

## A STUDY ON THE RELATIONSHIP BETWEEN STOCK RETURNS AND VOLATILITY

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### **Abstract**

*Nowadays, investors and financial advisors focus a lot of attention on ways to reduce risk while investing their savings in the stock market. These strategies include managing daily volatility and using different stock combinations. How well the model captures and how the model behaves with respect to the stock market and underlying assets determines the quality of risk measurements. This study looks at the connection between returns and volatility for the Bombay Stock Exchange (BSE), one of the Indian stock markets. The nature of volatility in the Indian stock markets is the main subject of this study. The ARCH-M model was used in this study to examine how stock market volatility behaves.*

**Keywords: Stock Returns, Volatility, trade volume, returns.**

### **Introduction**

Maintaining a stronger and expanding economy is crucial for every nation in order to raise population standards of living. Due to the stock market's success, there is now greater emphasis on encouraging domestic investment and boosting economic growth. An essential component of encouraging investment across all industries is financial stability. According to this perspective, markets and financial institutions may effectively mobilize savings from both domestic and foreign markets, maintain financial stability, distribute investments in an efficient manner, and supply liquidity in the market. The increasing contribution of the financial sector to the effective distribution of resources at fair prices has the potential to greatly improve the efficiency of our economy. Financial markets will allocate resources to the most fruitful uses if they function properly. Those who are willing to take on risk will bear the more properly priced financial hazards. Growth with macroeconomic stability and less financial uncertainty would be the outcome of real economic activity with increasing investments, both in terms of quantity and quality. The effective transmission of monetary policy efforts is facilitated by a stable financial system. Any stock's success is measured by its ability to either enhance or decrease shareholder wealth, which is difficult to gauge by altering the stock price's behavior. The market performance of a stock is influenced by a variety of factors, including industrial and economic ones.

It also depends on natural forces and the state of the economy as a whole. Many stocks produced a negative flow of return during the economic downturn, and vice versa. Another influence is the state of the stock market: Investors steer clear of stocks during a down market. It makes sense that this decline in stock demand would cause stock prices to decline. Bull markets are characterized by more active buying by investors, which raises the price of stocks. The health of the corporation issuing the shares is the final and possibly most significant element influencing stock performance.

For a number of reasons, scholars, decision-makers, and players in the financial market all need to understand the volatility of financial assets.

First of all, since financial market volatility is a gauge of risk exposure in investments, economic agents must be able

to foresee it. Second, policy makers are quite concerned about a volatile stock market because it breeds uncertainty, which hurts growth prospects. According to available data, markets that are thought to be extremely unpredictable "may act as a potential barrier to investing." Nevertheless, a rise in volatility in and of itself is not problematic; rather, it is a reflection of deeper issues with the underlying dynamics influencing economic activity and expectations surrounding it. In actuality, securities pricing and resource allocation would be more efficient the faster and more correctly prices reflect the information that is now accessible.

A market is considered "efficient" when prices accurately represent all available information and share prices randomly fluctuate around their "intrinsic" values. The ability to forecast future stock return volatility based on historical data would be extremely helpful from the perspective of an investor. The pricing of complex financial products like futures and options benefits from such forecasting abilities. With the help of historical daily stock return data from the BSE and NSE, an effort has been made to comprehend the nature of volatility in the Indian stock market.

### **Literature review**

In 2020, Roni Bhowmik and Shouyang Wang conducted research on return analysis and stock market volatility. Examining efficient GARCH models that are suggested for conducting market returns and volatility analysis was the study's goal. According to the study, research has changed significantly over the last ten years, with the majority of researchers working for emerging stock markets. Using high frequency data from the national stock exchange, Golaka C. Nath and Manoj Dalvi (2004) investigated the day of the week effect and market efficiency evidence from the Indian equity market.

The study used robust regression with biweights and dummy variables to empirically investigate the day of the week effect anomaly in the Indian equities market for the years 1999 to 2003 utilizing both high frequency and end-of-day data for the benchmark Indian equity market index S&P CNX NIFTY. The study discovered that Fridays had positive average returns whereas Mondays had negative ones. Goutam Tanty and Pramod Patjoshi (2016) conducted research on the volatility patterns of the Indian stock markets, specifically the BSE and NSE. This study's primary goal was to investigate the characteristics of stock market volatility in India. The behavior of stock market volatility has been studied in this study using the ARCH and GARCH models. The present study's findings demonstrated that volatility clustering is prevalent in both the NSE-S&P CNX Nifty and the BSE Sensex stock markets. The descriptive statistics result for the return series of both markets indicated that the NSE's return series was negatively skewed, whereas the BSE's was positively skewed. Som Sankar Sen (2013) conducted research on the impact of the day of the week on the NSE Nifty's return and volatility. The GARCH-M model was applied to the daily NIFTY returns data in order to get descriptive statistics of daily market returns.

