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Research on the Drivers Behind GameStop's Price Surge: Retail or Institutional Investors?

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Abstract: Traditional thinking holds that institutional investors play a dominant role in driving stock price changes. However, the sharp rise in GameStop's stock price in January 2021 challenged this conventional view, drawing academic attention to the possibility that retail investors can also lead stock price fluctuations under the influence of social media. Using the VAR model, the impact of trading on prices can be divided into information transmitted to the market through trading and non-information factors, such as noise and sentiment. This study aims to examine the influence of institutional and retail investment on stock price returns during this event. The empirical results show that after removing the impact of noise on stock prices, the same transaction volume from retail investors has a far greater permanent impact on prices than institutional investors. Unlike the information trading hypothesis, which suggests that informed trading constitutes a larger proportion of investment volume, the findings support the view that advancements in social platforms and emerging stock trading technologies compensate for retail investors' informational disadvantages, thus demonstrating a more significant influence in this event.

Keywords: VAR model, retail trading, informed trading, noise.

1. Introduction

Over the past three decades, information and communication technology has profoundly transformed the operations of financial trading platforms. Advances in trading system technology and policy changes have led to a surge in global trading venues, which have become competitors to traditional stock exchanges. This has expanded the total volume of securities transactions and attracted more retail investors to the stock market. The GameStop incident in October 2021 provides a valuable case study for analyzing the differing trading behaviors and strategies of retail and institutional investors in the information age, as well as their impacts on stock prices.

This study aims to test the impact of institutional and retail investors on prices within the framework of the information trading hypothesis. The information trading hypothesis posits that information revealed to the market through trading is a major component of price movements [1]. The price changes caused by the information implied in trades are permanent, as they disclose new information about the company. In contrast, uninformed trading has a temporary noise effect on stock prices [2]. Past literature often affirms the role of institutional investors in influencing prices, attributing this to their superior information due to scale effects. Conversely, retail investors seem less rational, and their investment decisions may be influenced by psychological biases and cognitive

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distortions [3]. However, social media has revolutionized how retail investors access information [4]. It is hypothesized that, in this event, retail trading revealed more information to the market.

Short squeezing is generally recognized as a cause for price increases. Shorting institutions, having noted GameStop's weak fundamentals over the past three years, anticipated a further decline in stock prices and thus engaged in large-scale short selling. It is estimated that short sellers had sold and committed to deliver 260% of the issued stock to buyers. A large number of retail investors on the Reddit platform noticed the excessive scale of shorting, held long positions in the stock, and combated large funds associated with GameStop, ultimately causing the stock price to increase by 21 times. This situation resulted in substantial losses for institutional investors due to the short squeeze. Retail investors accessed stock information via the social platform Reddit and bought stocks through trading platforms, revealing information to the market and causing a permanent change in stock prices.

A sample of 138,198 high-frequency trading data from GameStop was utilized, spanning 19 trading days from January 4 to January 29, 2021. The study employs a VAR model to validate the permanent effects of institutional and retail investments on prices. The VAR model is advantageous because it considers the significant interdependencies between variables and their serial correlations. Additionally, it allows for the decomposition of price movements into long-term and short-term impacts, which facilitates our comparison of the information embedded in the trades by retail and institutional investors that could permanently influence prices.

This research has several potential contributions. First, in the literature on decomposing information in stock price movements [5], decomposition is performed based on the type of investor. Second, regarding the literature on the role of retail investors [6], empirical evidence is provided to support the argument that, in the information age, retail investors can bring more information to the market rather than merely generating noise. Third, in terms of research on noise [7], this paper offers a straightforward method for decomposing noise and information within price movements.

2. Methodology

2.1. Data Description and Statistical Indicators

In this study, following past research [8][9](Callen and Segal, 2004; Lochstoer and Tetlock, 2020), a single transaction amount that accounts for the top 5% of all transaction volumes is defined as institutional investor activity, while the rest are classified as retail transactions. This definition is based on the understanding that institutional investors typically engage in transactions of larger amounts compared to retail investors. The paper chooses a one-minute interval to study the relationship between price changes and transaction volumes within each minute.

