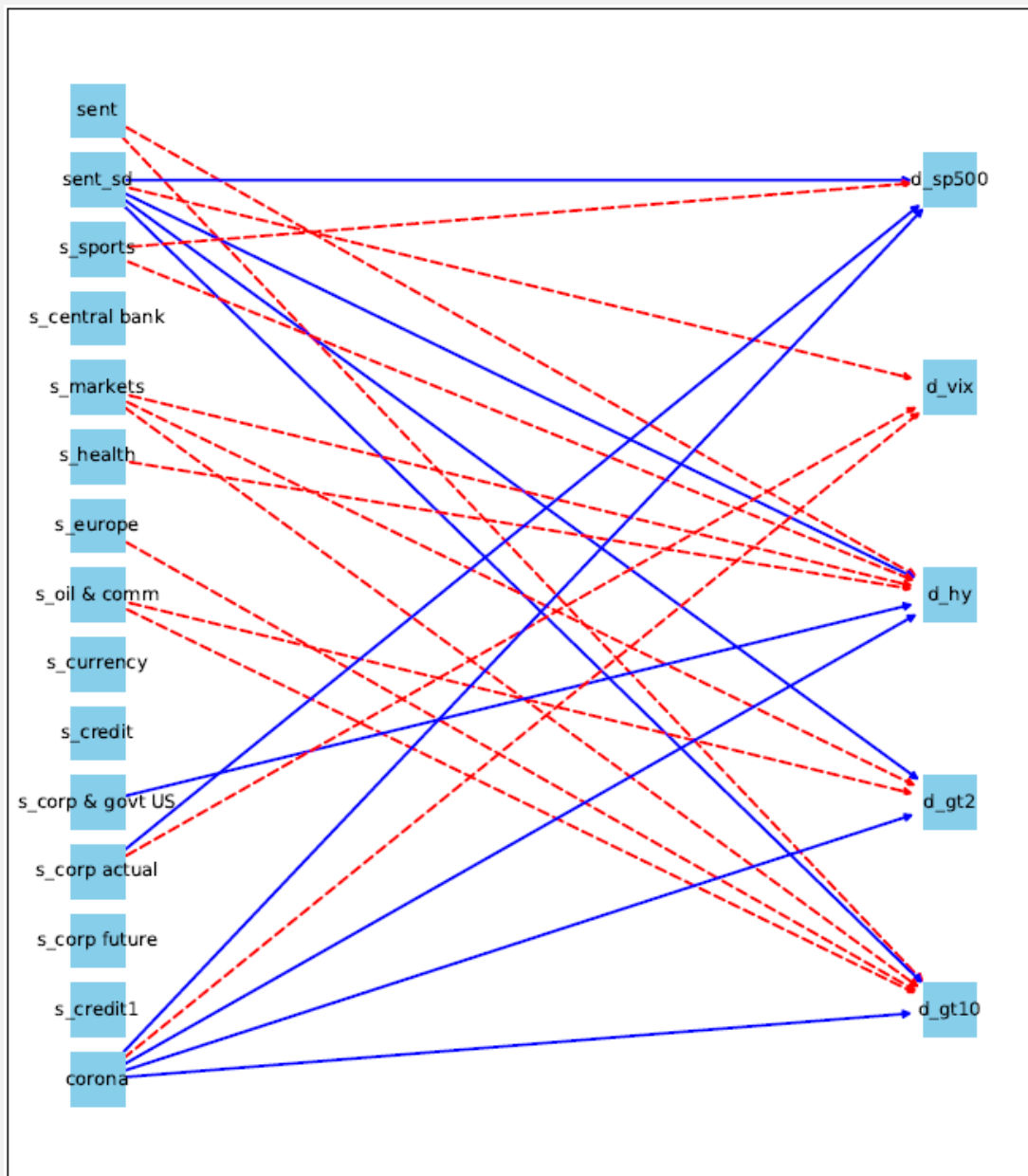
- Bad market action on day  $t-1$  leads to bad day  $t$  news coverage
- Bad day  $t$  news then negatively affects market prices on day  $t$
- Which then propagate to bad news coverage on day  $t+1$
- *Negative feedback*

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# Is there evidence of overreaction?

- There is very strong evidence of overreaction
- Day  $t$  news forecasts day  $t+1$  markets
- The day  $t+1$  market move *systematically reverses* the day  $t$  market reaction to contemporaneous news
- This is especially true for hypersensitive markets-news pairs



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# Structural break in mid-March

- Tests show structural break around mid-March
- In the pre-break regime:
  - Prices systematically react to non-informative news
  - Prices react more to news when volatility is higher
  - Bad news today leads to bad news coverage tomorrow: negative feedback loops
  - Strong evidence of overreaction to news as today's news response gets reversed tomorrow

# Post-break regime

- Post mid-March markets appear much more “normal”:
  - More informative (about future case counts) news matter more for contemporaneous market moves
  - Little evidence of hypersensitivity
  - Lead-lag relationships in the late sample are less pronounced
  - Little evidence for overreaction

# What happened?

Suggests yet another role for the Fed in breaking the negative feedback loop:

March 23, 2020

**Federal Reserve announces extensive new measures to support the economy**

For release at 8:00 a.m. EDT

Support for critical market functioning. The Federal Open Market Committee (FOMC) will purchase Treasury securities and agency mortgage-backed securities in the amounts needed to support smooth market functioning and effective transmission of monetary policy to broader financial conditions and the economy. The

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# Conclusion

- By repeatedly emphasizing potential negative outcomes, the media inadvertently contributes to market volatility
- The Fed helps to break the negative markets-news cycle

# Topic analysis

- What are the topics of news coverage about COVID-19?
- Tradeoff:
  - More topics means higher chance of finding news—markets relationships
  - More topics might make topics less “coherent”
- Identify power law between topic number ( $K$ ) and coherence ( $C_K$ )  
$$\ln C_K = -0.4 - 0.26 \times \ln K + \epsilon$$
- Find the model with the highest  $\epsilon$ , i.e. with the highest  $C_K K^{0.25}$

