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LONG-RUN EQUILIBRIUM AND SHORT-RUN DYNAMICS BETWEEN MODE-WISE TRADE VOLUME AND NIFTY RETURNS IN INDIA

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ABSTRACT

This study investigates the long-run equilibrium and short-run dynamics between mode-wise trading volume and Nifty 50 returns in the Indian stock market over the period January 2020 to December 2025. Using a quantitative research design based on secondary data from the National Stock Exchange of India and the Capitaline Database, the analysis employs descriptive statistics, correlation analysis, the Augmented Dickey-Fuller (ADF) unit root test, Johansen cointegration, Vector Error Correction Model (VECM), and Granger causality tests. The ADF test confirms that the trading volume series is stationary, and the Johansen cointegration test establishes a significant long-run relationship between trading volume and Nifty returns. Granger causality results indicate that trading volume predicts stock returns, whereas returns do not significantly influence trading volume. VECM estimates show that only the second lag of trading volume has a significant positive effect on current returns, and the overall model explains only a small share of return variation, with no evidence of residual autocorrelation. These findings suggest that while trading volume provides limited but significant predictive information for returns, additional economic, financial, and behavioural factors must be incorporated for more comprehensive modelling and improved investment decision-making.

INTRODUCTION

The Indian stock market has experienced remarkable growth over the past two decades, driven by economic liberalization, technological advancements, increased retail participation, and institutional investments. As one of the world's fastest-growing capital markets, the National Stock Exchange (NSE) plays a pivotal role in channeling investments and facilitating price discovery. The NIFTY 50 Index, representing the performance of fifty large-cap companies across diverse sectors, serves as a benchmark indicator of the Indian equity market and reflects overall investor sentiment and market dynamics.

Trade volume is widely recognized as a key indicator of market activity and liquidity. It reflects the intensity of trading, the dissemination of information, and investor confidence in financial markets. Traditional financial theories, including the Efficient Market Hypothesis (EMH), suggest that prices incorporate all available information; however, empirical evidence indicates that trading volume contains valuable information regarding future price movements and market volatility. Consequently, understanding the relationship between trading volume and stock returns has become an important area of research in financial economics.

The interaction between trading volume and stock returns is inherently dynamic and may exhibit both short-run adjustments and long-run equilibrium behaviour. Conventional regression models often fail to distinguish between these two dimensions, particularly when financial time series are non-stationary but cointegrated. The Vector Error Correction Model (VECM) provides an appropriate econometric framework to examine such relationships by integrating long-run cointegration with short-run dynamics. The model not only estimates the speed at which deviations from long-run equilibrium are corrected but also captures the immediate impact of changes in explanatory variables on stock returns. Consequently, VECM has become a preferred methodology for investigating the dynamic interactions among financial variables.

This study addresses this research gap by examining the long-run and short-run effects of mode-wise trade volumes on NIFTY returns using the Vector Error Correction Model (VECM). The study first investigates the stationarity properties of the selected variables, followed by cointegration analysis to determine the existence of long-run relationships. Subsequently, the VECM framework is employed to estimate both the long-term equilibrium effects and short-term dynamic adjustments between different modes of trading activity and NIFTY returns. By distinguishing between permanent and transitory effects, the study

provides a comprehensive understanding of how various trading modes influence market performance over different time horizons.

The findings of this study are expected to contribute to the growing literature on market microstructure, trading activity, and stock market efficiency in emerging economies. The results will provide valuable insights for investors, portfolio managers, policymakers, market regulators, and stock exchanges in understanding the role of different trading modes in shaping market returns. Furthermore, the study offers empirical evidence that may assist in improving trading strategies, liquidity management, and regulatory policies aimed at enhancing market stability and efficiency in the Indian equity market. The remainder of the paper is organized as follows: the next section reviews the relevant literature on volume–return relationships and market microstructure; the subsequent section describes the data and methodology, including the VECM specification; this is followed by empirical results and discussion; and the final section presents the conclusions and implications of the study.

