



**Valentina Semenova**

semenova@maths.ox.ac.uk

https://vms12.github.io/

**Julian Winkler**

julian.winkler@economics.ox.ac.uk

https://julianwinkler.info/

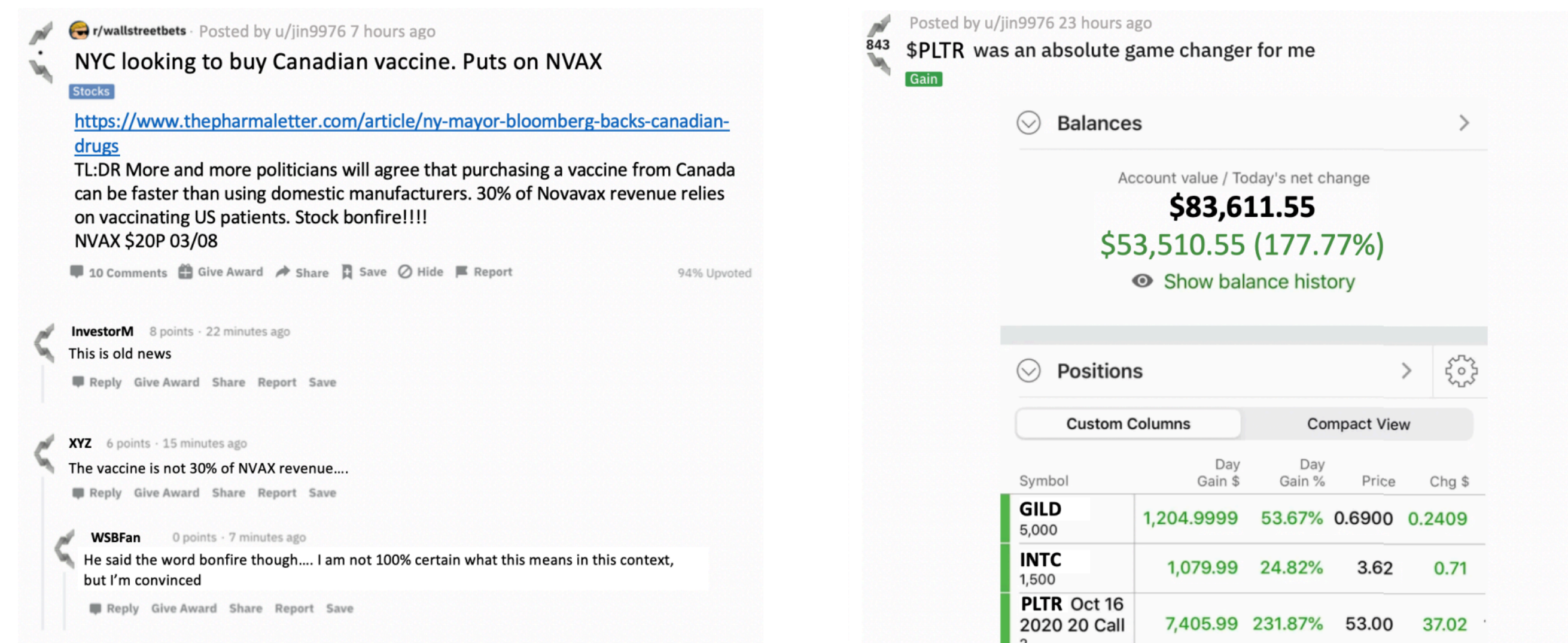
## Motivation

- **Investor psychology** plays an important role in the movement of financial markets
- SEC investigation of the market crash of 1962 revealed that 'investor psychology' and retail traders played a key role
- Irrational exuberance is the psychological basis of a speculative bubble (Shiller, 2005)
- **Social media** creates new avenues for investors to coordinate, and data for research
- GameStop short squeeze of 2021

