

# Research on the Factors Affecting Stock Price Volatility

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## ABSTRACT

Under the influence of the Covid-19, the economies of all countries were affected to varying degrees, particularly on the domestic stock market. Consequently, equity price volatility will be researched, primarily by studying factors affecting volatility. This paper is mainly divided into four aspects of research, first, through the monthly return standard deviation, distribution skewness, and other basic indicators are analyzed, emphasizing the importance of technical indicators to research stock price volatility. Thereafter, it is found that the emergence of social unrest events has a positive impact on the volatility of stock returns. Finally, it is concluded that macroeconomic conditions (GDP and industrial productivity) and international aspects (oil price volatility and financialization of commodities) positively correlate with equity price volatility. Volatility is influenced by numerous factors and cannot be discussed in isolation. Therefore, although we discussed four factors, there are hidden factors that were not considered.

**Keywords:** Volatility, Stock return, Financial liberalization, Macroeconomic

## 1. INTRODUCTION

Volatility is the fluctuations of the market and is one of the most basic characteristics of the stock market. The important factor of volatility is falling markets. The reasons why a market decline leads to volatility include simple leverage reasons, yet aside from this simple mechanism, after a market decline, volatility usually rises temporarily before it falls again. In recent years, stock volatility has had a big impact on the market. Economic information can have a greater impact on stock market volatility. Beak et al. found that COVID-19 news can significantly affect volatility, especially negative news[1]. Under the global environment of the changing international policies and the great impact of the COVID-19 on the economy, research on stock market volatility becomes more important. Therefore, the study of stock market volatility can relatively reduce the risks investors may face.

This paper studies four aspects. It discusses the importance of technical indicators in studying stock market volatility, the impacts of different events and crises on stock volatility, the influence of stock price

volatility of macroeconomic regulation, and the effects of international factors on equity return volatility.

## 2. TECHNICAL INDICATORS

When studying the influence of stock market volatility, the technical index is a very important research target. Technical indicators, including stock volatility and return rate in the stock market, are indispensable, as these indicators can help investors measure the correct direction of predicting the stock trend. Through the analysis of volatility and other technical indicators, investors can have a clear and intuitive understanding of the stock market, to quickly and accurately seize investment opportunities in the complex market. Good use of technical indicators can also enable investors to effectively avoid risk, allowing investors to timely stop losses and take corresponding remedial measures in an adverse environment. This paper studies the analysis of technical indicators in previous literature and summarizes the research and results of technical indicators on stock market volatility.

## **2.1. Explanation and measurements of volatility**

Volatility can be measured by different methods, which include the standard deviation of returns, the difference between high and low stock prices, and the Parkinson formula and GARCH. Qammar et al. made a comprehensive review, analysis of the significance of stock price volatility in literature, as well as its different measurement methods. It discusses the different types of stock price volatility, and various predictions and empirical measures of stock price volatility[2]. It also studies two reliable methods for measuring volatility, and the purpose of the two methods is to introduce explicit revenue variance modeling. When the return is expected and risk is uncertain, risk and return are positively correlated. There is a negative correlation between realized return and uncertain volatility.

## **2.2. Traditional Technical Indicators**

Additionally, evidence on the impact of trading patterns on the volatility of individual stocks supports the tax-loss-harvesting and behavior models, with volatility rising when trading in losing stocks and winning stocks. Agapova and Kaprielyan studied the impact of market and individual security's volatility on stock trading, as well as the relationship between stock volatility and trading behavior[3]. Hibbert et al. proposed the behavioral explanation of the return-volatility relationship which focused more on the short-term dynamic study of the return-volatility relationship[4]. Under the tax-induced motivation, losers of abnormal trading volume are positively correlated with stock market volatility. By using the standard volume event method, the cumulative abnormal volume (CAVL) of logarithmic transformation is estimated. According to the return grade stocks and the volatility of the previous month, it makes a double ranking of stocks and proves that the volatility of individual stocks should play a major role in the decision of executing trading strategies. Nevertheless, through the study of the dynamic correlation between the change of return rate and the change of volatility, it is found that the two are negatively correlated in the short term and the impact on their asymmetric effect. Hibbert et al. reviewed previous studies that negative changes in returns are associated with positive changes in volatility and asymmetric effects are more pronounced under negative changes in returns[4]. Thus, it is found that there are two theories to explain this relationship, namely the leverage hypothesis and the volatility feedback hypothesis, and both explained the long-term return-to-volatility relationship.

