

The Impact of Trading Volume on Stock Price Volatility

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Abstract. In the capital markets, research on the impact of market trading volume on asset prices and returns has been ongoing since the 1960s, and remains a focus of attention for scholars and investors both domestically and internationally. Studies on the relationship between volume and price primarily concentrate on the volatility of stock prices in relation to trading volume, and the correlation between stock return rates and trading volume. In empirical research on the volume-price relationship, the main theories are inseparable from the study of market information. Trading volume encompasses the market's reaction speed to information and the extent of information's impact on the market, which are significant reasons why trading volume can affect stock market prices and returns.

Keywords: trading volume, stock price, impact.

1. Introduction

Trading volume is an important factor affecting the price volatility of financial assets. Anyone familiar with stocks knows that, in the capital market, the technical curves that form stock prices are often misleading and manipulable, but trading volume is not deceptive. Even Wall Street in the United States has many proverbs about trading volume, indicating that volume is not only a key feature of bull and bear markets but also a leading indicator that guides the analysis of price movement trends.

This paper expands upon the summaries of predecessors [1], suggesting that high trading volume research on stock returns has the following practical significance:

The study of the relationship between high trading volume and stock returns can help us deeply understand the microstructure of financial markets. The core of financial market microstructure theory is to explain the price formation mechanism and outcomes of financial assets under a given market microstructure. During the process of studying the volume-price relationship, researching different market influencing factors can help us distinguish assumptions of different market microstructures and analyze the formation process and outcomes of stock prices.

The most fundamental characteristics of capital market operation are trading volume and price, which are also the focus of stock technical analysis. The core theory of technical analysis posits that stock prices are determined by supply and demand relationships, with trading volume being one of the most direct indicators reflecting market supply and demand; this paper's research supports the importance of trading volume in technical analysis and offers reasonable explanations and arguments for changes following high trading volume.

Moreover, the study of the relationship between high trading volume and asset returns can effectively guide investors in decision-making analysis. Whether from the perspective of short-term or long-term investment, it is necessary to thoroughly understand the impact of trading volume on price volatility to further judge the investment direction when significant changes in trading volume occur; furthermore, many current models studying the volume-price relationship can be used to estimate the impact on returns when trading volume fluctuates.

The research on the relationship between high trading volume and asset returns is not only applicable in the stock market but also holds guiding and explanatory significance in the foreign exchange market, futures and options market, financial derivatives market, and other financial product markets.

2. Literature review

The earliest foreign research on the relationship between volume and price dates back to 1959 when Osbome [2] established a model to empirically study the correlation between trading volume and absolute price changes, revealing a positive correlation between the two in his conclusions. This study sparked the interest of many scholars and led to the gradual development of different theoretical systems and a variety of models in subsequent research on the volume-price relationship. These studies have made significant contributions to the development of theories on the microstructure of financial markets and have paved the way for future research.

The main theories can be divided into two categories according to the research by Manlyn and Robert [3]. The first category is centered around information-based theories, while the second category looks at the market perspective, studying the impact of events on market investors' psychology and trading behavior, known as the visibility hypothesis.

Regardless of the category, the entry of new information is a key point of research. The difference lies in the individual's perception of information and the research perspective of the theory. Ultimately, all theories revolve around the study of information's impact on volume and price. Among them, information theory models are currently the mainstream theoretical models revealing the relationship between trading volume and price fluctuations, and are among the earliest formed and most developed theories internationally. The main theoretical models include: "Mixture Distribution Hypothesis (MDH), Sequential Arrival of Information, Differences of Opinion model (DO), and a framework in Noisy Rational Expectation Equilibrium."

The Mixture Distribution Hypothesis (MDH) is the most widely disseminated theory to date. Its core idea posits that information is a common factor affecting both trading volume and price. When new information enters the market, both price and trading volume will fluctuate simultaneously, and both are positively correlated with the rate at which information flows into the market. Since both price and trading volume are positively correlated with the rate of information flow, trading volume and price also show a positive correlation.

The Sequential Arrival of Information model has gone through two development phases. Initially, Copeland [4] in 1977 proposed that the arrival of information in the market is a process gradually accepted by investors. Simply put, the dissemination of information takes time, and the acceptance of information by investors is a progressive process. The second phase of development for this model was in 1981 when Jennings, Srarks, and Fellinghaml [5] improved upon the original model, showing that compared to active investors, passive investors tend to trade less when new market information arrives.

The Differences of Opinion model was introduced by Harris and Raviv [6] in 1993. As the name suggests, they believed that both trading volume and expected absolute return rate changes are influenced by information flow. However, the reason for changes in trading volume upon the arrival of information is not due to the gradual diffusion and time transmission effect as in the Sequential Arrival of Information model but because of differing judgments among traders about the received information. Moreover, in the decision-making process, each trader believes their information is correct and trades according to their judgment and application of their asset return model.