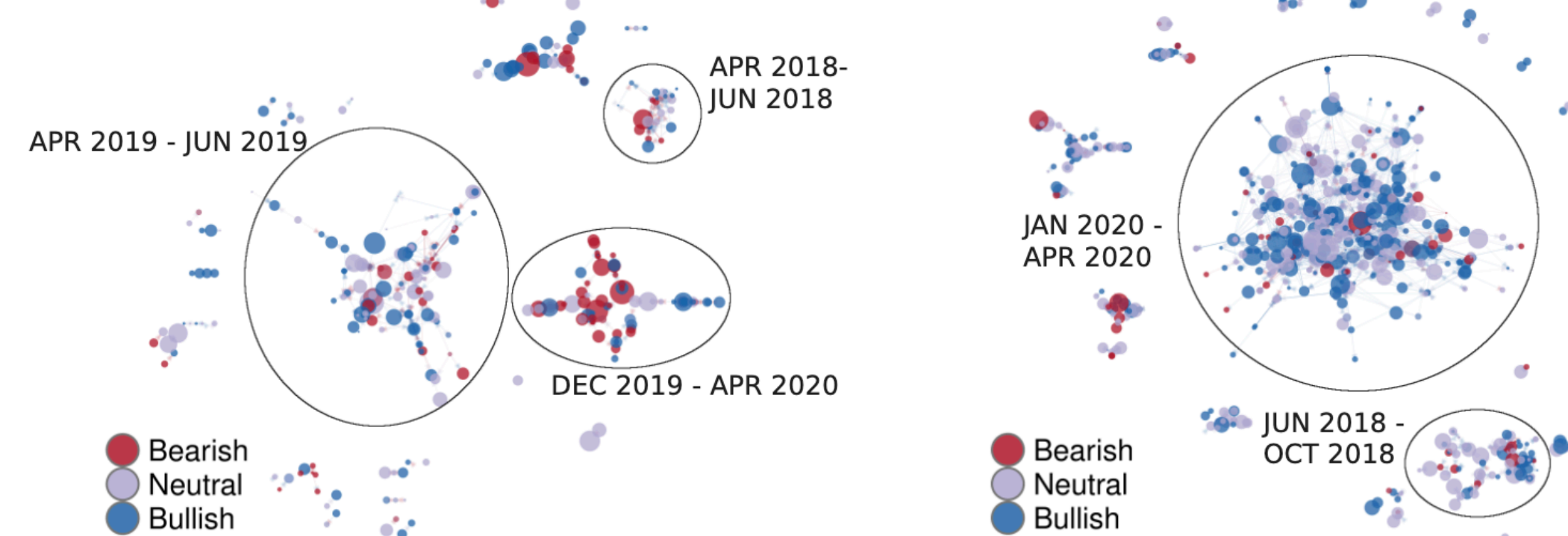
**Question:** How does exposure to information online impact investment decisions and asset prices?

## The WallStreetBets Dataset

- Anonymous investor discussion group on the Reddit platform: data contains user IDs and discussion text
- Users share trading strategies, that others comment on, and screenshots of positions

