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Network interdependency between social media and stock trading activities: Evidence from China

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HIGHLIGHTS

- Investigate the relationship between the interaction intensity and stock trading.
- Stocks with high RRO accompanied with low statistical VPT.
- The lively discussion in microblog network does not cause the VPT fluctuation.
- RRO plays a significant role in inverting the u-shaped relationship with VPT.

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ABSTRACT

The emergence of social media accelerates the research on information dissemination and its corresponding influence on trading tendency. Based on empirical study of the dynamic relationship between the ratio of re-post microblog and original microblog (RRO) and average volume per transaction (VPT), we find the following results: (1) In microblog network, stocks with high RRO are often accompanied with low statistical VPT; (2) When the discussion about one stock is quite lively in microblog network (such as the blog postings reach a summit), it does not statistically cause the fluctuations of VPT of the stock; (3) Overall speaking, RRO plays a significant role in inverting u-shaped relationship with VPT.

1. Introduction

In the past few decades, the development of the Internet has made great changes in the information gathering, processing and interaction. The emergence of internet-based social media makes the data of information dissemination process, which are never recorded or difficult to acquire in the past, can be obtained. And the data make the empirical research about the information transmission process in the stock market and its impact on dynamics characteristics of asset pricing become possible. Microblog, as one of reprehensive social media, attracts attention for its explosive growth. As of November 2013, Twitter has 230 million monthly active users, 100 million daily active users.[1] At the same time, Sina Weibo, as the microblogging web-site dominator in China, has 500 million registered users and 46.2 million daily active users.[2] As the social network platform, there is no doubt that information interaction in microblog network has exerted a considerable effect on the stock markets.

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1 http://www.sec.gov/archives/edgar/data/1418091/000119312513431301/d564001d424b4.htm#toc, IPO Prospects of Twitter Inc.,11/7/2013.

2 http://News.xinhuanet.com/newmedia/2013-02/21/c_124369896.htm, 'The number of Sina Weibo users have increased dramatically, exceeding 500 million',2013.2.21.

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Microblog, as an emerging social network, is quite different from the traditional media in two aspects. Firstly, information published by traditional media like newspapers, televisions or web portals is authoritative and investors only can receive information. The data recorded by traditional media, such as clicks, reveal the diffusion, but not the interaction process among the investors. Secondly, microblog users cannot only publish and receive information but also execute trades in the stock market, while traditional media cannot. The overlap between these two networks makes the interaction data from microblog more valuable.

There are many empirical studies which contribute to the relationship between microblog and financial market in recent years. These studies use data mining or sentiment analysis to analyze the relationship between the microblog information and stock price, demonstrating that the microblogging network can provide stock price forecasting with useful information. It is well known that information interaction changes the investor's expectations, prompted investor to trade, and affect stock price through trading ultimately. Previous studies ignore the effects of information interaction on investor's trade behavior but concentrate on stock price directly, and the results of these studies tend to be lack of economic implication. Therefore, the rationale of our study is two-folds. Firstly, we focus on the microblog and investors' trading behavior rather than the study on microblog and stock prices. We conduct a research on the influence on trading intensity of stock market by information interactions. Secondly, no empirical studies have been conducted on the emerging market, i.e., the Chinese stock market. The Chinese stock market is quite different from the developed stock market, with the characteristic of dominated by individual investor. Hence, the interaction between social media and stock market is more likely to strong.

2. Literature review

Many studies suggest that information extracted from social media can be used to predict stock prices. Antweiler and Frank [1] firstly find that the bullishness of the information content of internet stock message board has a statistically significant but economically small impact on future stock returns. About the microblog network, Bollen et al. [2] finds the accuracy of Dow Jones Industrial Average predictions can be significantly improved to 86.7% from 73.3% previously with 'Calm index' which is extracted from Twitter message by Google-Profile of Mood States. This result is also confirmed by Tayal and Komaragiri [3], Zhou et al. [4], Nuno Oliveira et al. [5], Oh and Sheng [6], Zhang et al. [7]. However, all these conclusions are based on a high accuracy semantic analysis technology. As Bollen et al. [8] suggest, sentiment index of microblog can capture the significant social events, but the most fluctuation of the stock index can be explained by other financial indicator, such as the simultaneous volume [9] or the previous index fluctuation [10], rather than the social events. Moreover, Chyan and Lengerich [11] find that the stock-chasing agent with sentiment index from Bollen et al. [2] compared with the one without the index has a higher accuracy but lower yields. The reason is that the wrong predictions often cause extreme losses. Zhang et al. [12] advocate the search frequency of stock name in Baidu Index as a proxy for investor attention proving that the social media information can enhance the speed of information dissemination and make the market efficient. Zhang et al. [13] employ the number of news appeared in Baidu News as proxy for Internet information arrival and explain the volatility clustering.

Due to the limitations of sentiment analysis, more and more scholars study the relationship between microblog network and stock market using aggregate data of microblog. Evangelopoulos et al. [14] validate that an aggregate of Twitter messages can be used as a predictor of future stock prices of publicly traded companies. Sprenger et al. [15] Using similar methods found that stock microblogs can claim to capture key aspects of the market conversation. Based on aggregate microblog data, Vincent and Armstrong [16] make a warning signal of dollar/euro exchange rate for forecasting the turning point of exchange rate fluctuation. The literatures above abandon the sentiment analysis method, using aggregate microblog data for financial markets study. However, these studies have two limitations. Firstly, these studies just focus on the impact of microblog contents for investors without regard to the information interaction. Secondly, we can conclude that more and more scholars focus on the influence to stock market by micro data rather than mainly regarding sentiment as control variable.

Ruiz et al. [17] regard hashtags, tweets, users and URLs as nodes, the called relationship as link to build stocks microblog interactive graph, and used the aggregate data of microblog network and interactive graph data collection and stock market data regression respectively. Ruiz et al. [17] find that there is a significant relationship between the stock market index and interactive graph data "the number of connected components", which is significantly higher than the whole network data (number of microblogs, users, etc.). Ruiz is the first one who focused on the user interaction process (users connect with each other through other content) and the relationship with the return on the stock market. However, its empirical conclusion indicates, the number of connected components, has no clear economic meaning, which fails to combine with the social interactive network theory. Moreover, his research focuses on the yield forecasting, and does not set out to investor trading behavior, which is affected directly by the information interaction.

3. Data

3.1. Capital data

We chose the Shanghai Stock Exchange 50 Index (SSE50) constituent stocks as the research sample in this paper. SSE50 index is composed of 50 representative stocks, which hold the characteristics of big market capitalization, high liquidity