

Market manipulation and suspicious stock recommendations on social media

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Summary

- This paper explore the relation between the content published on social media and small-capitalization stock returns
- We find that an abnormally high message activity on social media is associated with a large price increase on the event day and followed by a sharp price reversal over the next week
- To differentiate between the effects of overoptimism by noise traders and the illegal gains of a pump-and-dump scheme, we investigate social interactions between Twitter users through the use of network theory.

- Social media presents opportunities for fraudsters [Investor Alert: Social Media and Investing, SEC, 2014].
- One way fraudsters may exploit social media is to engage in a market manipulation, such as spreading false and misleading information about a company to affect the stocks share price (typically small, so-called microcap companies). Wrongdoers may perpetuate stock rumors on social media, as well as on online bulletin boards and in Internet chat rooms. [SEC, 2014]

- Information-based manipulation - Stock spam e-mails [Frieder and Zittrain, 2007; Hanke and Hauser, 2008; Nelson et al., 2013].
- Information-based suspicious stock recommendations - Internet message board [Sabherwal et al., 2013].
- Positive short-run price impact followed by a price reversal over the following days.

- We focus our attention on small-capitalization stocks (penny stocks, microcap stocks) quoted on the OTC Markets (previously known as Pink Sheets)
- All Common Stock and Ordinary Shares of companies incorporated in the United States, excluding American Depository Receipts, ETF, Funds, and Warrants. Our sample consists of 5,087 companies.
- We use Bloomberg to download daily price data, traded volume data, and market capitalization for all 5,087 stocks.

- Twitter is a micro-blogging platform that enables users to send and read short 140-character messages called “tweets”.
- We develop a computer program in the Python programming language to collect data in real time using Twitter Search and Stream Application Programming Interface (API).
- We extract all the messages containing a “\$” sign followed by the ticker name, as in Sprenger et al. (2014).
- Sample period: October 5, 2014, to September 1, 2015. We collect a total of 7,196,307 tweets.

Figure: Example of tweets



Awesome Stock Tips @AwesomeStockTip · 21 janv.



\$AACS is my Golden Cross, 52 Week High Possible Break out Mega Wednesday Alert



StockPromoters @StockPromoters · 22 janv.

\$AACS #StockPromoters.com



Bull Penny Picks @bppalerts · 21 janv.



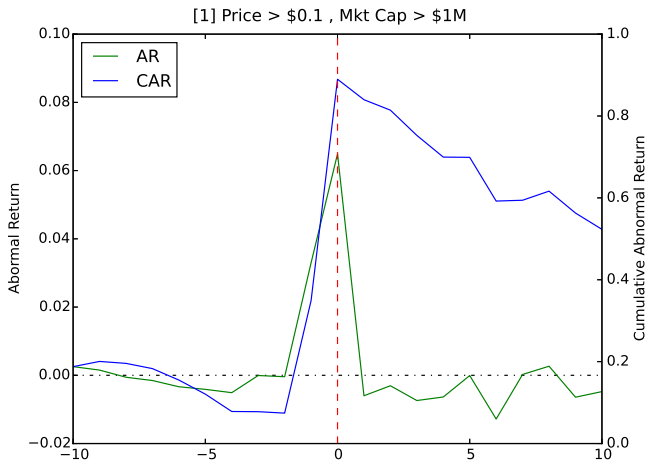
\$AACS with a volume of roughly 278K? First half hour of the day up 341%!! More Premium picks in our newsletter! goo.gl/2T9ulv



- We define an event as follows: when the number of messages posted on Twitter about company i during a given day t exceeds the average of the previous 7 days plus two standard deviations
- Minimum of 20 tweets from 20 distinct users to avoid having our results driven by a few active users
- We impose a minimum stock price of \$0.1 and a market capitalization greater than \$1,000,000 at the beginning of the event window.

