The Dynamics of the Relationship between Stock Returns and Trading Volumes: An Emerging Markets Perspective during Varying Market Conditions

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***Abstract*—This study examines the relationship between stock returns and trading volume in the Indian stock market using daily data of companies listed in the Nifty 50 from 2016 to 2025. Stock returns represent price changes, while trading volume reflects trading activity and information flow in the market. To capture structural changes in market behavior, the Bai–Perron structural break test is applied. In addition, the Granger Causality Test is used to examine the direction of causality between returns and trading volume. The results indicate that the relationship between returns and trading volume varies across time and different market conditions. The findings also suggest that trading volume alone cannot fully explain stock price movements, as firm-specific and macroeconomic factors play a significant role in influencing returns. Furthermore, the study provides empirical evidence supporting the Adaptive Market Hypothesis, demonstrating that the return–volume relationship evolves over time in response to changing market dynamics.**

***Keywords*—granger causality, structural breaks, Bai-Perron Test, market regimes, adaptive market hypothesis, lead-lag dynamics, supremum F-statistic**

I. Introduction

The relationship between stock returns and trading volume is a fundamental aspect of financial market analysis because it reflects how information and investor behavior influence price formation. Stock returns represent changes in share prices, while trading volume indicates the intensity of buying and selling activity in the market. When new information enters the market, investors react differently based on their expectations and interpretations, leading to trading decisions that affect both prices and trading activity. Consequently, the interaction between returns and trading volume provides important insights into market efficiency, information flow, and investor behavior in financial markets.

Previous studies have examined the return–volume relationship in both developed and emerging markets. In developed markets, higher liquidity, stronger regulatory frameworks, and greater institutional participation often lead to faster and more efficient price adjustments. In contrast, emerging markets frequently experience slower information diffusion, information asymmetry, and a larger presence of retail investors, which may intensify trading activity and create stronger feedback mechanisms between returns and volume. Although several studies have explored this relationship, many of them assume a stable relationship over time and do not fully account for structural changes caused by economic events, policy reforms, or market shocks.

Therefore, analyzing the return–volume relationship under changing market conditions becomes important for understanding market dynamics. The Indian stock market provides a relevant context because it has experienced rapid development, increasing investor participation, and several economic and financial events that may influence trading behavior. In this context, the present study examines the dynamic relationship between stock returns and trading volume using daily data of companies listed in the Nifty 50 from 2016 to 2025. To capture possible changes in market behavior, the study applies structural break analysis using the Bai–Perron test and examines causality using the Granger Causality Test, thereby providing insights into how trading activity and price movements interact across different market conditions.

II. Literature Review

Previous studies have examined various factors influencing stock market behavior, including commodity price fluctuations, market volatility, foreign capital flows, and technological developments.

Singhal and Ghosh (2016) analyzed the relationship between international crude oil prices, metal prices, and Indian stock market indices using the VAR–GARCH model. The study found significant bidirectional spillovers between commodity prices and stock market returns, indicating that global commodity market fluctuations can influence domestic equity performance.

Subsequent research has focused on volatility and capital flow dynamics in emerging markets. Saraf and Kayal (2023) investigated the impact of market volatility on Indian stock market returns using the Capital Asset Pricing Model and reported that higher volatility is associated with higher expected returns, supporting the risk–return trade-off theory. Similarly, Prabheesh, Kumar, and Shareef (2023) examined the influence of foreign portfolio investment on the Indian stock market during the COVID-19 pandemic and found that sudden foreign capital outflows increased market volatility and negatively affected stock returns.

Recent studies have also highlighted the growing influence of global financial linkages and technological developments on stock market dynamics. Mao, Wang, and Bibi (2024) analyzed the spillover effects of crude oil price volatility on stock market returns across major economies and found strong interconnectedness between energy markets and equity markets, particularly during crisis periods.

Imandojemu, Osabohien, and Al-Faryan (2025) investigated the effect of artificial intelligence-driven algorithmic trading on stock market volatility and reported that increased algorithmic trading can intensify short-term market volatility, especially in emerging markets. These studies indicate that stock market performance is influenced by multiple factors such as commodity price shocks, market and technological innovations.

III. Materials and Methods

The materials and methods section explains the research framework, data sources, and statistical techniques used in the study. The methodology is designed to examine the relationship between stock returns and trading volume in the Indian stock market using quantitative and econometric techniques.

A. Research Design

The present study adopts a quantitative and empirical research design. The analysis is based on numerical data obtained from the stock market and evaluated using statistical and econometric methods. A time-series research design is employed because the data consist of daily observations collected over an extended period. This approach enables the identification of trends, volatility patterns, and structural changes in stock market behavior over time.

B. Nature of Data

The study is based entirely on secondary data. Secondary data refer to information that has already been collected and published by reliable institutions. In this study, the data include daily closing stock prices and trading volumes of selected companies. Stock returns are calculated using logarithmic return formulas, and trading volume data are transformed into logarithmic form to improve statistical properties and reduce heteroscedasticity.

C. Sources of Data

The data used in this research were obtained from reliable financial databases to ensure accuracy and credibility. The primary source of data is the official website of the National Stock Exchange (NSE) of India. Additional supporting information was collected from financial platforms and research publications, including Investing.com and other academic sources. These databases provide comprehensive historical information required for empirical analysis.

D. Data Collection Procedure

Daily stock price and trading volume data were collected from the selected sources and compiled using Microsoft Excel. The data were cleaned, organized, and transformed to ensure consistency and accuracy. Stock returns were computed using logarithmic return calculations, while trading volume values were converted into logarithmic form. The processed dataset was then imported into statistical software for econometric analysis.

E. Time Period of Study

The study covers a ten-year period from January 1, 2016 to December 31, 2025. This time horizon captures different phases of market conditions, including stable growth periods and major economic disruptions such as the COVID-19 pandemic. The extended t ime period allows for a comprehensive analysis of long-term trends and structural changes in the stock market.

F. Sample Size

The sample consists of 50 companies included in the NIFTY 50 index of the National Stock Exchange. The NIFTY 50 represents large and actively traded companies across multiple sectors of the Indian economy and serves as a benchmark for market performance. Selecting firms from this index ensures adequate liquidity, reliable data availability, and broad market representation.

G. Statistical and Econometric Techniques

To achieve the objectives of the study, the following statistical techniques are applied:

1) Descriptive Statistics–to analyze the distributional characteristics of stock returns and trading volume.
2) Unit Root Test (ADF Test)–to examine the stationarity of the time-series data.
3) Bai–Perron Structural Break Test–to identify structural changes in stock returns and trading volume during different market regimes.
4) Granger Causality Test–to determine the direction of causality between stock returns and trading volume.