Literature review

The literature review highlights diverse empirical studies examining the relationships among trading activity, foreign investment flows, market microstructure, and stock market performance across various global and Indian contexts. Ainapure and Iyer (2017) establish a long-term positive correlation between Foreign Institutional Investment (FII) and key Indian sectoral indices, with causality mainly from sectors to FII. Aitken et al. (2017) explore how colocation and high-frequency trading influence trade sizes, suggesting colocation responds to high-frequency trading trends. Bouri et al. (2019) and Chen et al. (2001) analyze trading volume's impact on returns and volatility, with findings that volume and returns exhibit bidirectional causality, while volatility remains persistent and negatively affects liquidity. Institutional short-term trading is shown by Cheriyan and Lazar (2019) to enhance price informativeness and market efficiency. Gallagher et al. (2013) emphasize the joint behavior of prices and volume as reflective of underlying economic forces. Verma and Verma (2007) note that moving-average trading rules generate returns but are offset by transaction costs. Sengupta et al. (2019) demonstrate that trading volume improves volatility prediction, with asymmetric effects linked to negative news. Technological shifts towards electronic and mobile trading are discussed by Mitra (2011) and Tai and Ku (2013), highlighting changes in market operations and investor behavior. Studies on Indian markets by Sultana (2012), Naik and Sethy (2022), and Kumar et al. (2018) confirm the significant role of Foreign Portfolio Investment (FPI) in influencing market returns. Maglaras et al. (2014) find that trading

volume Granger-causes extreme returns and return volatility under specific conditions. Collectively, these studies underscore the complex interplay between trading volume, foreign investment, market structure, and price dynamics, informing the understanding of market efficiency and investor behavior.

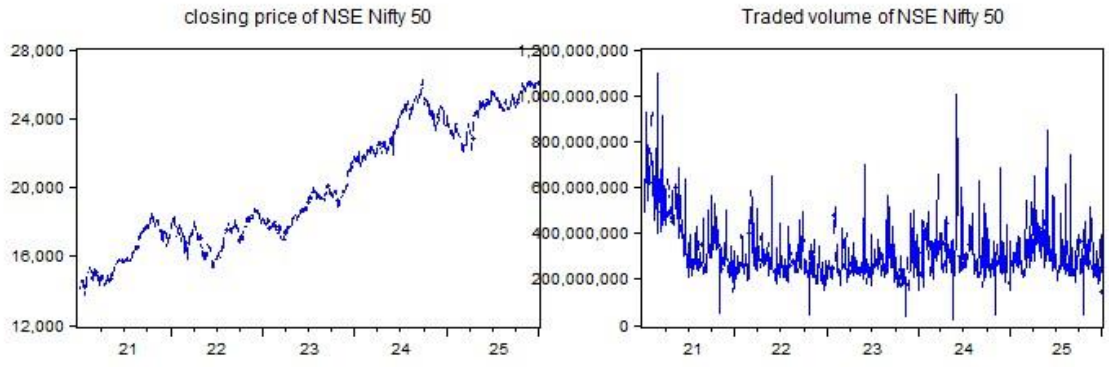
Research Methodology

The study adopts a quantitative research approach using secondary data to examine the relationship between trading volume and Nifty 50 returns in the Indian stock market. A descriptive and analytical research design is employed to analyse the behaviour of trading volume and its impact on index returns over the period January 2020 to December 2025. The Nifty 50 Index, representing leading companies listed on the National Stock Exchange of India, is selected as the benchmark due to its wide acceptance and reliability as a market performance indicator.

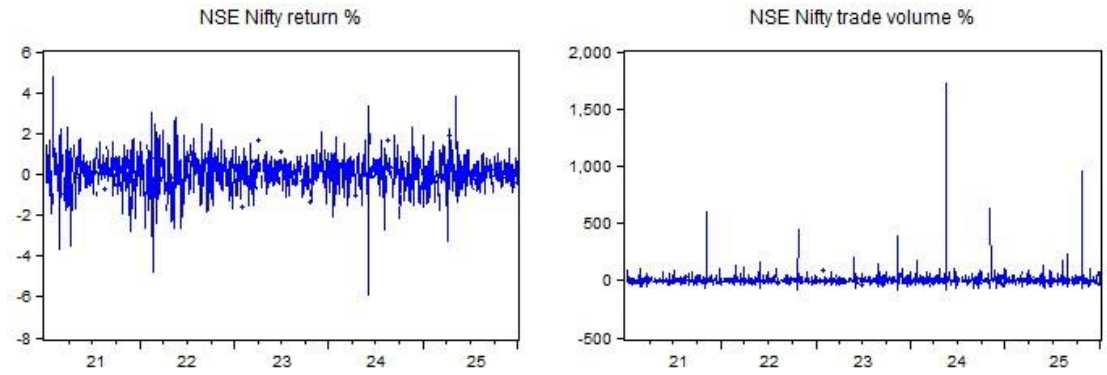
Data on Nifty 50 returns and trading volumes are sourced from the National Stock Exchange (NSE) and the Capitaline Database. The dataset is processed and organized using Microsoft Excel for data collection, classification, and preliminary analysis. Advanced statistical and econometric analyses are conducted using EViews software.