## **2.3. Innovative Model Research**

Moreover, the stock price volatility and stock premium close to the historical value are studied through the dynamic equilibrium model of stock price. Brennan

and Xia studied the effect among dividend growth rate, stock price volatility, and investor's return rate[5]. The non-observability of the expected dividend growth rate introduces a learning factor that increases stock price volatility. It shows that through the distinction between equity holders receive cash flow and total consumption, and by allowing for studying a random but unobservable dividend growth rate. This could produce a representative, agent model and the rational behavior of stock price series in the first two moments closely match the historical sequence of prices, yet this is the relatively steady series consistent dividend behavior and consumption. Furthermore, information about growth rates and consumption volatility is found to have a sensitive impact on the long-term expected growth rate. Bansal and Yaron explained how information about growth rates and economic uncertainty, i.e., consumption volatility, changes perceptions of long-term expected growth rates and consumption volatility[6]. It is proved that the volatility of the large and small equity premium, the risk-free rate of interest, and the market rate of return, the risk rate, and the dividend yield. It detects the negative correlation between return news and returns volatility news. They proved that dividend yield can predict returns and the volatility of returns varies with time. Asset prices are sensitive to news of small growth rates and consumption volatility when information about consumption has a significant impact on long-term expected growth rates or consumption volatility.

Therefore, by using different methods to measure volatility, it can be found that the positive correlation between expected return and uncertain risk, and the negative correlation between realized return and uncertain volatility. Meanwhile, it studies the effects of market and individual stock volatility on stock trading, as well as the relationship between stock volatility and trading. It is also found that the return rate can be predicted by dividend yield, and the return rate volatility is changing with time. Thus, investors are susceptible to emotional influence when making important decisions and fear increases volatility in returns when markets fall and exacerbate asymmetric effects. Based on the analysis of consumption, dividends, interest rate, stock price, and other indicators, the paper also studied the dependence of dividends volatility on the uncertainty of the growth rate. The studies on these technical indicators provide the basis for the following analysis.

## **3. EVENT FACTOR**

Market crisis, political risk, and major public events may all have some impact on the volatility of the stock market. This part of the paper will be analyzed and discussed separately in combination with specific events.

### **3.1. Market crisis**

The frequency behavior of stock returns to non-crisis and crisis periods is distinguished. Akter and Nobi investigated the financial data of 377 stocks in S&P 500 Index from 1998 to 2012 by measuring realized stock returns and realized volatility and studies the normal distribution and distribution frequency between daily stock return rate and volatility. During these periods, the market was affected by various crises. By comparing the distribution of stock return rate and volatility, the frequency behavior of stock return to non-crisis period to crisis period is revealed. The frequency or normal distribution of the daily stock return methods, which clearly show the fat-tail and kurtosis behavior of market prices fluctuations, are good indicators of market risk[7].

Furthermore, during the Great Depression, the standard deviation of stock returns was two to three times that of any time in American history. Cortes and Weidenmier used a series of new building permits and levers to study this problem. The results show that the volatility of economic growth and financial leverage can largely explain the high volatility of the stock market during the great depression. The market will consider the possibility of an impending economic disaster. The analysis suggested that future research may test whether forward-looking economic measures, such as construction permits or housing starts, have greater explanatory power in predicting stock fluctuations during periods of severe economic and financial pressure[8].

### **3.2. Political risk**

Interactions exist between politics and finance. Local and global political risks can influence to some extent the volatility of industry returns. Boutchkova et al. examined focused on the industry level, mainly from the dependence on international trade, the complexity of input structure, and labor concentration of industry analysis. The increase in overseas political uncertainty will increase the earnings volatility of export-oriented companies. Industries with complex input structures have more volatile returns to environments with weak contract enforcement. Meanwhile, it found that under left-wing governments and countries with strict labor laws, the returns to labor-intensive industries are more unstable[9].

In addition, based on a sample of 27 OECD countries, Bialkowski et al. investigated whether the national election would increase the volatility of the stock market by paying attention to the stock market fluctuations before and after the national election. It is found that the country component of the variance in index return can easily double in a week, that is, investors are surprised by the actual situation election results. Furthermore, the national elections can be considered as important events

by the participants of options markets. In the upsurge of political changes, options tend to trade at higher implied volatilities. The results are of great significance to the optimal strategies of risk-averse stock market investors and option market participants[10].