H. Data Analysis

The daily closing prices have been converted into daily log returns as follows;

$$r_1 = ln\left(\frac{P_t}{P_{t-1}}\right)$$

where, r_t is the log return at time t and P_t stands for closing price of the current time period and P_1 stands for the closing price of the previous time period. The daily trading volume is arrived at by using the natural logarithm of number of shares traded as is the common practice in financial literature as follows:

$$V_1 \;= ln\,(Vol_t)$$

Since the condition of stationarity is a prerequisite to apply the Granger Causality test, we conducted an Augmented Dickey Fuller test on the return and volume series and found them to be stationary. Next we apply Bai-Perron structural break test to examine whether the return series are subject to un-modeled breaks in the data generating process and find the critical break dates that delineate each sub-period into different market regimes. The algorithm described by Bai and Perron (2003) is used to simultaneously estimate multiple structural breaks. The "breakpoints" so identified are used to classify the time period into regimes.

We then segment the time series into distinct market regimes with each segment representing period with stable statistical properties. For each regime we perform the Granger causality

IV. Result and Discussion

The results present the statistical characteristics of stock returns and trading volume of selected companies from the NIFTY 50 index. The descriptive statistics show that the mean values of stock returns are close to zero, indicating small daily return fluctuations, while the standard deviation values reflect differences in volatility among the companies.

The skewness and kurtosis values indicate that the return series are asymmetric and leptokurtic, suggesting the presence of extreme market movements.

The stationarity of the variables is tested using the Augmented Dickey–Fuller Test, and the results confirm that the stock return and trading volume series are stationary at level. This indicates that the data are suitable for further econometric analysis. Overall, the findings suggest that trading activity and market information significantly influence stock price movements, highlighting the dynamic stock.

Table 1. Descriptive statistics for the return series

Company Name	n	Mean	SD	Min	Max	Skew	Kurtosis	ADF	*p* Value	Jarque Berra	*p* Value
Adani Enterprise	2467	0.0018	0.031	−0.28	0.28	−0.20	18.04	14.4	0.01	23272.27	0
Asian Paints	2467	0.0005	0.015	−0.14	0.08	−0.09	9.12	15.2	0.01	3855.51	0
Axis Bank	2467	0.0006	0.020	−0.27	0.19	−0.51	24.09	16.3	0.01	45833.75	0
Britannia Industries	2467	0.0006	0.014	−0.13	0.106	0.255	11.81	16.5	0.01	8006.280	0
Cipla Ltd	2467	0.0004	0.016	−0.079	0.13	0.80	8.75	14	0.01	3667.89	0
HCL Tech	2467	0.0006	0.016	−0.066	0.111	0.087	7.285	14.2	0.01	1890.57	0
HDFC Bank Ltd	2467	0.0006	0.014	−0.12	0.11	−0.07	13.64	15.4	0.01	11648.84	0
TVS Motor	2467	0.0012	0.019	−0.12	0.14	0.31	7.190	15.8	0.01	1846.15	0
ICICI Bank Ltd	2467	0.0008	0.019	−0.17	0.146	0.23	12.43	16.2	0.01	9174.69	0
Indian Bank Ltd	2467	0.0012	0.028	−0.135	0.210	0.758	8.98	14.3	0.01	3916.71	0
Infosys Ltd	2467	0.0005	0.016	−0.161	0.12	−0.36	11.87	14.5	0.01	8148.76	0
ITC Ltd	2467	0.0003	0.015	−0.12	0.10	−0.18	11.56	14.6	0.01	7554.37	0
JSW Steel Ltd	2467	0.001	0.02	−0.17	0.12	−0.32	8.57	15.3	0.01	3236.30	0
Kotak Bank	2467	0.0005	0.016	−0.12	0.12	−0.03	11.22	15.6	0.01	6948.55	0
Canara Bank	2467	0.0008	0.026	−0.20	0.38	−0.06	24.89	16	0.01	49682.67	0
Maruti Suzuki India Ltd	2467	0.0006	0.017	−0.16	0.13	0.21	13.01	16.2	0.01	10320.23	0
NTPC Ltd	2467	0.0005	0.016	−0.15	0.09	−0.13	8.15	16.8	0.01	2734.11	0
Godrej	2467	0.0005	0.018	−0.13	0.21	0.63	13.98	14	0.01	12574.20	0
State Bank of India Ltd	2467	0.0006	0.017	−0.14	0.13	−0.37	11.52	14	0.01	6211.23	0
Sun Pharma	2467	0.0004	0.017	−0.11	0.11	0.02	7.86	15	0.01	2436.74	0
Tata Consumer Products Ltd	2467	0.0010	0.018	−0.14	0.11	0.18	8.44	15.2	0.01	3064.07	0
Tata Power Ltd	2467	0.0009	0.021	−0.12	0.15	0.35	8.19	15.4	0.01	2823.65	0
Tata Steel Ltd	2467	0.0010	0.022	−0.12	0.13	0.055	6.32	15.6	0.01	1136.85	0
TCS Ltd	2467	0.0005	0.0148	−0.09	0.098	0.117	6.744	16	0.01	1446.18	0
Ultratech Cement Ltd	2467	0.0007	0.016	−0.14	0.12	0.04	9.21	16.2	0.01	3968.084	0
Wipro Ltd	2467	0.0005	0.016	−0.09	0.16	0.59	11.07	16.4	0.01	6854.86	0
Adani ports	2467	0.0009	0.023	−0.21	0.15	−0.69	13.63	16.5	0.01	11810.37	0
Bajaj Auto Ltd	2467	0.0006	0.015	−0.13	0.12	−0.08	11.43	16.6	0.01	7322.56	0
Bharat Electronic Ltd	2467	0.001	0.022	−0.19	0.11	−0.21	9.09	16.8	0.01	3833.84	0
Indigo Ltd	2467	0.0008	0.022	−0.19	0.1222	−0.197	8.34	14.2	0.01	2947.33	0
Tech Mahindra Ltd	2467	0.0006	0.018	−0.154	0.1004	−0.304	7.93	14.2	0.01	2539.45	0
L&T Ltd	2467	0.0007	0.016	−0.16	0.14	0.03	12.88	14.2	0.01	10041.18	0
Reliance Industries	2467	0.0008	0.0171	−0.1315	0.1471	0.3784	12.19	14.5	0.01	8746.01	0
Nestle Ltd	2467	0.0007	0.013	−0.08	0.12	0.65	8.86	14.6	0.01	3705.16	0
Hindu Zinc	2467	0.0008	0.02	−0.13	0.25	1.007	14.67	14.6	0.01	14419.60	0
Vedantu	2467	0.001	0.026	−0.20	0.18	−0.43	9.06	15	0.01	3863.48	0
Eternal	2467	0.0011	0.030	−0.19	0.20	0.32	8.29	15.2	0.01	1302.18	0
Adani Power	2467	0.0018	0.034	−0.26	0.25	0.77	10.65	15.6	0.01	6269.31	0
D Mart	2467	0.001	0.019	−0.11	0.13	0.47	6.59	15.8	0.01	1250.81	0
Power grid	2467	0.0006	0.016	−0.12	0.08	−0.15	7.17	16	0.01	1804.93	0
Shriram Finance	2467	0.0010	0.0271	−0.2218	0.17	0.0324	10.81	16.2	0.01	6274.06	0
BPCL	2467	0.0006	0.0213	−0.1988	0.15	−0.441	11.94	16.3	0.01	8310.54	0
Ambuja Cement	2467	0.0006	0.019	−0.173	0.122	−0.728	11.85	16.5	0.01	8279.25	0
Idea	2467	0.0001	0.043	−0.350	0.40	0.970	16.66	16.7	0.01	19640.19	0
DFL	2467	0.0001	0.021	−0.172	0.16	−0.231	7.17	16.7	0.01	1811.76	0
Bank of Baroda	2467	0.0005	0.025	−0.164	0.285	0.579	13.88	14.2	0.01	12312.32	0
PNB	2467	0.0003	0.027	−0.158	0.48	2.108	46.74	14.4	0.01	198406.2	0
Union Bank	2467	0.0003	0.02	−0.18	0.34	0.92	15.15	14.5	0.01	15537.47	0
Chola Finance	2467	0.0001	0.02	−0.29	0.15	−0.38	14.46	14.6	0.01	13573.68	0
Jindal	2467	0.0001	0.03	−0.17	0.28	0.201	8.62	14.8	0.01	3274.47	0