The core variables of this study are threefold: Stock Price Change (Return), Institutional Investment Volume (InstVolume), and Retail Investment Volume (RetailVolume). The Stock Price Change (Return) is calculated as the difference between the current transaction price and the previous transaction price. For Institutional Investment Volume (InstVolume), it represents the net value within the time interval, calculated by subtracting the selling amount from the buying amount of institutional investors. Similarly, Retail Investment Volume (RetailVolume) is the net value calculated by subtracting the selling amount from the buying amount by retail investors.

This approach allows a detailed examination of the dynamics between trading volumes by investor type and stock price movements, offering insights into how different trading behaviors impact the market. This analytical method provides a basis for understanding the market effects of trades by institutional versus retail investors, which is essential for testing theories related to information dissemination and market influence in high-frequency trading environments.

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Table 1: Statistical Description

	count	mean	std	min	25%	50%	75%	max
InstVolume	7144	267951	6832470	-162664519	0	0	16864	443581881
RetailVolume	7144	-24091	736815	-13770914	-57753	-1905	31781	7840173
Return	7144	43	4313	-57010	-80	0	110	178000

2.2. Model Design

$$\text{Return}_t = \alpha_0 + \sum_{i=1}^{76} \left(\beta_{i1}\text{Return}_{t-i} + \gamma_{i1}\text{InstVolume}_{t-i} + \delta_{i1}\text{RetailVolume}_{t-i}\right) + \epsilon_{1t} \quad (1)$$

$$\text{InstVolume}_t = \alpha_1 + \sum_{i=1}^{76} \left(\beta_{i2}\text{Return}_{t-i} + \gamma_{i2}\text{InstVolume}_{t-i} + \delta_{i2}\text{RetailVolume}_{t-i}\right) + \epsilon_{2t} \quad (2)$$

$$\text{RetailVolume}_t = \alpha_2 + \sum_{i=1}^{76} \left(\beta_{i3}\text{Return}_{t-i} + \gamma_{i3}\text{InstVolume}_{t-i} + \delta_{i3}\text{RetailVolume}_{t-i}\right) + \epsilon_{3t} \quad (3)$$

This study employs a VAR model to validate the permanent effects of institutional and retail investments on prices, following the proposed permanent-transitory decomposition [10]. The VAR model is used to examine how stock price returns respond to three shocks: (i) historical price changes, (ii) transaction volumes of institutional investors, and (iii) transaction volumes of retail investors. The advantages of the VAR model include: (i) accounting for significant time autocorrelations and interrelationships between stock prices and transaction volumes, (ii) facilitating the decomposition of price changes into effects attributable to institutional and retail investors, and (iii) focusing on the information embedded in transactions by both types of investors, with the VAR model helping us to eliminate the temporary impacts of noise on prices. Conventionally, the lag order of the VAR model is determined by the Akaike Information Criterion to be 76 periods.

3. Empirical Results and Analysis

Table 2: Impulse Response Analysis Results

After t periods	Institutional trade volume	Retail trade volume	Price return	Cumulative impact on price
0	10000	0	0	0
1	75.559576	-5.185478	-0.222348	-0.222348
2	1.711653	-1.725875	-0.124009	-0.346357
3	-0.460992	-0.906156	-0.037581	-0.383938
4	-1.719114	-0.671863	-0.014672	-0.39861
5	-0.818015	-0.642153	-0.003862	-0.402471
...	...	...	...	...
996	0	0	0	-0.404559
997	0	0	0	-0.404559
998	0	0	0	-0.404559
999	0	0	0	-0.404559
1000	0	0	0	-0.404559

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After estimating through the VAR model, impulse response analysis is utilized to explore the permanent impacts of retail and institutional investors on prices. A scenario is set where, at time point 0, the investment amounts from both institutional and retail investors suddenly increase by $10,000. This initial increase affects the price returns and influences the investment amounts of institutional and retail investors in the following period. As time progresses (with an increase in t), the price returns gradually approach zero. To measure the total impact caused by the change in institutional investment at time 0, the price returns from time t and all prior periods are summed to calculate the cumulative impact on the price. This cumulative impact eventually stabilizes at a fixed value, indicating the permanent effect of the initial shock on the price.