There was a day-of-the-week influence on the daily NIFTY return during the pre-T+2 rolling settlement era, according to the study. The conclusion was that the oddity might be the result of investor excitement and a desire to purchase stocks in the run-up to the weekend. In 2013, Sarika Mahajan and Balwinder Singh conducted a study on the relationship between return, volume, and volatility in the Indian stock market using pre- and post-rolling settlement analysis. A bi-variate Vector Autoregressive Model (VAR) of order  $p$  with the following form was employed in the investigation. To sum up, the SENSEX showed a positive contemporaneous relationship between volume and volatility both before and after the rolling settlement period, with the degree of connection being higher in the latter. Halil Kiyamaz and Hakan Berument (2001) investigated the impact of the day of the week on stock market volatility. Investigating the impact of the day of the week on stock market volatility in sub-periods was the study's main goal. The Ordinary Least Squares (OLS) approach was used to evaluate the day of the week influence in the return equation. This study examined the impact of the day of the week on stock market volatility using the S&P 500 market index from January 1973 to October 1997. The results demonstrated that the volatility and return equations both exhibit the day of the week effect.

Dr. Silky Vigg Kushwah and Ms. Sulekha Munshi (2018) conducted research on how seasonality affects Indian stock exchanges. The descriptive statistics and paired sample t-test are the data analysis methods employed in this study. The S&P CNX Nifty 50 has been used as a model. Additionally, it was shown that there is a negative association between Nifty returns and Diwali and calendar year events. However, because of their strong link, the announcement of the budget and events that occur during the financial year have a direct impact on Nifty returns. A study by Sudharshan Reddy Paramati and Rakesh Gupta (2011) examined the empirical relationship between economic growth and stock market performance using data from India.

After correcting for seasonal variations, the obtained data were transformed into natural logarithms (ln) for each variable. For the empirical analysis, this study used a wide range of econometric tests, including the Granger Causality test, the Engle-Granger Cointegration method, the Unit Root (ADF, PP, and KPSS) tests, and, lastly, the Error Correction Model (ECM). The BSE and GDP did not have a causal relationship, but the NSE and GDP did have a unidirectional association that ran from GDP to NSE. Mr. Divyang J. Joshi (2012) conducted research on the Indian stock market's market efficiency test. The random walk theory was to be tested on the Bombay stock exchange. This paper's primary goal was to use a run test to examine the Indian stock market's efficiency level and random walk characteristics between January 1, 2001, and December 31, 2010. Therefore, the results provide short-term support for the random-walk hypothesis but not long-term support.

### **Objective of the study**

The main objective of the study is to analyze the daily performance of the stock market with respect to BSE indices.

### **Research methodology**

Data has collected from BSE websites and taken closing price of major 16 indices. 6 months' data were has analyzed 2021 to 2022.

### **Tools and techniques**

The researcher initially discusses the data set used in this investigation in this part. Major BSE indices make up the data collection. The ARCH-M model was used to investigate the pattern of time-varying volatility of daily returns. The data is based on the BSE Sensex stock price index's daily closing prices between September 1, 2020, and February 26, 2021. The daily closing price is included in the sample size, which is 125 BSE observation days. The information was sourced from the online database at [www.bseindia.com](http://www.bseindia.com). In order to calculate the stock market volatility on return, the researchers looked at the Sensex's intra- and inter-day returns.

Typically, stock prices are tracked at predetermined intervals (daily, weekly, or monthly), and in this study, researchers have looked at the Sensex's intra- and inter-day returns. Typically, stock prices are tracked on a daily, weekly, or monthly basis. Use the Excel function "STDEV" to determine the standard deviation of daily returns once the daily return has been calculated. This will help you understand the daily volatility of specific stocks or indices. Simply multiplying the daily volatility value by the square root of time will convert the daily volatility to annual volatility.

### **Hypothesis**

**H<sub>0</sub>:** There is no significant difference in the mean volatility among the quarters.

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## **Data Analysis and Interpretation**

BSE Indices	Mean	Std. Dev	Skewness	Kurtosis	Jarque-Bera Estim.	P-Value	Ob
BSE ALL CAP	-0.0003	0.014	0.87	6.29	70.95	0.00	123
BSE 100	-0.0003	0.015	0.87	6.38	74.45	0.00	123
BSE 100 ESG Index	-0.0856	0.231	0.63	6.35	65.38	0.00	123
BSE 100 Large cap	-0.8070	0.023	0.81	6.98	94.89	0.00	123
BSE 150 Mid cap	-1.3598	0.187	0.55	4.96	25.95	0.00	123
BSE 200	-2.0192	0.789	0.80	6.76	85.53	0.00	123
BSE 250 Large Midcap	-1.8720	0.738	0.81	6.75	85.41	0.00	123
BSE 250 Small cap	-0.4352	0.355	0.59	6.18	59.28	0.00	123
BSE 400 Mid Small cap	-0.9465	0.606	0.59	5.40	36.77	0.00	123
BSE 500	-0.0000	0.014	0.87	6.30	71.43	0.00	123
BSE Large cap	-0.0003	0.015	0.87	6.49	78.16	0.00	123
BSE Mid cap	-0.0002	0.015	0.60	4.88	25.65	0.00	123
BSE SENSEX	-0.0003	0.014	0.85	6.24	68.85	0.00	123
BSE SENSEX 50	-0.0003	0.014	0.83	6.41	73.86	0.00	123
BSE Small cap	-0.0002	0.014	0.64	5.79	48.54	0.00	123