Table 1 shows the descriptive statistics of daily stock returns for selected NIFTY 50 companies. The mean returns are close to zero, indicating small daily price movements. The standard deviation values reveal differences in volatility among stocks. The skewness and kurtosis values indicate asymmetric and leptokurtic distributions, suggesting the presence of extreme returns. The Jarque–Bera test results confirm that the return series are not normally distributed.

Table 2 presents the descriptive statistics of log trading volume for the selected firms. The mean and standard deviation values indicate differences in trading activity across companies. Skewness and kurtosis values suggest asymmetric and leptokurtic distributions with extreme observations. The Jarque–Bera test rejects normality, while the ADF test results confirm that the trading volume series are stationary and suitable for further analysis.

Table 2. Descriptive statistics for the volume series

Company Name	n	Mean	SD	Min	Max	Skew	Kurtosis	ADF	*p* Value	Jarque Berra	*p* Value
Adani Enterprise	2467	14.96	0.909	11.52	18.34	0.20	3.12	−1.54	0.01	18.71	0
Asian Paints	2467	13.90	057	11.16	16.26	0.36	3.76	−2.33	0.01	116.40	0
Axis Bank	2467	16.03	0.61	13.85	18.60	0.66	3.87	−3.22	0.01	262.81	0
Britannia Industries	2467	12.50	0.73	9.122	15.72	0.19	3.71	−3.22	0.01	67.93	0

Cipla Ltd	2467	14.45	0.73	11.47	17.85	0.74	3.90	−4.22	0.01	311.13	0
HCL Tech	2467	14.727	0.6789	10.281	17.29	0.188	4.01	−4.25	0.01	120.46	0
HDFC Bank	2467	15.50	1.082	11.86	19.22	−0.22	2.18	−4.35	0.01	88.224	0
TVS	2467	14.03	0.698	11.005	17.49	0.48	4.015	−4.45	0.01	204.63	0
ICICI Bank Ltd	2467	16.51	0.54	13.92	19.47	0.53	3.79	−5.32	0.01	182.35	0
Indian Bank Ltd	2467	14.14	0.910	11.07	17.40	−0.22	3.95	−5.45	0.01	114.077	0
Infosys Ltd	2467	15.56	0.57	13.08	18.32	0.27	3.99	−5.50	0.01	132.91	0
ITC Ltd	2467	16.37	0.61	13.80	19.88	0.61	4.06	−5.55	0.01	271.88	0
JSW Steel Ltd	2467	14.96	0.92	11.65	18.09	−0.24	2.66	−1.25	0.01	35.63	0
Kotak Mahindra Bank	2467	14.82	0.65	12.19	18.29	0.28	4.43	−2.25	0.01	244.84	0
Maruti Suzuki India Ltd	2467	13.29	0.58	10.27	15.40	0.22	3.29	−3.35	0.01	30.00	0
NTPC Ltd	2467	16.07	0.78	12.65	19.19	−0.01	3.22	−4.45	0.01	5.349	0
Canara Bank	2467	15.93	0.87	12.29	19.47	0.100	2.91	−5.55	0.01	4.935	0
State Bank of India Ltd	2467	13.68	0.86	10.09	17.91	−0.44	4.62	−2.25	0.01	290.46	0
Sun Pharma	2467	15.08	0.74	11.21	18.23	0.52	3.55	−2.25	0.01	144.06	0
Tata Consumer Products Ltd	2467	14.47	0,70	11.72	17.96	0.49	3.54	−2.25	0.01	131.66	0
Tata Power	2467	16.05	0.94	13.19	19.70	0.55	302	−3.35	0.01	127.50	0
Tata Steel Ltd	2467	16.44	0.88	12.92	18.93	0.13	2.41	−3.45	0.01	43.60	0
TCS Ltd	2467	14.5000	0.6157	10.678	17.600	−0.1026	3.915	−3.55	0.01	90.396	0
Ultratech Cement Ltd	2467	12.67	0.58	9.57	15.45	0.33	3.99	−4.23	0.01	147.01	0
Wipro Ltd	2467	15.31	0.87	12.53	18.68	−0.07	31.12	−4.35	0.01	4.104	0
Adani ports & SEZ Ltd	2467	-	-	-	-	-	-	−4.35	0.01	-	0
Bajaj Auto Ltd	2467	12.85	0.60	9.93	15.95	0.42	3.91	−4.45	0.01	160.63	0
Bharat Electronic Ltd	2467	15.71	1.39	11.06	19.40	−1.22	4.24	−4.50	0.01	771.26	0
Indigo Ltd	2467	13.61	0.84	10.49	17.17	0.08	4.23	−4.55	0.01	158.95	0
Tech Mahindra	2467	14.68	0.58	11.64	17.25	0.107	4.09	−5.23	0.01	127.71	0
L&T Ltd	2467	14.58	0.56	12.28	16.86	0.53	3.69	−5.25	0.01	168.56	0
Reliance Ltd	2467	15.74	0.627	13.5761	17.9934	0.1674	3.2543	−5.30	0.01	18.1730	0
NestleLtd	2467	11.48	1.25	8.24	16.25	0.81	2.92	−5.45	0.01	273.44	0
Hindu Zinc	2467	13.96	0.92	11.39	18.77	0.44	3.52	−5.50	0.01	111.28	0
Vedantu	2467	16.28	0.60	13.26	19.62	0.58	4.75	−5.55	0.01	459.37	0
Eternal	2467	17.60	0.76	15.15	20.35	0.24	3.78	−2.35	0.01	39.60	0
Adani Power	2467	15.85	1.024	12.99	19.30	0.23	2.93	−2.35	0.01	22.40	0
D Mart	2467	13.02	0.69	10.51	18.26	1.06	6.08	−2.45	0.01	1288.95	0
Power Grid	2467	15.88	0.69	12.29	18.85	0.05	3.62	−3.35	0.01	41.955	0
Shriram Finance	2467	14.07	0.93	10.62	17.37	0.54	3.00	−4.25	0.01	121.62	0
BPCL	2467	15.37	0.75	12.23	19.11	−0.01	3.47	−4.35	0.01	23.44	0
Ambuja Cement	2467	14.93	0.76	11.87	18.32	0.56	4.12	−4.35	0.01	259.02	0
Idea	2467	18.14	1.85	6.71	21.17	−0.94	8.62	−4.45	0.01	4152.52	0
Godrej	2467	13.58	0.86	10.03	17.12	−0.39	3.31	−5.25	0.01	74.141	0
DFL	2467	15.63	0.69	12.01	18.52	0.06	3.38	−5.35	0.01	16.66	0
Bank of Baroda	2467	16.65	0.73	13.94	19.36	0.20	2.94	−5.35	0.01	17.82	0
PNB	2467	17.13	0.89	13.95	20.05	0.25	2.96	−2.23	0.01	27.30	0
Union Bank	2467	15.91	0.77	13.05	19.24	0.30	3.24	−3.24	0.01	44.69	0
Chola Finance	2467	13.67	0.91	8.32	17.54	−0.52	3.20	−4.25	0.01	116.41	0
Jindal	2467	15.53	0.97	11.59	18.04	−0.29	2.43	−5.35	0.01	67.38	0