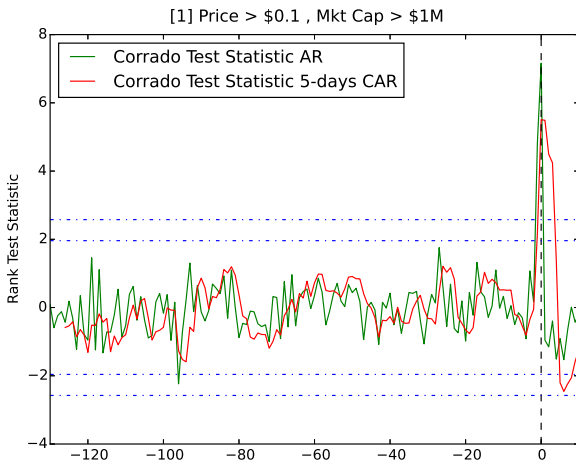
- For each event, we analyze all the tweets sent on that day, using Renault's (2016) domain-specific sentiment lexicon. We identify a total of 567 events associated with a positive sentiment.
- Market return model, considering the NASDAQ MicroCap Index as a benchmark of normal return.

Figure: Event Study - Abnormal returns and cumulative abnormal returns



Event Study

Figure: Event Study - Abnormal returns and cumulative abnormal returns - Corrado rank test



- Results are robust to the model of normal return considered and price/volume/market-cap/trading-days thresholds.
- Cumulative returns decrease by 3.1% during the next trading week.
- Significant at the 5% level using a non-parametric Corrado rank test (using a 120-day estimation window and a 21-day event window).

Network Analysis and Suspicious Behaviors

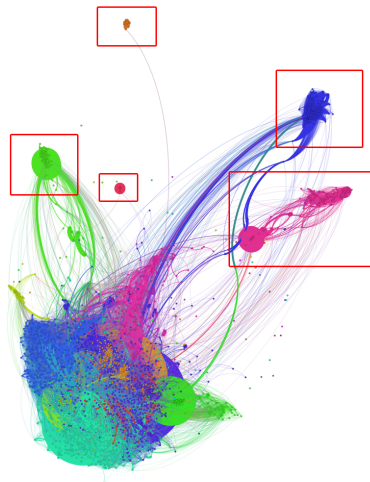
- Disentangle an overoptimism effect from manipulation.
- Diesner et al. (2005) identify suspicious behaviors using the Enron email corpus and network theory.
- We use a similar methodology to analyze interactions between users on Twitter and identify groups of users with suspicious behaviors.

Network Analysis and Suspicious Behaviors

- Interactions are directly observable through the function “mention” and “retweet” .
- Total of 2,011,315 users' interactions.
- After excluding all users with less than 50 directed entrant or outbound links, we have a network of 8,961 users and 205,093 directed links.
- We use Gephi, an open-source network analysis and visualization software, to cluster users based on interactions similarity.

Network Analysis and Suspicious Behaviors

Figure: Network analysis of the Twittersphere based on retweets and mentions



Network Analysis and Suspicious Behaviors

- We identify five clusters characterized by a very high level of interactions between themselves and a low level of interactions with all the other clusters.
- We analyze manually the tweets sent by users from those clusters.
- We identify various suspicious behaviors:
 - Scheduled automatic postings
 - Fake accounts now deleted by Twitter
 - Previous tweets not related to the financial market
 - Abnormal followers/retweets ratio