### **3.3. Public events**

Major public events, such as COVID-19 in recent years, will impact the volatility of the stock market. Altig et al. studied the economic uncertainty indicators of the US and UK before and during the COVID-19: implied stock market volatility, newspaper policy uncertainty, Twitter about economic uncertainty, subjective uncertainty of business growth, inconsistency of forecasters on future GDP growth; macro uncertainty measurement based on model. There are four results: all indicators show great uncertainty in response to influenza and its economic consequences; the peak amplitude varies greatly; the time path is different: a COVID-19 size uncertainty shock foreshadowed a 12 - 19% decline in industrial production peak. Finally, Altig et al. pointed out that the continued high degree of uncertainty is not a good sign of economic recovery[11].

In general, event factors, including market crisis, political risk, and major public events, are all of the concern when studying stock market volatility, as they all may have some shock on stock market volatility. The findings on these factors have important implications for the optimal strategies for risk-averse investors in stock markets and participants in options markets.

## **4. MACROECONOMIC FACTORS**

Most of the macroeconomic and stock market fluctuations have a reciprocal causal relationship, among which some macroeconomic factors and stock prices have a relatively strong correlation. Each of the emerging markets will be looked at.

### **4.1. Period and research depth**

Engle et al developed the GRAPH-Midas model to distinguish short- and long-term fluctuations and found that the macroeconomic base plays a vital role in the short- and long-term[12]. The relevant fundamentals include mainly two factors: inflation and growth of industrial output. The factors of long-term inflation and industrial output are the same in the sample analysis, which means that they are correlated with fluctuations. On the other hand, Diebold and Yilmaz looked at the wider relationship between stock market movements and the economy as a whole. By analyzing international stock market data from 46 countries, they also proved that fundamental volatility is positively correlated with stock market volatility and that gross domestic product (GDP) volatility leads to stock market volatility. However, the key here is not to study the high-frequency relationship

between return volatility and macro fundamentals, but to study, the average change over time in the international market, which is the financial macro interface. Consequently, this can be interpreted as further exploration of the underlying yield volatility interfaces as well as intermediate frequency fluctuations (e.g., business cycle) [13].

## **4.2. Different market**

### *4.2.1. Developed countries*

The discussion is split between developed and developing countries, the former being developed countries. Abbas et al analyzed the relationship between stock market volatility and macroeconomic fundamentals in the G7 using monthly data over 30 years. First, the conditional volatility and macroeconomic variables of stock market returns are obtained through GARCH series models, and the influence of the Internet and the global financial crisis in the early 21st century is included. Then estimate the multivariate vector autoregressive model to analyze the dynamic relationship between stock yields and macro variables. Conclusion fluctuation in money supply growth is considered the main factor for macroeconomic fluctuation. The GARCH model reveals the usual characteristics of persistence of volatility, the asymmetric behavior of stock returns, and certain macroeconomic variables (industrial production, short-term interest rates, and oil prices). In addition, GARCH results reveal a significant impact of crisis periods on most volatility sequences. VAR results show that the volatility transmission effect of industrial production, money supply, and inflation is positive, while the volatility transmission effect of interest rate is not significant. For The UK, the relationship between stock market volatility and macroeconomic volatility is one-way, while for other G7 countries, the causal relationship is two-way. Money supply and exchange rate fluctuations have a strong two-way causal relationship with stock market fluctuations in most countries[14].

### *4.2.2. Emerging countries*

While many studies have examined the relationship between volatility in stock returns and macroeconomics based on data from developed markets, few studies have been conducted in emerging markets. Zakaria and Shamsuddin studied the relationship between volatility in Malaysian stock market returns and five macroeconomic fluctuations, based on monthly data on GDP, inflation, exchange rate, interest rate, and money supply from January 2000 to June 2012. It is concluded that the fluctuation of the interest rate is significantly related to the fluctuation of the money supply and the stock market. There is no significant correlation between the volatility of macroeconomic variables and that of the stock market[15]. Ahmad and Ramzanze analyzed stock price

fluctuations and macroeconomic factors in a Pakistani stock exchange over 14 years. They concluded that macro-economy has a certain influence on stock trends and returns, such as inflation, industrial production, import, and export trade, but currency and the exchange rate have no influence on the stock market[16].

In conclusion, macroeconomics and stock prices are inextricably linked, and they influence each other in some ways. Both inflation and industrial production have a strong positive correlation with stock market volatility in both developed and developing countries. However, the money supply has a significant effect on the stock markets of some developed countries but has no effect on the stock markets of developing countries studied.

## **5. INTERNATIONAL FACTORS**

As equity markets have liberalized, international factors have had a greater impact on the volatility of equity returns. The inclusion of international factors in the analysis and prediction of stock return volatility can improve accuracy. This part of the paper will analyze the degree of financial liberalization, foreign instability, oil and commodity prices.