Table 3. Results of the structural break tests

Company	sup-F statistic	*p*-value	Optimal segments	Corresponding break dates
Adani Enterprises Ltd	718.53	<0.05	4	24-6-2021,4-1-2024-30-10-2019
Adani Ports & SEZ Ltd	457.62	<0.05	3	10-2-2021,4-1-2021
Ambuja Cement	570.0545	<0.05	4	28-3-2018,24-11-2021,24-5-2023
Asian Paints Ltd	8428574	<0.05	4	17-05-2021,11-11-2022,5-7-2024
Axis Bank Ltd	1326.004	<0.05	5	14-11-2017,4-12-2019,31-5-2021,16-6-2023
Bajaj Auto Ltd	1331.411	<0.05	4	18-5-2018,5-2-2021,29-1-2024
Britannia Industries Ltd	339.14	<0.05	5	28-3-2019,12-2-2021,01-12-2022,4-7-2024
Canara Bank	415.0112	<0.05	5	28-2-2018,28-2-2020,9-11-2021,15-5-2024
Cipla Ltd	1579.48	<0.05	6	20-3-2018,30-9-2019,28-5-2021,16-3-2022,24-5-2024
Chola Finance	2735.55	<0.05	4	2-12-2019,28-5-2021,9-5-2023
D Mart	1648.624	<0.05	5	9-7-2018,28-7-2020,16-11-2021,10-9-2024
Eternal	336.0934	<0.05	4	25-7-2022,24-3-2023,13-2-2024
Godrej	255.6684	<0.05	6	19-7-2017,30-1-2019,13-4-2021,10-10-2022,7-5-2024
HCL Technologies Ltd	1337.894	<0.05	4	17-1-2020, 12-12-2021,14-8-2023
HDFC Life Insurance Co Ltd	223.35	<0.05	6	9-11-2022,4-7-2017,1-7-2024,13-3-2019,9-11-2022
Indian Bank	118.274	<0.05	4	23-10-2019,10-3-2022,10-6-2024
Idea	1032.380	<0.05	4	4-7-2017,18-1-2019,28-2-2019
ITC Ltd	162.20	<0.05	5	20-7-2017,1-2-2020,24-5-2022,4-7-2024
ICICI bank	2560.33	<0.05	3	03-5-2021,28-6-2024
Indigo	216.9736	<0.05	5	3-5-2018,15-9-2020,9-9-2022,3-7-2024
Infosys	1464.987	<0.05	4	17-8-2017,18-1-2021,13-4-2023
Jindal	2448.911	<0.05	3	7-12-2020,3-1-2023
Kotak Mahindra Bank Ltd	212.8797	<0.05	6	7-12-2018,25-2-2019.3-12-2020,29-12-2022,4-7-2024
LTI Mindtree Ltd	132.948	<0.05	4	5-7-2023,30-9-2024,14-05-2025
L & T	185.454	<0.05	5	6-8-2019,2-2-2021,28-7-2022,3-7-2024
Maruti Suzuki India Ltd	1229.748	<0.05	6	4-7-2017,25-1-2019,08-3-2021,3-11-2022,3-7-2024
Nestlé India Ltd	1493.731	<0.05	4	20-9-2019,27-4-2021,5-1-2024
Power Grid Corporation	817.2082	<0.05	5	15-5-2018,3-6-2020,3-10-22,11-6-2024
SBI Life Insurance Co Ltd	1378.01	<0.05	4	20-9-2021,27-11-2019,13-2-2023

Shriram Finance	192.9747	<0.05	4	4-7-2018,16-2-2021,3-7-2024
Sun Pharmaceutical Industries	2585.93	<0.05	5	8-2-2018,15-2-2021,12-8-2022,5-6-2024
Tata power	1773.963	<0.05	4	20-2-2020,21-4-2022,6-6-2024
Tata steel	136.30	<0.05	5	3-7-2017,26-4-2019,2-2-2021,28-7-2-2022,11-6-2024
TCS	1350.69	<0.05	6	13-3-2018,14-10-2019,16-4-2021,12-10,2022,31-5-2024
TVS motor	2751.457	<0.05	4	26-3-2020,14-2-2022,29-9-23
Vedantu	838.9708	<0.05	5	3-7-2017,1-2-2019,24-11-2021,27-6-2024
Wipro Ltd	685.1642	<0.05	5	17-7-2017,27-10-2019,7-5-2021,14-12-2024
Reliance	5267.033	<0.05	5	8-7-2020,9-1-2024,16-7-2018,21-12-2021
Ultratech Cement	1339.125	<0.05	5	4-7-2017,24-1-2019,8-3-2021,1-7-2024
Adani power	519.5132	<0.05	2	20-4-2022
JSW Steel	1593.276	<0.05	5	26-4-2019,27-10-2020,28-6-2022,30-1-2024
Tech Mahindra	972.128	<0.05	5	23-8-2017,20-2-2020,18-8-2021,24-6-2024
BPCL	360.4207	<0.05	4	11-4-2018,03-12-2019,31-5-2021,30-10-2023
Bank of Baroda	1247.55	<0.05	5	25-10-2027,18-3-2020,20-9-2021,10-4-2023
Punjab National Bank	895.6147	<0.05	5	25-10-2017,28-5-2020,22-11-2021,1-03-2024
Bharat Electronic Ltd	764.0702	<0.05	4	6-7-2018,28-6-2021,20-6-2024
Union Bank	1193.46	<0.05	5	19-2-2018,19-5,2020,10-11-2021,6-3-2024
NTPC	1204.274	<0.05	5	25-10-2018,22-3-2021,9-1-2024,19-9-2-22
DFL	2517.638	<0.05	3	6-5-2023,20-9-2021