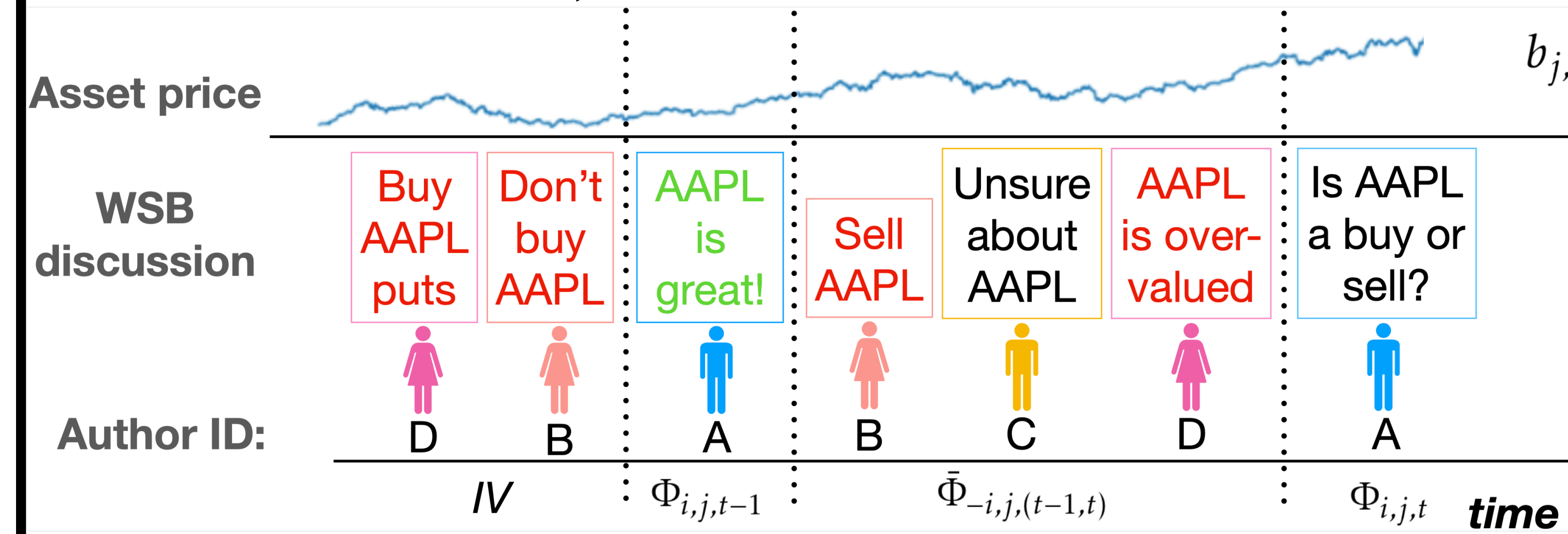


- Raw WSB data was transformed into user interaction and exposure data over time for time series and network analysis
- Sentiments were extracted using FinBERT (Araci, 2019); assets discussed were also extracted in the form of tickers
- Sentiments were regressed on future investment decisions with strong correlations