### *5.1. Degree of financial liberalization*

Some theoretical studies attempted to explain how financial liberalization affects volatility levels. Umutlu et al. discussed whether the degree of financial liberalization will affect the aggregate volatility of stock returns by considering the time-varying nature of financial liberalization. Their results showed that the aggregate volatility of stock return volatility is negatively correlated with the degree of financial liberalization, even after controlling for market development, liquidity, country, and crisis, and is more pronounced in emerging small and medium-sized markets. Moreover, Umutlu et al. found a positive correlation between the degree of financial liberalization and global volatility. They argued that the expansion of the investor and foreign investor base brought about by financial liberalization has improved the accuracy of public information and thus reduced volatility[17].

### *5.2. External investability*

The relationship between equity volatility and external instability in emerging markets has been widely concerned. Bae et al. studied the potential impact of foreign investors in emerging market equities by testing the relationship between the availability of stock to foreign investors and its return volatility. Compared with other research methods, it added degree open factors in the research process and focuses on individual firms. Finally, it found that highly investible stocks have higher return volatility than non-investible stocks. This can be explained by the fact that highly investible stocks are

more closely linked to the world market and thus bear more world market risks[18]. Moreover, Chen et al. studied the influence of foreign institutional ownership on the volatility of stock returns at the level of Chinese companies, with a sample of 1458 companies from 1998 to 2008. The results showed that the increase of foreign institutions' shareholding will increase the volatility of stock returns at the firm level, after controlling for the complete shareholding structure, firm size, turnover, leverage ratio, and potential endogenous problems. Chen et al. concluded that the increase of foreign institutional ownership can strengthen the positive impact of liquidity on volatility, thus improving the volatility of stock returns at the company level[19].

### **5.3. Oil and commodity prices**

As markets liberalized, the relationship between oil and commodity prices and equity market volatility became increasingly apparent. Christoffersen and Pan studied and found that the positive impact of oil volatility implied by options predicted negative returns and higher market volatility in the future. They also found that over time, oil price volatility was a strong predictor of overall stock market volatility after the financialization of commodity markets. In addition, Christoffersen and Pan recorded the connection between oil volatility and financial intermediaries' funding restrictions and believed that the increase of oil price uncertainty would make financial intermediaries' funding restrictions increasingly tight, and then affect stock market volatility through this economic channel[20]. Baur and Dimpfl analyzed the return-volatility relationship of commodity prices and found that since the middle of 2000, especially during the global financial crisis, the return-volatility relationship of commodity prices showed a trend of weakening effectiveness and approaching equity effect. Baur and Dimpfl believed that this change in asymmetric volatility is due to the financialization of commodity markets and the role of financial factors stronger than physical supply and demand factors. This also indicated that the financialization of commodities will lead to an increase in portfolio risk if investors include commodities in their portfolios to hedge investment risks[21].

In summary, the greater the degree of financial liberalization, the lower the aggregate volatility of total equity returns, and this was more pronounced for small and medium-sized emerging market companies. The degree of financial liberalization was studied by factors such as capital flow and transaction volume with foreign investors. Therefore, the external investability of enterprises was the embodiment of adapting to financial liberalization. However, a study of individual firms found that firms with high investability and a high proportion of foreign investors' shares generally have higher return volatility because they take on more global risk factors. In addition, fluctuations in oil and commodity prices also

affect the volatility of stock returns. The study found that increased volatility in oil prices increases volatility in equities, while financialization of commodity prices reduces the ability to hedge risk in a portfolio.

## **6. CONCLUSION**

To sum up, the main purpose of this paper is to explore the factors that affect the volatility of stock returns. First of all, the paper introduced the importance of technical indicators in studying the influencing factors of stock return volatility, and the changes of dividend income, stock volatility, and trading behavior will have an important impact on the prediction of stock returns. Moreover, the paper also mentioned that the asymmetric effect of the distribution of stock return volatility would be more obvious in bad market conditions. Then from the recent events with great influence in the world, observe and study the impact of major events in the economy, politics, and disaster on the volatility of stock returns, and find that social unrest events have a positive impact on the volatility of stock returns. Then, from the macroeconomic perspective on GDP growth rate and industrial productivity to analyze the impact of stock volatility, the results showed that both have a positive impact on stock volatility, and for developing countries, the increase of the money supply does not affect stock volatility. Finally, from the perspective of economic and trade globalization, the increased degree of financial market liberalization restrains the total volatility of stock returns, but the increase of external investability and the increase of foreign shares in the company will lead to the increase of stock volatility of individual companies. Volatility in oil prices and financialization of commodities increase volatility in stocks and portfolios, respectively.

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