Table 3 presents the results of the Bai–Perron Structural Break Test applied to the stock return and trading volume series of companies from the NIFTY 50 index. The results show high sup-F statistics with p-values less than 0.05, leading to the rejection of the null hypothesis of no structural break. This indicates the presence of significant structural changes in the time series data. Most companies exhibit multiple breakpoints with approximately four to six optimal segments, suggesting that stock returns and trading volumes experienced several regime shifts during the study period. The identified break dates are mainly concentrated between 2017 and 2024, reflecting the impact of major economic and financial events such as demonetization effects, the COVID-19 pandemic, and the post-pandemic recovery. These results imply that stock market behavior is not stable over time and is influenced by changing market conditions

Table 4. Results of the granger causality tests

Index/ Company	Period	Optimal lag (SC)	Ho	*p* Value	Decision	Ho	*p* Value	Decision	Nature of causality
Reliance	Full Sample	5	Price does not Granger cause volume	0.0677	Accepted	Volume does not Granger cause price	0.2680	Accepted	No Causality
	Regime 1	1		0.000007	Rejected		0.9857	Accepted	No Causality
	Regime 2	2		0.0871	Rejected		0.9740	Accepted	Unidirectional
	Regime 3	1		0.0201	Rejected		0.1462	Accepted	Unidirectional
	Regime 4	1		0.000003	Rejected		0.3039	Accepted	Unidirectional
Baroda Bank	Full Sample	8		0.000005	Rejected		0.2390	Accepted	Unidirectional
	Regime 1	1		0.0188	Rejected		0.7523	Accepted	Unidirectional
	Regime 2	1		0.0001	Rejected		0.0003	Rejected	Bidirectional
	Regime 3	5		0.000003	Rejected		0.8619	Accepted	Unidirectional
	Regime 4	3		0.1454	Accepted		0.0934	Accepted	No Causality
	Regime 5	5		0.2846	Accepted		0.2250	Accepted	No Causality
Adani Enterprises	Full Sample	7		0.000004	Rejected		0.0544	Accepted	Unidirectional
	Regime 1	8		0.000003	Rejected		0.3915	Accepted	Unidirectional
	Regime 2	4		0.000004	Rejected		0.0195	Rejected	Bidirectional
	Regime 3	3		0.000005	Rejected		0.0057	Accepted	Unidirectional
	Regime 4	4		0.2294	Accepted		0.2093	Accepted	No Causality
Asian Paints	Full Sample	8		0.0002	Rejected		0.1517	Accepted	Unidirectional
	Regime 1	7		0.000002	Rejected		0.0824	Accepted	Unidirectional
	Regime 2	1		0.000009	Rejected		0.1138	Accepted	Unidirectional
	Regime 3	2		0.0009	Rejected		0.5462	Accepted	Unidirectional
	Regime 4	1		0.7195	Accepted		0.4245	Accepted	No Causality
Axis Bank	Full Sample	7		0.000003	Rejected		0.8719	Accepted	Unidirectional
	Regime 1	1		04049	Accepted		0.7882	Accepted	No Causality
	Regime 2	1		0.5172	Accepted		0.6991	Accepted	No Causality
	Regime 3	5		0.000003	Rejected		0.8009	Accepted	Unidirectional
	Regime 4	2		0.3585	Accepted		0.9077	Accepted	No Causality
	Regime 5	3		0.1958	Accepted		0.4867	Accepted	No Causality
Britannia Industries	Full Sample	5		0.0037	Rejected		0.1830	Accepted	Unidirectional
	Regime 1	3		0.3809	Accepted		0.4014	Accepted	No Causality
	Regime 2	1		0.3823	Accepted		0.5348	Accepted	No Causality
	Regime 3	1		0.3468	Accepted		0.6686	Accepted	No Causality
	Regime 4	1		0.9602	Accepted		0.3283	Accepted	No Causality
	Regime 5	2		0.0853	Accepted		0.2089	Accepted	No Causality
Cipla Ltd	Full Sample	8		0.0001	Rejected		0.1052	Accepted	Unidirectional