The methodological framework includes descriptive statistics and correlation analysis to explore basic data properties and preliminary relationships between trading volume and returns. Time series properties are assessed using the Augmented Dickey-Fuller (ADF) unit root test to determine stationarity. The Johansen cointegration test is applied to examine the existence of long-run relationships between trading volume and Nifty returns. A Vector Error Correction Model (VECM) is then estimated to capture both long-run equilibrium dynamics and short-run adjustments. Finally, Granger causality tests are employed to identify the direction of causality between trading volume and Nifty returns, thereby providing insights into the dynamic interaction between trading activity and market performance.

Data Analysis & Interpretation



Graph 01 showing the closing price of Nifty index and trading volume.



Graph 02 showing the returns of Nifty index and trading volume in percentage.

Interpretation: The graph 01 illustrates NSE Nifty returns and trading volume from 2021 to 2025. The return graph shows fluctuations throughout the study period. Most returns remain, but sharp increases and decreases indicate market volatility driven by investor sentiment, economic conditions, corporate announcements, and other market factors. Overall, the return series shows variations with occasional extreme movements. The trading volume graph shows that shares trade remained stable for most of the period but recorded spikes during 2023 and 2025. These increases indicate heightened trading activity. Although trading volume increased sharply at points, corresponding changes in Nifty returns were not always large, suggesting that trading activity does not necessarily result in price movements. The graph 02 presents the closing price and trade volume of the NSE Nifty 50 index from 2020 to 2025. The closing price shows upward trend, rising from 14,000 to nearly 27,000 points, despite short-term declines. A fall around 2024 was followed by recovery. Trade volume varied, with spikes during 2023, 2024, and 2025.

RESULTS OF DESCRIPTIVE STATISTICS

Variables	NSE Nifty50 Return	Trade Volume Returns
Mean	0.054186	7.090087
Median	0.053216	-0.642868
Maximum	4.742347	1723.234
Minimum	-5.929358	-92.14333
Std. Dev.	0.879933	70.37274
Skewness	-0.353775	15.23919
Kurtosis	7.152146	324.6171
Jarque-Bera	915.1370	5383573.
Probability	0:000000	0:000000
Sum	67.08226	8777.527
Sum Sq. Dev.	957.7867	6126024.
Observations	1238	1238

Interpretation

The dataset comprises 1,238 observations. The Return variable exhibits an average value of 0.0542, suggesting a slight positive mean return accompanied by moderate volatility. The distribution is slightly negatively skewed and demonstrates high kurtosis, indicating the occurrence of extreme return values. The Trade Volume variable displays substantial variability and is markedly positively skewed, suggesting that a limited number of trading days experienced exceptionally high volumes. The Jarque-Bera test yields a p-value of 0.0000 for both variables, confirming the non-normal distribution of the data. Collectively, these findings indicate the presence of volatility and outliers in both return and trading volume.

Results of Stationarity test using Augmented Dickey Fuller test

	t-Statistic	Prob.*	Results
Nifty 50 closing price	-0.796346	0.8193	Non stationary
Trade volume	-0.56983	0.5421	stationary
Nifty returns	-34.69346	0:0000	stationary
Trade volume returns	-40.58880	0:0000	Non stationary
Note: significance at 1%,5 % & 10% level			

Interpretation: The Augmented Dickey-Fuller (ADF) test assessed stationarity of the return series. The test statistic was -34.6935, with a p-value of 0.0000, below the 5% significance level. Therefore, the null hypothesis was rejected, indicating the return series is stationary and has no unit root. The ADF test also assessed the trade volume series. The test statistic was -40.5888, with a p-value of 0.0000, below the 5% significance level. Thus, the null hypothesis was rejected, confirming the trade volume series is stationary and has no unit root.

Johansen Co integration Test Results

Unrestricted Co-integration Rank Test (Trace)				
Hypothesized: No. of CE(s)	*Eigenvalue*	*Trace Statistic*	*0.05 Critical Value*	*Prob.***
None *	0.193578	490.3956	15.49471	0.0001
At most 1 *	0.166880	225.1181	3.841466	0:0000
Unrestricted Co-integration Rank Test (Maximum Eigenvalue)				
Hypothesized: No. of CE(s)	*Eigenvalue*	*Trace Statistic*	*0.05 Critical Value*	*Prob.***
None *	0.193578	265.2775	14.26460	0.0001
At most 1 *	0.166880	225.1181	3.841466	0:0000

Interpretation: Johansen Co integration Test examined return and Trade volume using 1,233 observations. Both Trace and Maximum Eigenvalue tests indicate two co integrating equations: test statistics exceed critical values and p-values (0.0000) are below 0.05, so the null hypothesis of no co integration is rejected. The normalized co integrating equation shows a long-term relationship between return and trade, with variables moving together over despite short-term fluctuations. Adjustment coefficients indicate the variables correct short-term deviations and return to long-term equilibrium. In summary, the results confirm a long-term equilibrium relationship between return and trade, indicating they are co integrated and suitable for time series analysis and econometric modeling.