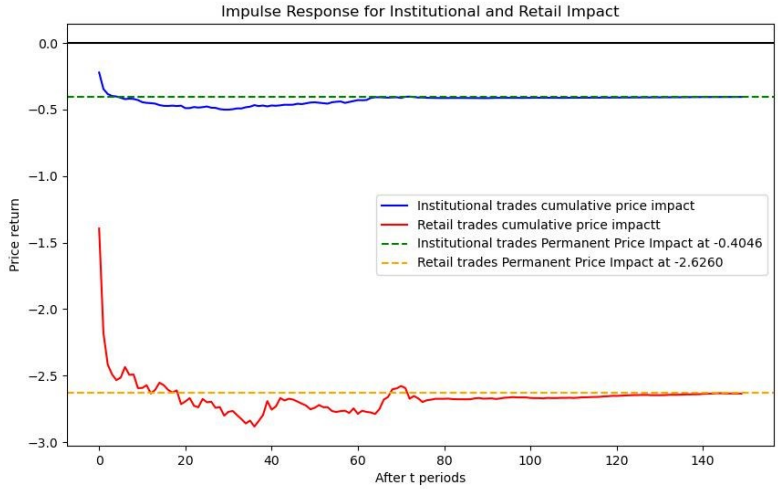

Figure 1: As time progresses, the impacts of institutional and retail investors on prices change

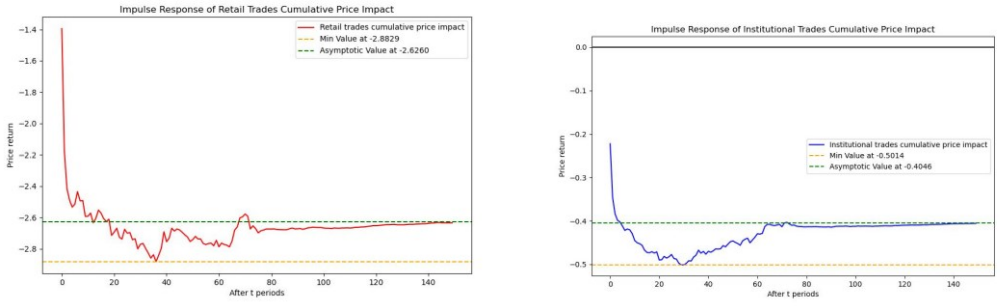

Figure 2: both the long-term and short-term effects of trades made by retail and institutional investors

In the analysis of the cumulative impacts of the same amount of investment by institutional and retail investors on prices, two charts are presented, with the cumulative price impact curves of institutional investors represented by a blue line and those of retail investors by a red line. Both charts show that prices initially drop to a low point (marked by a yellow line) and then gradually recover. Eventually, the prices tend to stabilize at a fixed value (marked by a green line). This difference can be attributed to short-term factors such as uninformed trading, market noise, herd behavior, and overreaction.

In the charts, the final stable value for institutional investment (green line) is noticeably lower than that for retail investment (yellow line). Compared to institutional investments, the permanent impact of retail investments on prices is significantly higher, with the permanent price effect of retail

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investments being -2.626, while that of institutional investments is only -0.4046. This finding underscores the significant role of retail investors in influencing market prices, especially in large-scale market events.

4. Conclusion

The GameStop stock surge incident has drawn attention to the role of retail investors in the securities market amid social media revolution. By using the VAR model, the permanent effects of retail and institutional trading on stock prices were successfully identified. Empirical findings revealed that a sudden purchase of $10,000 in GameStop stocks by retail investors could result in a permanent price impact of -$2.6260 per share, far greater than the -$0.4046 per share permanent impact caused by the same amount of institutional investment. Of the effects of retail investment on prices, 8.91% can be explained by noise, whereas 19.31% of the institutional investment's impact on prices can be attributed to noise. Overall, in the GameStop case, the substantial information brought to the market by retail trading through transactions is the main driver of the price increase.

The main limitation of this paper is reflected in the method of identifying institutional investors. Distinguishing institutions from retail investors based on the size of individual orders may incorrectly identify small trades of institutional investors as retail or recognize large transactions formed by multiple retail transactions on a trading platform as institutional, which could lead to biased conclusions. For more robust results, future research could collect more information on transactions and use more efficient identification strategies.

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