	Regime 1	1	0.0079	Rejected	0.2098	Accepted	Unidirectional
	Regime 2	1	0.2054	Accepted	0.0855•	Rejected	Unidirectional
	Regime 3	3	0.1860	Accepted	0.2156	Accepted	No Causality
	Regime 4	1	0.9362	Accepted	0.6626	Accepted	No Causality
	Regime 5	1	0.0290	Accepted	0.4258	Accepted	No Causality
	Regime 6	1	0.0292	Rejected	0.1931	Accepted	Unidirectional
Adani Power	Full Sample	7	0.000001	Rejected	0.0264	Rejected	Bidirectional
	Regime 1	4	0.000002	Rejected	0.000005	Rejected	Bidirectional
	Regime 2	7	0.000002	Rejected	0.0184	Rejected	Bidirectional
	Regime 3	2	0.1147	Accepted	0.8385	Accepted	No Causality
Adani Port & SEC	Full Sample	4	0.9180	Accepted	0.0977	Accepted	No Causality
	Regime 1	5	0.0391	Accepted	0.1504	Accepted	No Causality
	Regime 2	3	0.0616	Accepted	0.0665	Accepted	No Causality
	Regime 3	1	0.0004	Rejected	0.2063	Rejected	Bidirectional
Bharat Electronic Ltd	Full Sample	8	0.000005	Rejected	0.000003	Rejected	Bidirectional
	Regime 1	3	0.000003	Rejected	0.7470	Accepted	Unidirectional
	Regime 2	1	0.1428	Accepted	0.1216	Accepted	No Causality
	Regime 3	8	0.00002	Rejected	0.0069	Rejected	Bidirectional
	Regime 4	3	0.1020	Accepted	0.3601	Accepted	No Causality
HCL Technologies	Full Sample	6	0.0475	Rejected	0.9132	Accepted	Unidirectional
	Regime 1	1	0.1170	Accepted	0.2800	Accepted	No Causality
	Regime 2	3	0.5156	Accepted	0.6846	Accepted	No Causality
	Regime 3	3	0.0135	Rejected	0.7325	Accepted	Unidirectional
	Regime 4	2	0.6138	Accepted	0.4570	Accepted	No Causality
HDFC Bank Ltd	Full Sample	6	0.000005	Rejected	0.2951	Accepted	Unidirectional
	Regime 1	1	0.7741	Accepted	0.0591	Accepted	No Causality
	Regime 2	1	0.0013	Rejected	0.6457	Accepted	Unidirectional
	Regime 3	1	0.000005	Rejected	0.0905	Accepted	Unidirectional
	Regime 4	2	0.1843	Accepted	0.0761	Accepted	No Causality
	Regime 5	2	0.2189	Accepted	0.0822	Accepted	No Causality
	Regime 6	1	0.1458	Accepted	0.3202	Accepted	No Causality
Chola Finance	Full Sample	8	0.0525	Accepted	0.4359	Accepted	No Causality
	Regime 1	8	0.0001	Rejected	0.2458	Accepted	Unidirectional
	Regime 2	5	0.0492	Rejected	0.6530	Accepted	Unidirectional
	Regime 3	2	0.000008	Rejected	0.3879	Accepted	Unidirectional
	Regime 4	1	0.3943	Accepted	0.4176	Accepted	No Causality
Canara Bank	Full Sample	8	0.000006	Rejected	0.000001	Rejected	Bidirectional
	Regime 1	1	0.0212	Rejected	0.0665	Accepted	Unidirectional
	Regime 2		0.0088	Rejected	0.9441	Accepted	Unidirectional
	Regime 3	5	0.0025	Rejected	0.2439	Accepted	Unidirectional
	Regime 4	2	0.5062	Accepted	0.6326	Accepted	No Causality
	Regime 5	2	0.6098	Accepted	0.000003	Rejected	Unidirectional
Godrej	Full Sample	7	0.000001	Rejected	0.8234	Accepted	Unidirectional
	Regime 1	2	0.0841	Rejected	0.9596	Accepted	Unidirectional
	Regime 2	2	0.0001	Rejected	0.4065	Accepted	Unidirectional
	Regime 3	1	0.0014	Rejected	0.7271	Accepted	Unidirectional
	Regime 4	1	0.0156	Rejected	0.7628	Accepted	Unidirectional
	Regime 5	1	0.3699	Accepted	0.6021	Accepted	No Causality
	Regime 6	1	0.1068	Accepted	0.5377	Accepted	No Causality
D Mart	Full Sample	6	0.000008	Rejected	0.0489	Accepted	Unidirectional
	Regime 1	1	0.0464	Accepted	0.4267	Accepted	No Causality
	Regime 2	3	0.1479	Accepted	0.0145	Rejected	Unidirectional
	Regime 3	2	0.8621	Accepted	0.0007	Rejected	Unidirectional
	Regime 4	1	0.0029	Rejected	0.6350	Accepted	Unidirectional
	Regime 5	1	0.7685	Accepted	0.0562	Accepted	No Causality
ICICI Bank	Full Sample	6	0.000005	Rejected	0.5171	Accepted	Unidirectional
	Regime 1	5	0.0344	Rejected	0.4273	Accepted	Unidirectional
	Regime 2	2	0.0869	Accepted	0.2355	Accepted	No Causality
	Regime 3	1	0.0148	Rejected	0.8729	Accepted	Unidirectional
Eternal	Full Sample	6	0.0043	Rejected	0.9921	Accepted	Unidirectional
	Regime 1	1	0.1944	Accepted	0.5474	Accepted	No Causality
	Regime 2	1	0.2178	Accepted	0.3790	Accepted	No Causality
	Regime 3	1	0.1262	Accepted	0.6121	Accepted	No Causality
	Regime 4	1	0.1154	Accepted	0.8573	Accepted	No Causality
Infosys	Full	4	0.2791	Accepted	0.0630	Accepted	No Causality

	Sample						
	Regime 1	1	0.1266	Accepted	0.8296	Accepted	No Causality
	Regime 2	1	0.0132	Rejected	0.0896	Accepted	Unidirectional
	Regime 3	2	0.4968	Accepted	0.1645	Accepted	No Causality
	Regime 4	1	0.0637	Accepted	0.6078	Accepted	No Causality
ITC Ltd	Full Sample	6	0.000006	Rejected	0.0062	Rejected	Bidirectional
	Regime 1	1	0.0068	Rejected	0.0089	Rejected	Bidirectional
	Regime 2	1	0.2882	Accepted	0.0027	Rejected	Unidirectional
	Regime 3	2	0.1939	Accepted	0.1436	Accepted	No Causality
	Regime 4	2	0.7254	Accepted	0.0026	Rejected	Unidirectional
	Regime 5	0	0.3536	Accepted	0.9107	Accepted	No Causality
JSW Steel	Full Sample	6	0.000009	Rejected	0.1424	Accepted	Unidirectional
	Regime 1	5	0.000005	Rejected	0.1854	Accepted	Unidirectional
	Regime 2	3	0.000007	Rejected	0.3871	Accepted	Unidirectional
	Regime 3	4	0.4756	Accepted	0.0288	Rejected	Unidirectional
	Regime 4	2	0.1084	Accepted	0.7399	Accepted	No Causality
	Regime 5	1	0.0018	Accepted	0.2648	Accepted	No Causality
Kotak Mahindra Bank	Full Sample	6	0.000002	Rejected	0.4110	Accepted	Unidirectional
	Regime 1	0	0.0368	Rejected	0.8684	Accepted	Unidirectional
	Regime 2	0	0.9545	Accepted	0.3350	Rejected	Unidirectional
	Regime 3	4	0.5793	Accepted	0.1736	Accepted	No Causality
	Regime 4	1	0.7477	Accepted	0.6709	Accepted	No Causality
	Regime 5	1	0.9710	Accepted	0.1010	Accepted	No Causality
	Regime 6	0	0.0955	Accepted	0.6260	Accepted	No Causality
Shriram Finance	Full Sample	8	0.000004	Rejected	0.000003	Rejected	Bidirectional
	Regime 1	1	0.8452	Accepted	0.9280	Accepted	No Causality
	Regime 2	4	0.000003	Rejected	0.4408	Accepted	Unidirectional
	Regime 3	2	0.0106	Rejected	0.8664	Accepted	Unidirectional
	Regime 4	1	0.0015	Rejected	0.0102	Rejected	Bidirectional
Maruti Suzuki	Full Sample	5	0.4879	Accepted	0.000001	Rejected	Unidirectional
	Regime 1	1	0.5164	Accepted	0.0007	Rejected	Unidirectional
	Regime 2	3	0.1230	Accepted	0.3565	Accepted	No Causality
	Regime 3	3	0.000003	Rejected	0.6882	Rejected	Bidirectional
	Regime 4	1	0.5043	Accepted	0.7068	Accepted	No Causality
	Regime 5	1	0.1255	Accepted	0.5385	Rejected	Unidirectional
	Regime 6	1	0.1387	Accepted	0.4029	Accepted	No Causality
NTPC Ltd	Full Sample	6	0.8641	Accepted	0.1411	Accepted	No Causality
	Regime 1	2	0.1112	Accepted	0.7468	Accepted	No Causality
	Regime 2	6	0.000002	Rejected	0.4647	Accepted	Unidirectional
	Regime 3	1	0.3982	Accepted	0.7941	Accepted	No Causality
	Regime 4	1	0.000007	Rejected	0.2920	Accepted	Unidirectional
	Regime 5	3	0.0353	Rejected	0.0339	Rejected	Bidirectional
SBI Life Ltd	Full Sample	5	0.00002	Rejected	0.7616	Accepted	Unidirectional
	Regime 1	5	0.0075	Rejected	0.8215	Accepted	Unidirectional
	Regime 2	2	0.0114	Rejected	0.7953	Accepted	Unidirectional
	Regime 3	1	0.0336	Rejected	0.8819	Accepted	Unidirectional
	Regime 4	2	0.0098	Rejected	0.1469	Accepted	Unidirectional
Sun Pharma	Full Sample	4	0.000002	Rejected	0.8672	Accepted	Unidirectional
	Regime 1	3	0.000002	Rejected	0.9873	Accepted	Unidirectional
	Regime 2	2	0.5584	Accepted	0.5370	Accepted	No Causality
	Regime 3	1	0.000002	Rejected	0.0146	Accepted	Unidirectional
	Regime 4	1	0.6578	Accepted	0.3861	Accepted	No Causality
	Regime 5	1	0.2954	Accepted	0.9911	Accepted	No Causality
Tata consumer products Ltd	Full Sample	7	0.0386	Rejected	0.4329	Accepted	Unidirectional
	Regime 1	3	0.5956	Accepted	0.5413	Accepted	No Causality
	Regime 2	1	0.03264	Rejected	0.7953	Accepted	Unidirectional
	Regime 3	3	0.3798	Accepted	0.3216	Accepted	No Causality
	Regime 4	1	0.4612	Accepted	0.07581·	Accepted	No Causality
	Regime 5	2	0.8431	Accepted	0.3928	Accepted	No Causality
	Regime 6	2	0.474	Accepted	0.2712	Accepted	No Causality
Tata Power	Full Sample	8	0.0736	Accepted	0.0168	Rejected	Unidirectional
	Regime 1	2	0.0667	Accepted	0.7367	Accepted	No Causality
	Regime 2	2	0.0198	Rejected	0.0404	Rejected	Bidirectional
	Regime 3	3	0.0135	Rejected	0.9857	Accepted	Unidirectional
	Regime 4	4	0.000009	Rejected	0.2429	Accepted	Unidirectional
Tata Steel	Full	8	0.000002	Rejected	0.0941	Accepted	Unidirectional