The characteristics of the stock return of 16 major BSE indices from 2021 to February 2022 are examined here by the researcher. Nonetheless, the complete return series is broken down into the days of the week, and the four return series legs are examined for each day of the week. Every day of the week or month has a negative return for every index. In addition, the Sensex's most volatile indexes include the BSE 150 midcap, BSE 200, BSE 250 large midcap, BSE 250 small cap, and BSE 400 mid small cap, in that order (0.187667, 0.7896428, 0.7388633, 0.3557909, 0.6062162). On the other hand, the Sensex's volatility does not significantly change during the week.

Nonetheless, the normalcy of the frequency distribution in each of the index series is confirmed by taking into account the Skewness and Kurtosis. As previously mentioned in the research technique, the frequency distribution must be symmetric (zero skewness) and have a peakedness or kurtosis equivalent to three in order for it to be considered normal. The null hypothesis of the frequency distribution's normality is rejected at both the 5 percent and 1 percent levels of significance, so providing statistical evidence that none of the frequency distributions are normal. Even yet, the sample size is big (quite near 130) because

the researcher used the actual data series for all of the stocks.

### Results of Unit Root Test

Every day of the week, the return series for every index is examined for the existence of the unit root. The Augmented Dickey-Fuller test is used in this study to determine whether non-stationarity is present. The computed t-statistic's absolute values, however, surpass 2 for every index, hence rejecting the null hypothesis that a unit root exists. The null hypothesis of the presence of unit roots at the 5% and 1% levels of significance is also supported by the p-values (shown in parenthesis) being less than 0.01 and 0.05. Consequently, both indexes' return series are stationary at level itself. This can be explained by the fact that return is determined by taking the first difference between the closing stock prices of two consecutive days. The initial return series itself can therefore be the subject of any empirical investigation since it is integrated of order zero [I (0)]. Thus, the return series does not need to be transformed.

### Major Findings and Researcher's Observations

1. Using the ARCH-M model, the researcher discovered that all sample indices displayed volatility. Accordingly, the title demonstrated that the market's performance has been highly erratic, but this has had a negative impact.
2. For BSE, it is seen that the z-value is calculated to be close to 2. The null hypothesis cannot be accepted because the value is outside the 95% confidence interval. The implication is that subsequent price fluctuations do not occur independently.
3. The major BSE indices in this sample all displayed a high degree of volatility.
4. All indexes in the study have been more volatile, and we discovered that the investors in the sample were risk averse. As a result, researchers advise investors to base their choices on market behavior.
5. It is clear from this analysis that the index's daily average returns and volatility varied throughout time and location.
6. There was no day-level seasonality in Period 1's volatility, and a notable positive day effect was seen for both reporting and non-reporting Monday, Tuesday, Wednesday, Thursday, and Friday.

### Conclusion

This study covers a wide range of research on the return and volatility of the stock market utilizing systematic review techniques on several of the key BSE indexes in India. The researchers' suggestions for conducting systematic literature evaluations that seek, analyze, and classify all available and accessible material on market volatility and returns served as the impetus for this review. Analyzing stock market volatility and returns is a relatively significant and new area of study. The ease of accessing and obtaining researchable data and processing power has led to a wealth of study on the volatility and return of financial markets. When it comes to analyzing stock market volatility and returns, the ARCH-M type models perform well. Several models of the ARCH-M family have become more and more popular in recent years. Every country should understand the stock market's risk and return behavior, but emerging nations especially need to understand this since there are less alternatives for investment diversification and risk aversion in these markets. It's clear that the Indian stock market has grown significantly during the past ten years in terms of capitalization, trading, turnover, investor count, and other factors. During this time, the Indian stock market has seen rapid changes in all of these areas. There have been ups and downs throughout history. This study used high frequency and near returns computed using the BSE Sensex market indices to analyze the daily volatility in the BSE for the period from September 2021 to February 2022. There were 125 days to trading in the data. According to the study's findings, BSE doesn't

adhere to any models. This analysis rejects the existence of random walks and supports the idea that the Indian capital market is not weak from a market efficiency perspective by using the unit root test and the ARCH model.

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