Since the 20th century, research on the relationship between volume and price in capital markets has increasingly gained attention. In 2000, Chen Liangdong [7] analyzed the trading volume and price volatility of stocks on the Shanghai Stock Exchange. By analyzing data from 100 trading days over the same period for both A-shares and B-shares, the results showed a very similar volume-price relationship between A-shares and B-shares, with a noticeable positive correlation. In 2002, Wang Chengwei and Wu Chongfeng [8] conducted a Granger study on stock market trading volume and price volatility, with results similar to those of Yan Jinan and Zhang Wei, who used the ARCH-M model for Granger testing. Both studies confirmed a bidirectional nonlinear causal relationship between stock market trading volume and returns, but returns are a linear Granger cause of trading volume.

Although many scholars have proven that trading volume indeed has a significant impact on asset prices in capital markets, a more detailed explanation and specific demonstration of their correlation would be more meaningful.

Many scholars in China have conducted deeper analyses of the volume-price relationship. Chen Yiling and Song Fengming (2000) [9] from Tsinghua University divided trading volume into expected and unexpected volumes and analyzed the empirical results of the volume-price relationship from the perspective of information economics. They pointed out that the previously common belief of a positive correlation between financial asset returns and trading volume was incorrect, and that the two exhibited asymmetry.

In 2002, Song Fengming and Tang Jun [10], focusing on the characteristics of the Chinese stock market, analyzed the volume-price relationship from the perspective of China's stock market information transmission mechanism. Their main views were: 1. The entry of information flow is the main factor affecting changes in trading volume and returns in the Chinese stock market; 2. Different stocks respond differently to information, with small-cap stocks showing more intense reactions in trading volume and price fluctuations. This model, integrating characteristics of the Chinese stock market, established a new information transmission mechanism, providing a more reasonable explanation for the features of the Chinese stock market.

Furthermore, many scholars based their studies on the Mixed Distribution Hypothesis and used the GARCH model to add trading volume to the independent variables to study the volume-price relationship. For example, Gu Lan (2001) [11], Liu Jianhua (2007) [12] used intraday high-frequency data; Zhao Liuyan, Wang Yiming (2003) [13] utilized the EGARCH (1, 1) model with large-cap stock intraday data; and He Xingqiang, Liu Xingyun (2005) [14] applied the EGARCH-GED model for their analysis. These scholars arrived at similar conclusions: models incorporating trading volume data to represent the entry of information flow proved significant correlation between trading volume and price fluctuations.

Recently, some scholars have made innovations on the existing foundation. In 2006, Li Shuangcheng, Xing Zhian, and Ren Biao [15] studied the impact of trading volume on price fluctuations, dividing trading volume into expected and unexpected parts, and derived that unexpected trading volume has a significant impact on the short-term fluctuations of financial asset prices, also finding that favorable news has a greater impact on the market. In 2007, Wu Chaopeng and Wu Shinong [16] defined high trading volume and analyzed its impact on price fluctuations, discovering that high trading volume leads to a reversal in stock price trends. In 2008, Li Qide and Wang Jun [17], using the Shanghai Composite Index as their data selection, confirmed that trading volume fluctuation exhibits an asymmetric "spike-and-fat tail" distribution, and noted that more significant changes in trading volume led to higher speculative returns. In 2012, Wang Caifeng and Sun Xiaoxia in "Posterior Distribution Construction and Simulation in the Analysis of China's Stock Market Volume-Price Relationship"[18] used the Bayesian estimation method of Markov chain Monte Carlo simulation technique, combined with the computer's supercomputing power, to simulate the estimated parameters, solving the difficulty of parameter estimation and indicating the correlation between unexpected trading volume and price fluctuations.

3. Conclusion

In 1975, researcher Epps found during the process of using models to study stock market price behavior that higher trading volumes often accompany better market conditions. Following this discovery, many scientists have successively confirmed a phenomenon in the U.S. stock market: when a stock experiences unusually high trading volumes at a certain trading point, its price tends to rise significantly in the future, generating higher returns. Conversely, if a stock shows extremely low trading volumes, its price may continue to decline, resulting in lower returns. Scholars have proposed various hypotheses to explain this phenomenon, including market positive announcements causing this premium phenomenon, its association with liquidity, and attempts to explain it from the

perspective of return autocorrelation. Many believe that the surge in trading volume draws more investor attention. Theoretically, increased attention alone is not enough to convince investors to buy a stock. However, if high trading volume indeed attracts enough attention, from a behavioral finance perspective, many investors might find reasons to convince themselves to purchase the stock, thus causing significant price increases and generating abnormal returns. This is the more popular visibility hypothesis.

In China, some scholars have also studied the phenomenon of high trading volumes leading to high returns, but their findings differ from international results. Several scholars have selected stocks in the Chinese stock market to build models for correlation analysis, finding that prices significantly rise at the initial stages of high trading volumes. However, unlike international findings, this significant increase only lasts for a short period, and the return rate tends to decrease after about 20 days. The reasons behind this phenomenon are manifold, possibly due to information asymmetry, imperfections in China's market operation mechanisms, hidden market manipulation, or the result of games between institutional and retail investors. In summary, research into the impact of high trading volumes on stock market returns, compared to many other influencing factors, is still not deep enough and requires further investigation.

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