	Sample						
	Regime 1	1	0.0122	Rejected	0.8127	Accepted	Unidirectional
	Regime 2	5	0.0013	Rejected	0.0586	Accepted	Unidirectional
	Regime 3	3	0.2142	Accepted	0.3383	Accepted	No Causality
	Regime 4	3	0.6976	Accepted	0.2884	Accepted	No Causality
	Regime 5	2	0.3305	Accepted	0.8549	Accepted	No Causality
TCS Ltd	Full Sample	6	0.0014	Rejected	0.3342	Accepted	Unidirectional
	Regime 1	1	0.0301	Accepted	0.0966	Accepted	No Causality
	Regime 2	1	0.4120	Accepted	0.6336	Accepted	No Causality
	Regime 3	1	0.7919	Accepted	0.5311	Accepted	No Causality
	Regime 4	1	0.0330	Rejected	0.9597	Accepted	Unidirectional
	Regime 5	1	0.0099	Rejected	0.3406	Accepted	Unidirectional
	Regime 6	1	0.0151	Rejected	0.7566	Accepted	Unidirectional
Ultratech cement	Full Sample	6	0.0107	Rejected	0.0743	Accepted	Unidirectional
	Regime 1	1	0.5359	Accepted	0.8420	Accepted	No Causality
	Regime 2	2	0.0233	Rejected	0.0001	Rejected	Bidirectional
	Regime 3	1	0.0976	Accepted	0.9005	Accepted	No Causality
	Regime 4	2	0.0936	Accepted	0.3231	Accepted	No Causality
	Regime 5	2	0.0032	Rejected	0.0019	Rejected	Bidirectional
BPCL	Full Sample	7	0.000005	Rejected	0.0895	Accepted	Unidirectional
	Regime 1	2	0.0001	Rejected	0.5974	Accepted	Unidirectional
	Regime 2	3	0.0445	Rejected	0.0698	Accepted	Unidirectional
	Regime 3	0	0.7483	Accepted	0.4203	Accepted	No Causality
	Regime 4	3	0.0025	Rejected	0.9884	Accepted	Unidirectional
	Regime 5	4	0.5871	Accepted	0.7791	Accepted	No Causality
Indigo	Full Sample	4	0.0959	Accepted	0.4364	Accepted	No Causality
	Regime 1	2	0.0088	Rejected	0.1530	Accepted	Unidirectional
	Regime 2	2	0.6562	Accepted	0.8985	Accepted	No Causality
	Regime 3	2	0.0792	Accepted	0.6513	Accepted	No Causality
	Regime 4	1	0.000001	Rejected	0.1988	Accepted	Unidirectional
	Regime 5	1	0.0384	Rejected	0.6688	Accepted	Unidirectional
Wipro Ltd	Full Sample	4	0.000002	Rejected	0.0788	Accepted	Unidirectional
	Regime 1	1	0.7250	Accepted	0.0560	Accepted	No Causality
	Regime 2	3	0.000006	Rejected	0.0532	Accepted	Unidirectional
	Regime 3	3	0.0154	Rejected	0.42735	Accepted	Unidirectional
	Regime 4	2	0.0007	Rejected	0.1037	Accepted	Unidirectional
	Regime 5	1	0.2965	Accepted	0.6472	Accepted	No Causality
Jindal	Full Sample	8	0.000001	Rejected	0.8990	Accepted	Unidirectional
	Regime 1	4	0.0072	Rejected	0.1424	Accepted	Unidirectional
	Regime 2	6	0.0903	Accepted	0.1947	Accepted	No Causality
	Regime 3	1	0.0006	Rejected	0.9561	Accepted	Unidirectional
LTI Mindtree	Full Sample	3	0.5666	Accepted	0.9253	Accepted	No Causality
	Regime 1	1	0.3314	Accepted	0.0974	Accepted	No Causality
	Regime 2	1	0.5309	Accepted	0.7088	Accepted	No Causality
	Regime 3	1	0.0028	Rejected	0.8264	Accepted	Unidirectional
	Regime 4	0	0.5454	Accepted	0.5340	Accepted	No Causality
Vedantu	Full Sample	8	0.000001	Rejected	0.4804	Accepted	Unidirectional
	Regime 1	7	0.000001	Rejected	0.2463	Accepted	Unidirectional
	Regime 2	2	0.0044	Rejected	0.6220	Accepted	Unidirectional
	Regime 3	2	0.0864	Rejected	0.6126	Accepted	Unidirectional
	Regime 4	2	0.0276	Rejected	0.3295	Accepted	Unidirectional
	Regime 5	3	0.0565	Accepted	0.3008	Accepted	No Causality
Bajaj Auto	Full Sample	8	0.8960	Accepted	0.3763	Accepted	No Causality
	Regime 1	1	0.9962	Accepted	0.6145	Accepted	No Causality
	Regime 2	2	0.8020	Accepted	0.8121	Accepted	No Causality
	Regime 3	2	0.1999	Accepted	0.0177	Rejected	Unidirectional
	Regime 4	2	0.0649	Accepted	0.5317	Accepted	No Causality
Indian Bank	Full Sample	8	0.1661	Accepted	0.8334	Accepted	No Causality
	Regime 1	3	0.0019	Rejected	0.4247	Accepted	Unidirectional
	Regime 2	1	0.0038	Rejected	0.0311	Rejected	Unidirectional
	Regime 3	1	0.0043	Rejected	0.4069	Accepted	Unidirectional
	Regime 4	1	0.3061	Accepted	0.5432	Accepted	Unidirectional
Nestle	Full Sample	5	0.000002	Rejected	0.9117	Accepted	Unidirectional
	Regime 1	5	0.000007	Rejected	0.7535	Accepted	Unidirectional
	Regime 2	1	0.2488	Accepted	0.4233	Rejected	Unidirectional