## Identifying Peer Influence

- We employ two methods to identify whether investors influence each other's sentiments about an asset, net of other factors



We estimate the effect of average peer sentiment  $\bar{\Phi}_{i,j,(t-1,t)}$  between author  $i$ 's posts about asset  $j$

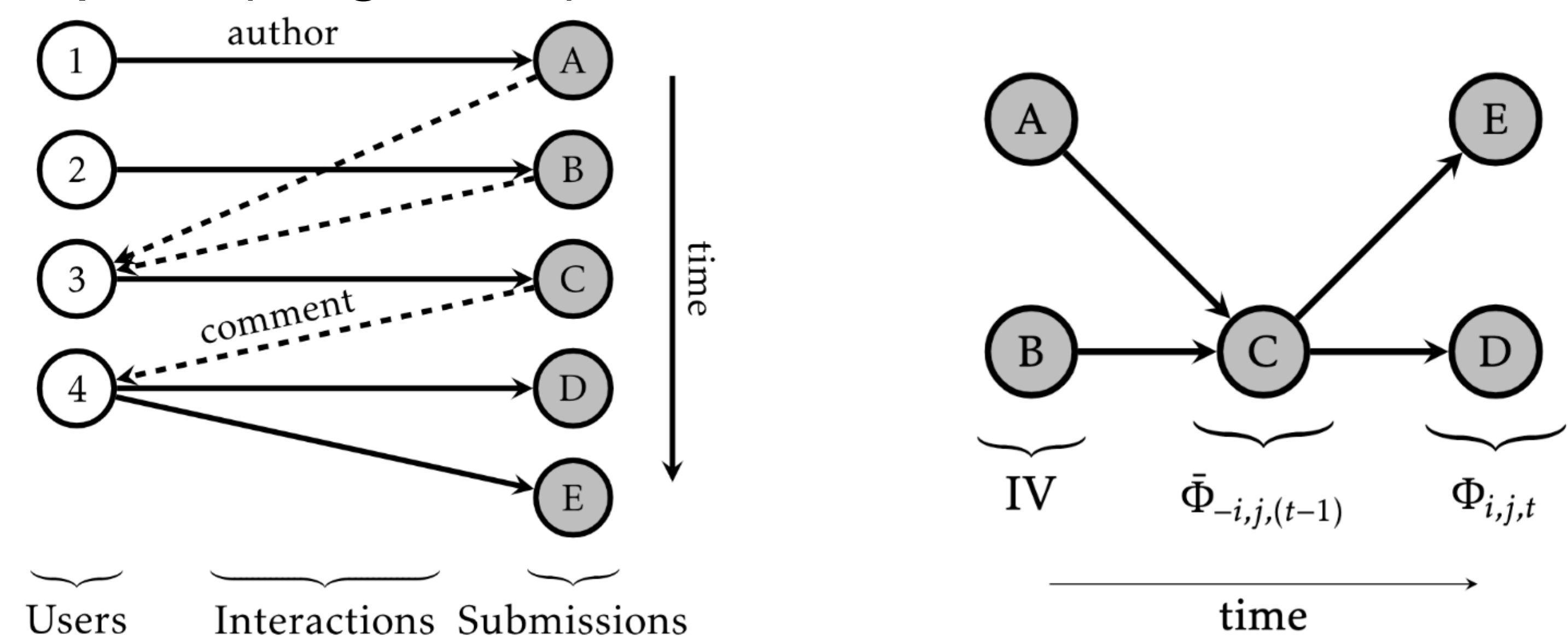
$$\Phi_{i,j,t} = \kappa \bar{\Phi}_{-i,j,(t-1,t)} + X_{i,j,t} \beta + \epsilon_{i,j,t}$$

