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Brokers' financial network and stock return

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ABSTRACT

Brokerage firms are usually not only known for trading stocks for their retail clients in return for commission fee but also known for being information distributors of their clients' investment recommenders. However, only a few studies have examined investors' trading behaviors within a brokerage firm. This study proposes a financial network model in modeling the information diffusion process of investors within brokerage firms and investigates the potential effect of interconnectedness among brokerage firms on stock returns. We find that the centrality of brokerage firms has strong explanatory power to stock returns even if we control for the Fama–French pricing factors and other characteristics of stock.

1. Introduction

In the past decades, network research has appeared in almost aspects of science and technology, especially in physics, sociology, and computer science. The study of networks in finance has also attracted the interest of researchers applying the financial network model in studying issues such as cascading effect, systemic risk, and interbank collateral debt obligation in market.[1] However, only a few studies have examined investors' trading behaviors within a brokerage firm. In this study, we propose a financial network to model the interconnectedness of brokerage firms in investigating the dynamic information diffusion among investors and the potential effect on stock returns.

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[1] Allen and Gale (2000), Billio, Getmansky, Lo, and Pelizzon (2012), and Chuang and Ho (2013), etc.

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In the literature of financial network, most existing studies have proposed a method to define the linkage by examining each pair of investors' trading motives during a short time period. However, this definition is not applicable to define the linkage for brokerage firms in the current. As much investors' trading information is concentrated within a brokerage firm, having the same trading on a particular stock for two brokerage firms at the same time is easy. In this situation, a fully connected network in which all brokerage firms are connected to each other can be obtained. Therefore, the conventional method to define the linkage is unadaptable in conducting the financial network for brokerage firms.

Instead, we define the linkage of brokerage firms using the multivariate vector autoregressive (MVAR) model to construct the financial network of brokerage firms based on the analysis of their dynamic interactions. We assume that if one brokerage (say b_1) firm's time-t portfolio return, r_1^t, can be predicted by other brokerage firms' (say $b_2, \ldots, b_k$) lag-$t-1$ portfolio returns, $r_2^{t-1}, \ldots, r_k^{t-1}$, then linkages exist from $b_2, \ldots, b_k$ to b_1. The linkages can be viewed as the dynamic information diffusion process among brokerage firms. Our goal is to determine whether the time-$t-1$ information diffuses from the brokerage firms $b_2, \ldots, b_k$ to the brokerage firm b_1 at time-t. The portfolio returns of brokerage firms $b_2, \ldots, b_k$ at time-$t-1$ can become significantly correlated with the portfolio return of brokerage firm b_1 at time-t in the MVAR model.

The definition of "link" in this study is different from that of Ozsoylev, Walden, Yavuz, and Bildik (2014), who define the connection between each pair of investors as two agents trading the same stock in the same direction in a short period. It is also different from that of Pareek (2012), who defines link as two fund managers allocating 5% or more of their portfolio to the same stock being connected to each other. The network structure can be inferred and identified by the Granger-causality test. We consider the data set of brokerage firms' trading records rather than the account–level data set in this study. The reason is that most investors existing in stock markets are usually illiquidity traders, i.e., they do not trade frequently but buy-and-hold for a period of time. Therefore, tracking these investors' trading behaviors may be irrelevant in constructing a financial network and even cause an estimation bias, as shown in Gomez-Rodriguez, Leskovec, and Krause (2012), where the exact maximum likelihood estimation is not feasible for this kind of large network of investors. The interconnectedness among broker firms we define here can reflect both statistical correlations and economic connections in the multivariate time series sense.

Our empirical study is conducted using a data set that consists all of the brokerage firms' daily trading information from January 2, 2004 to February 25, 2011 in Taiwan. During the sample period, 95 brokerage firms were recorded, and 1330 stocks were traded. The data set has detailed information on order types (buy or sell), daily total trading amounts, and average price of stocks traded by each brokerage firm. After constructing the financial network of brokerage firms, we calculate each brokerage firm's network centrality to identify the relevant nodes within the financial network. We argue that if one particular brokerage firm's centrality is relatively higher than others, then some investors' trading within this particular brokerage firm motivates other brokerage firms' investors trading and causes the information cascading effect. These trading leaders are regarded as information–advantaged investors in the market, and thus they are more likely to affect stock returns in the market.

In our regression analysis, we find substantial support for a significant relationship between financial network centralities of brokerage firms and cross-sectional stock returns. When a brokerage firm has more connections with other brokerage firm in a short period of time, the status of information diffusion is in the beginning of momentum. Therefore, the short-term centrality of brokerage firm tends to have a positive effect on stock returns. When a brokerage firm has more connections with other brokerage firm in a long period of time, the status of information diffusion reaches the ending of momentum in the market. Therefore, the long-term centrality of brokerage firm has negative impact to stock returns. The empirical result satisfies the conjecture of the theoretical model in Walden (2014) and can be supported by recent studies on the effect of social networks. The study indicates that central investors in the network tend to access more information and trade earlier in the right direction than peripheral investors.

The remainder of this paper is organized as follows: Section 2 reviews the related literature. Section 3 describes the details of our data set and methodology in constructing the financial network of brokerage firms. The main empirical results are presented in Section 4. Section 5 concludes.