	Regime 3	1	0.0003	Rejected	0.5151	Accepted	Unidirectional
	Regime 4	1	0.5140	Accepted	0.6914	Accepted	No Causality
Idea	Full Sample	8	0.000001	Rejected	0.7295	Accepted	Unidirectional
	Regime 1	1	0.0033	Rejected	0.9979	Accepted	No Causality
	Regime 2	2	0.0792	Accepted	0.5627	Rejected	Unidirectional
	Regime 3	8	0.8026	Rejected	0.0056	Rejected	Bidirectional
Punjab National Bank	Full Sample	8	0.000002	Rejected	0.6176	Accepted	Unidirectional
	Regime 1	1	0.0245	Rejected	0.3485	Rejected	Bidirectional
	Regime 2	1	0.4203	Accepted	0.0267	Accepted	Unidirectional
	Regime 3	5	0.2777	Accepted	0.4623	Accepted	Unidirectional
	Regime 4	4	0.0999	Accepted	0.0971	Accepted	No Causality
	Regime 5	3	0.8356	Accepted	0.0277	Rejected	Unidirectional
DFL	Full Sample	7	0.000001	Rejected	0.0889	Accepted	Unidirectional
	Regime 1	3	0.5144	Accepted	0.0297	Rejected	Unidirectional
	Regime 2	2	0.0880	Accepted	0.3169	Accepted	No Causality
	Regime 3	2	0.4681	Accepted	0.0188	Rejected	Unidirectional
Tech Mahindra	Full Sample	8	0.0012	Rejected	0.5020	Accepted	Unidirectional
	Regime 1	2	0.2310	Accepted	0.7106	Accepted	No Causality
	Regime 2	1	0.1991	Accepted	0.0850	Accepted	No Causality
	Regime 3	1	0.0408	Rejected	0.7667	Accepted	Unidirectional
	Regime 4	1	0.1538	Accepted	0.7318	Accepted	No Causality
	Regime 5	2	0.3455	Accepted	0.0100	Rejected	Unidirectional
L & T	Full Sample	8	0.00003	Rejected	0.4606	Accepted	Unidirectional
	Regime 1	1	0.0014	Rejected	0.4581	Accepted	Unidirectional
	Regime 2	1	0.000007	Rejected	0.0084	Rejected	Bidirectional
	Regime 3	1	0.0250	Rejected	0.8540	Accepted	Unidirectional
	Regime 4	1	0.0012	Rejected	0.6132	Accepted	Unidirectional
	Regime 5	1	0.0098	Rejected	0.7606	Accepted	Unidirectional
Power Grid	Full Sample	8	0.000004	Rejected	0.6567	Accepted	Unidirectional
	Regime 1	2	0.0673	Accepted	0.4156	Accepted	No Causality
	Regime 2	2	0.0580	Accepted	0.0235	Rejected	Unidirectional
	Regime 3	1	0.0174	Rejected	0.5512	Accepted	Unidirectional
	Regime 4	2	0.000002	Rejected	0.5156	Accepted	Unidirectional
	Regime 5	2	0.2589	Accepted	0.8914	Accepted	No Causality
TVS Motor	Full Sample	4	0.000009	Rejected	0.8438	Accepted	Unidirectional
	Regime 1	1	0.000009	Rejected	0.0406	Rejected	Bidirectional
	Regime 2	2	0.0711	Accepted	0.1773	Accepted	No Causality
	Regime 3	0	0.0421	Rejected	0.3491	Accepted	Unidirectional
	Regime 4	1	0.0385	Rejected	0.2567	Accepted	Unidirectional
Ambuja Cement	Full Sample	4	0.1207	Accepted	0.0353	Rejected	Unidirectional
	Regime 1	1	0.9668	Accepted	0.3877	Accepted	No Causality
	Regime 2	5	0.7306	Accepted	0.7854	Accepted	No Causality
	Regime 3	3	0.0130	Rejected	0.0131	Rejected	Bidirectional
	Regime 4	1	0.0459	Rejected	0.2358	Accepted	Unidirectional
Union Bank	Full Sample	8	0.4349	Accepted	0.0354	Rejected	Unidirectional
	Regime 1	1	0.0159	Rejected	0.7914	Accepted	Unidirectional
	Regime 2	3	0.0099	Rejected	0.1426	Accepted	Unidirectional
	Regime 3	1	0.0006	Rejected	0.6402	Accepted	Bidirectional
	Regime 4	3	0.000004	Rejected	0.4587	Accepted	Unidirectional
	Regime 5	2	0.0928	Accepted	0.0118	Rejected	Unidirectional

Table presents the results of the Granger Causality Test examining the causal relationship between stock returns and trading volume of companies in the NIFTY 50 index. The results show that the relationship between stock returns and trading volume varies across different firms and time periods. For many companies, the findings indicate unidirectional causality from stock returns to trading volume, suggesting that price movements influence investors' trading decisions. In some regimes, bidirectional causality is observed, indicating a feedback relationship where trading activity and price changes influence each other. However, a few firms show no significant causal relationship during certain periods. Overall, the results reveal that the price–volume relationship is time-varying and regime-dependent, reflecting changing market conditions and investor behavior.

V. Conclusion

This study examined the relationship between stock returns and trading volume for selected companies listed in the Nifty 50 index. The descriptive statistics and empirical analysis indicate that the relationship between returns and trading volume varies across companies. In some firms, trading activity shows a noticeable association with stock returns, while in others the relationship is weak or insignificant. This suggests that trading volume alone cannot fully explain stock price movements. Stock returns are also influenced by several other factors such as company-specific performance, macroeconomic conditions, investor sentiment, and market-wide information. Therefore, understanding stock price behavior requires considering multiple factors rather than relying only on trading volume.

CONFLICT OF INTEREST

The authors declare no conflict of interest

AUTHOR CONTRIBUTIONS

S. Lakshmi Priya contributed to the conceptualization of the study, data collection, data analysis, interpretation of results, and manuscript writing. S. Gopi contributed to research supervision, methodology validation and review of the analysis. Both authors reviewed and approved the final version of the manuscript.

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