Network Analysis and Suspicious Behaviors

Date	User	Message content
17:12:05	ckelly3	RT @majegivudys: \$SING - SinglePoint's product suite will provide Medical Cannabis dispensaries [...]
17:36:19	_Singlepoint_	\$SING working to finish acquiring GreenStar Payment Solutions in short order
17:44:57	badnewsbruno	RT @Singlepoint.: \$SING working to finish acquiring GreenStar Payment Solutions in short order
18:54:40	_Singlepoint_	\$SING increasing number of terminals every week on track to hit sales targets
20:00:01	JayBugster	When completed GreenStar Payment Solutions, Inc. will be a wholly owned subsidiary of SinglePoint. - \$SING
20:00:02	BoardwalkPennyS	When completed GreenStar Payment Solutions, Inc. will be a wholly owned subsidiary of SinglePoint. - \$SING
20:00:02	Micro_Cap_Pro	When completed GreenStar Payment Solutions, Inc. will be a wholly owned subsidiary of SinglePoint. - \$SING
20:00:02	MicroCapUnivers	When completed GreenStar Payment Solutions, Inc. will be a wholly owned subsidiary of SinglePoint. - \$SING
20:00:03	PennyStockMach	When completed GreenStar Payment Solutions, Inc. will be a wholly owned subsidiary of SinglePoint. - \$SING
20:00:03	StockShocks	When completed GreenStar Payment Solutions, Inc. will be a wholly owned subsidiary of SinglePoint. - \$SING
20:00:03	PennyStockExcel	When completed GreenStar Payment Solutions, Inc. will be a wholly owned subsidiary of SinglePoint. - \$SING
20:00:03	DaddyHotStocks	When completed GreenStar Payment Solutions, Inc. will be a wholly owned subsidiary of SinglePoint. - \$SING
20:00:03	StockUltraman	When completed GreenStar Payment Solutions, Inc. will be a wholly owned subsidiary of SinglePoint. - \$SING
20:00:03	HotStockCafe	When completed GreenStar Payment Solutions, Inc. will be a wholly owned subsidiary of SinglePoint. - \$SING
20:00:03	Penny_Hotsocks	When completed GreenStar Payment Solutions, Inc. will be a wholly owned subsidiary of SinglePoint. - \$SING
20:00:07	PlatinumPennys	When completed GreenStar Payment Solutions, Inc. will be a wholly owned subsidiary of SinglePoint. - \$SING
20:00:11	Virmmac	When completed GreenStar Payment Solutions, Inc. will be a wholly owned subsidiary of SinglePoint. - \$SING
20:00:13	lonPennyStocks	When completed GreenStar Payment Solutions, Inc. will be a wholly owned subsidiary of SinglePoint. - \$SING
21:00:03	JayBugster	Did you read the \$SING LOI news? http://t.co/gTEykD6oSz
21:00:03	Virmmac	Did you read the \$SING LOI news? http://t.co/AxEUNqLoOk
21:00:04	BoardwalkPennyS	Did you read the \$SING LOI news? http://t.co/arilkU2OIX
21:00:04	StockShocks	Did you read the \$SING LOI news? http://t.co/ixKf03Rm9C
21:00:04	PlatinumPennys	Did you read the \$SING LOI news? http://t.co/SUG48Rf392
21:00:04	StockUltraman	Did you read the \$SING LOI news? http://t.co/WDy1STjZ2B
21:00:04	Micro_Cap_Pro	Did you read the \$SING LOI news? http://t.co/8LICPwiBLV
21:00:06	HotStockCafe	Did you read the \$SING LOI news? http://t.co/f3EKncSwQq
21:00:07	Penny_Hotsocks	Did you read the \$SING LOI news? http://t.co/NrH2obv7ti http://t.co/Ln1HqzOnok
21:00:11	PennyStockMach	Did you read the \$SING LOI news? http://t.co/Hx4mynnUDR
21:00:12	JayBugster	Did you read the \$SING LOI news? http://t.co/b6brmQtl5t http://t.co/eqgRTP9NG
21:00:12	Penny_Hotsocks	Did you read the \$SING LOI news? http://t.co/r8Au3hcEaL
21:00:13	lonPennyStocks	Did you read the \$SING LOI news? http://t.co/WJ5vFU7CHB
21:04:54	aheadsupotc	\$SING received a new alert. See why at http://t.co/FwU0sYdHLW \$MSEZ #Penny #pennystocks [...]
21:06:11	ckelly3	RT @aheadsupotc: \$SING received a new alert. See why at http://t.co/FwU0sYdHLW \$MSEZ #Penny [...]
22:00:00	PennyStockExcel	SinglePoint, Inc. Signs LOI to Acquire 100% of GreenStar Payment Solutions - \$SING
22:00:00	StockUltraman	SinglePoint, Inc. Signs LOI to Acquire 100% of GreenStar Payment Solutions - \$SING
22:00:01	Micro_Cap_Pro	SinglePoint, Inc. Signs LOI to Acquire 100% of GreenStar Payment Solutions - \$SING
22:00:01	lonPennyStocks	SinglePoint, Inc. Signs LOI to Acquire 100% of GreenStar Payment Solutions - \$SING
22:00:02	HotStockCafe	SinglePoint, Inc. Signs LOI to Acquire 100% of GreenStar Payment Solutions - \$SING
22:00:04	MicroCapUnivers	SinglePoint, Inc. Signs LOI to Acquire 100% of GreenStar Payment Solutions - \$SING
22:52:29	ckelly3	RT @JayBugster: SinglePoint, Inc. Signs LOI to Acquire 100% of GreenStar Payment Solutions - \$SING

Conclusion

- Investors should be skeptical of information from social media accounts that lack a history of prior postings or sending messages.
- Given the risk of manipulation and the average negative return of OTC stocks documented in the literature, we believe that individual investors should be very cautious when choosing to invest on risky and illiquid small capitalization stocks.

The End