

**Final Report for the AFAANZ Research Grant Project**

*“The Wisdom of Crowds: Using People’s Tweeting on Social Media to Predict Large Stock Price Reversals”*

Prepared by the Grant Recipient:

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30 November 2020

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## Project Summary (500 words)

Social media platforms provided a public channel for investor interest to be gauged. Recently, Bartov, Faurel, & Mohanram (2018, TAR) use the term “the wisdom of crowds” to describe discussions among anonymous people on social media. They find people's aggregated opinions are predictive of short-term stock returns. The literature on wisdom of crowds, however, suggests that crowds are not always wise.

In this paper, we argue that wise crowds do not always function in the event of social contagion. Two dimensions quantify social contagion effects: intensity and extensity. We take the approach of predictive analytics and identify three network characteristics—argument diversity and sentiment diversity (to model intensity of contagion) and tree size (to model extensity of contagion)—to predict when the wisdom of the crowd disappears. The context of our examination is the prediction of stock returns of initial public offerings (IPOs); the loss of crowd wisdom is manifested as an abrupt change in stock returns.

Our social network data come from StockTwits. We extract 18 million tweets for 859 IPOs launched between 2008 and 2016, corresponding to 177,053 firm-week observations. Based on the results of logistic regression and multinomial logistic models, we find that a network comprised of large trees and posts with similar arguments (or sentiment) leads to a loss of crowd wisdom, and that these factors increase the predictability of an abrupt change in stock price (e.g. crashes and jackpots) in the subsequent week. Further, we assess predictability levels and measure the predictive power of the models with out-of-sample predictions to confirm the practicality of our developed models.

Theoretically, our paper identifies boundary conditions for when researchers shift the application of wisdom of crowds from offline to social networks. Practically, our findings advise practitioners not to routinely attribute superiority to the crowd when harnessing social network data to advance their predictions.

Funds Granted: \$2,000

## Detailed Report on Expenditure:

Research assistance: \$2,000 (100%)

Variations are primarily driven by the difference in requested amount and funds granted.



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**Fund No:** S6204059  
**Project:** AFAANZ - The Wisdom of Crowds: Using People's Tweeting on Social Media to Predict Large Stock Price Reversa  
**Donor Ref:**  
**Chief Investigator:** Stanley Choi

**STATEMENT OF INCOME AND EXPENDITURE**  
**For the Period 01 January, 2019 to 31 May, 2020**

	<u>Current Period</u> \$
Unspent Balance as at 01 January, 2019	0.00
<b><u>Add</u></b>	
Other Income	2,000.00
Total Income	<u>2,000.00</u>
Total Available Funds Before Expenditure	<u>\$2,000.00</u>
<b><u>Less</u></b>	
Salaries & Related Costs	2,000.00
Total Expenditure	<u>2,000.00</u>
Unspent Balance as at 31 May, 2020	<u>\$0.00</u>

I certify that the above statement accurately summarises the financial records of the grant and that these records have been properly maintained so as to record accurately the Income and Expenditure of the grant.

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Muhammad Alam, CPA  
Financial Accountant  
Research Financial Advisory

## Outcomes: A working paper and a presentation

### **Abstract**

Researchers have recently leveraged the wisdom-of-the-crowd effect on social networks to make predictions. In this paper, we argue that wise crowds do not always function in the event of social contagion. Two dimensions quantify social contagion effects: intensity and extensity. We take the approach of predictive analytics and identify three network characteristics—argument diversity and sentiment diversity (to model intensity of contagion) and tree size (to model extensity of contagion)—to predict when the wisdom of the crowd disappears. The context of our examination is the prediction of stock returns of initial public offerings (IPOs); the loss of crowd wisdom is manifested as an abrupt change in stock returns. Our social network data come from StockTwits. We extract 18 million tweets for 859 IPOs launched between 2008 and 2016, corresponding to 177,053 firm-week observations. Based on the results of logistic regression and multinomial logistic models, we find that a network comprised of large trees and posts with similar arguments (or sentiment) leads to a loss of crowd wisdom, and that these factors increase the predictability of an abrupt change in stock price (e.g. crashes and jackpots) in the subsequent week. Further, we assess predictability levels and measure the predictive power of the models with out-of-sample predictions to confirm the practicality of our developed models. Theoretically, our paper identifies boundary conditions for when researchers shift the application of wisdom of crowds from offline to social networks. Practically, our findings advise practitioners not to routinely attribute superiority to the crowd when harnessing social network data to advance their predictions.