Results of Pairwise Granger Causality tests

Null- Hypothesis	**Observation**	**F-Statistic**	**Prob.**
Trade__ does not Granger Cause return	1236	3.40860	0.0334
Return does not Granger Cause trade		0.81016	0.4450

Interpretation: The Pairwise Granger Causality Test examined the causal relationship between return and Trade volume using 1,236 observations with two lags. The results show that the null hypothesis, " Trade volume does not Granger Cause return," is rejected, as the p-value (0.0334) is less than 0.05, suggesting that past trade volume helps predict stock returns. In contrast, " return does not Granger Cause Trade volume " cannot be rejected because the p-value (0.4450) exceeds 0.05. Overall, the results show unidirectional Granger causality from Trade volume to return: trading activity predicts stock returns, but stock returns do not predict trading activity.

Results of VECM MODEL

	Coefficient	**Std. Error**	**t-Statistic**	**Prob.**
C(1)	0.013336	0.028469	0.468433	0.6396
C(2)	-0.02307	0.028476	-0.81008	0.418
C(3)	0.000392	0.00036	1.090007	0.2759

C(4)	0.000899	0.000359	2.501275	0.0125
C(5)	0.044633	0.025392	1.757792	0.079
R-squared	0.006328	Mean dependent var		0.053232
Adjusted R-squared	0.003099	S.D. dependent var		0.880298
S.E. of regression	0.878933	Akaike info criterion		2.58382
Sum squared resid	950.9752	Schwarz criterion		2.604531
Log likelihood	-1591.8	Hannan-Quinn criter.		2.59161
F-statistic	1.959787	Durbin-Watson stat		2.001829
Prob(F-statistic)	0.098374			

Interpretation: The VAR model assessed how past return and Trade volume affect return. Trade volume (-2) has a statistically significant effect on return (p-value = 0.0125), suggesting that trading activity two periods earlier influences stock returns. By contrast, return (-1), return (-2), and Trade volume (-1) are not significant, and the constant term is insignificant at the 5% level. The R-squared of 0.0063 shows that the model explains only 0.63% of return variation. The F-statistic (p-value = 0.0984) indicates that the model is not significant at 5%. The Durbin-Watson statistic of 2.0018 suggests no significant autocorrelation in the residuals. Only the second lag of trade volume has predictive value.

FINDINGS & CONCLUSION

Nifty returns exhibited continuous fluctuations throughout the study period. Most return values remained stable, with only a few periods of high volatility. The NSE Nifty 50 closing price demonstrated a strong upward trend from 2020 to 2025. Short-term market corrections were followed by recoveries, indicating positive market performance. The average return is slightly positive, suggesting overall market growth. The ADF test confirms that the TRADE series is stationary, with a p-value less than 0.05, indicating the absence of a unit root. Trade volume Granger-causes stock returns, indicating predictive power, while stock returns do not Granger-cause trade volume. Only Trade volume (-2) has a significant positive effect on current stock returns, whereas the lagged values of return and Trade volume (-1) are not statistically significant. The model explains only a small portion of the variation in stock returns. The Durbin-Watson statistic indicates no significant autocorrelation in the residuals. Overall, trade volume from two periods earlier has limited but significant predictive power for returns.

CONCLUSIONS

In conclusion, this study provides empirical evidence that trading volume plays a meaningful role in explaining and forecasting NSE Nifty returns, as demonstrated by the identified long-

run cointegration and the predictive power of lagged volume. The results, particularly from the Granger Causality and VAR analyses, indicate that changes in trade volume precede movements in returns, highlighting its usefulness as a leading indicator of market behaviour. Nonetheless, the limited explanatory power of other variables and the inability of returns to significantly influence volume underscore that trading activity alone cannot capture the full complexity of stock market dynamics. Future research should therefore incorporate broader macroeconomic, firm-specific, and behavioural factors to build more robust predictive models, while practitioners and policymakers may use trading volume in conjunction with such indicators to enhance market analysis, risk assessment, and investment strategies.

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