### Frequent Posters Approach

- Uses historical posts of peers (that post before time  $t-1$ ) as an IV to predict peer sentiment

### Commenter Network Approach

- Uses neighbours of posts that an individual has commented on (friends of friends) to estimate peer (neighbour) sentiment



## Results

- Both approaches find evidence of peer influence

Panel B.1: Second Stage – peer influence estimated using predicted average sentiment of peers

	Frequent Posters	Network
	(1)	(2)
Independent Variable		
Average peer sentiment, $\hat{\Phi}_{-i,j,(t-1)}$ (predicted)		
Investor Sentiment ( $\Phi_{i,j,t}$ )	0.19 (0.05) ***	0.19 (0.08) **
Author & asset controls ( $X_{i,j,t}$ )	Yes	Yes

- Paper also investigates salience and prominence

## Market Dynamics with Peer Influence

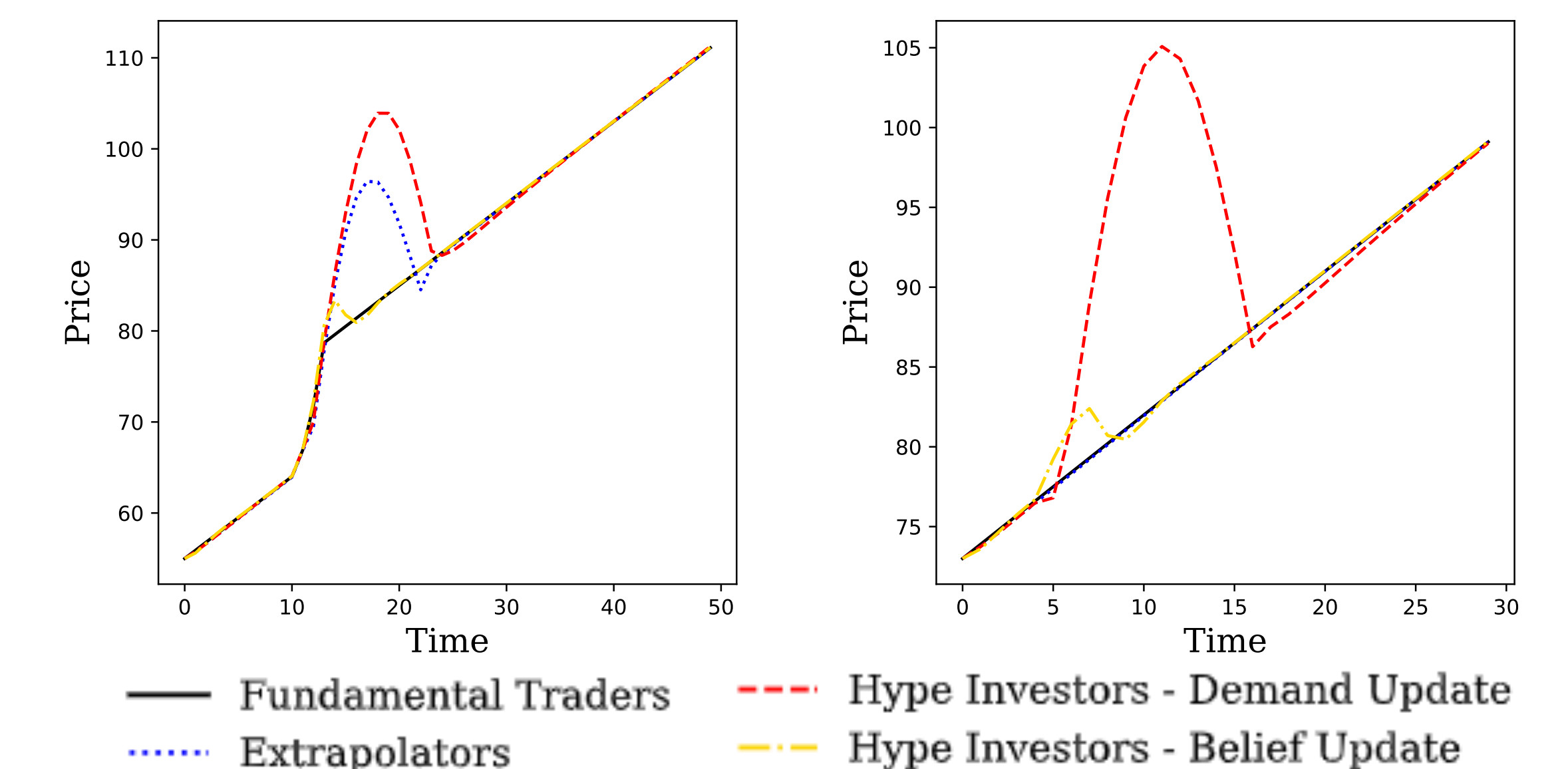
### Models

- Asset demand model with simultaneous updates in returns  $r_t$  and sentiments  $\phi_t$ , with peer influence  $\alpha$ , extrapolation  $\beta$ , risk aversion  $\gamma$ :

$$\phi_t = \frac{\alpha \phi_{t-1} + \beta r_t}{\gamma \sigma^2},$$

$$r_t = -\frac{\alpha}{\beta} \phi_{t-1} + \frac{S_t \gamma \sigma^2}{\beta N}.$$

- A model for bubble dynamics with peer influence and extrapolation
- Individuals update either demand or beliefs about future movement of the asset; model initialized with values from data
- Model compared to simple extrapolation (Barberis et al, 2018)



### Evidence from the Data

- Stock returns are closely linked to WSB characteristics:

	Dependent variable:	
	(1)	(2)
$\Phi_{j,t}$	0.60*** (0.04)	
$\Phi_{j,t-1}$	-0.16*** (0.02)	-0.07*** (0.02)
$r_{j,t-1}$		-0.06*** (0.004)
$\Phi_{j,t-1} \times r_{j,t-1}$		0.01 (0.01)
Day FE	Yes	Yes
Observations	8,287,639	8,287,639
R <sup>2</sup>	0.0004	0.003

Note: \*p<0.1; \*\*p<0.05; \*\*\*p<0.01

## Discussion and Implications

- This paper demonstrates how new, unstructured text data from online forums can be used to study economic behaviors
- We present evidence of how peer influence and investor psychology can influence the market

## References

- Shiller, R. J. (2005) *Irrational Exuberance (Second Edition)*, Princeton University Press.
- Barberis, N., Greenwood, R., Jin, L. & Shleifer, A. (2018), Extrapolation and Bubbles, *Journal of Financial Economics* 129(2), 203-27.
- Araci, D. (2019), FinBERT, arxiv preprint at arXiv:1908.10063.