Keywords: wisdom of crowds, social networks, social contagion, intensity, extensity

### **Workshop Presentation**

Information System Department Workshop – City University Hong Kong 2020

## Future Intentions for this Project

Targeted journal submission: *MIS Quarterly (A\*, FT45) – Top Information System journal*

Targeted submission timeframe: *December 2020*

## Summary of Outcomes and Benefits

### **Key Contributions**

Our study contributes in two ways. First, given the richness of discussions on social networks, practitioners often advocate for the “online wisdom of crowds.” In contrast, the host of the Bloomberg Podcast Masters in Business, Barry Ritholtz, published an article titled The “Wisdom of Crowds” is not that Wise (Ritholtz 2015), which suggests that the wisdom of crowds may fail because people do not hold special individual knowledge. He mentions that groups of people tried to guess the outcomes of events such as the Greek referendum and the 2004 Iowa primary, but failed, because they merely drew on public polling data and did not have any individual knowledge. These people “act[ed] more like a focus group than a crowd with specialized knowledge” (Ritholtz 2015, p. 2); in other words, Ritholtz is concerned about diversity.

Our findings extend Ritholtz’s discussions. People in crowds do not contribute any specialized knowledge to discussions. As Ritholtz suggests, people do not have any individual knowledge. However, it is also possible that social contagions occur. When people in crowds are too highly interdependent, this leads to consensus thinking involving poor judgment and biased emotions, which contributes only similar ideas to discussions. On the surface, both low diversity and low independence can cause the problem of little specialized knowledge. Because our study is predictive in nature, we do not test which of these two explains the loss of crowd wisdom. However, we consider low independence a more valid explanation, because a large tree is associated with a high likelihood of loss of crowd wisdom, and a large tree is associated with low independence but not low diversity.

Second, IT firms are often responsible for solving complex problems, such as user experience design and innovation creation. One approach for navigating these problems is turning to social networks to ask a large number of people for their opinions and suggestions, and then combining these to form the best overall decision. The past decade has witnessed a trend in some IT firms, referred to as “idea-friendly” firms, to unleash the wisdom of crowds. Successful examples include IBM and Valve Software. IBM developed a platform, ThinkPlace, to enable hundreds of thousands of IBM employees to originate ideas. Other employees can join in with questions, comments, or suggestions at any time. Valve Software gave control to employees to propose ideas about the game’s goals, strategy, logic, and key elements running behind the features (Power 2014). Despite their success, our study draws the attention of these firms to their blind spot—the crowd’s collective wisdom may turn to unintended ignorance. Crowds are wise at times, and unwise at others. Given that wise crowds should evolve organically, in practice, firms should not intervene in employees’ discussions, and thus, there is no preventive measure to stop the formation of mobs. Our study provides actionable guidelines to predict the occurrence of mobs. When a large number of employees mention an innovation idea, firms should check whether employees support the idea with like arguments, and whether employees express similar emotions regarding the idea. This would help firms to assess the situation prudently, rather than see wise crowds fail spectacularly in producing value-added ideas.

### **Major Benefit of the Research Grant**

Tweet data will be obtained via a private license granted by Stocktwits Inc. (applicants already obtained). Media will be our major control variable, which is sourced from a private license with Thomson Reuters News Analytics, via Sirca (again, applicants already obtained). However, unpacking these two databases into usable format requires help from programming specialists, because these databases are provided as a big tape and was coded in JSON format. *The financial assistance in programming and research assistance from this grant has greatly assisted our data processing.*

---- **End of Report** ----