

SHARE PRICE MOVEMENT AND VOLATILITY ANALYSIS OF SELECTED FMCG STOCKS IN INDIA: EVIDENCE FROM TECHNICAL INDICATORS AND GARCH MODELS

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Abstract

The Fast-Moving Consumer Goods (FMCG) sector is regarded as one of the most resilient sectors in the Indian economy due to its stable demand and defensive characteristics. This study examines the share price movement and volatility behaviour of selected FMCG companies listed on the National Stock Exchange (NSE) of India, namely Hindustan Unilever Limited, ITC Limited, Nestle India Limited, Tata Consumer Products Limited, and Britannia Industries Limited, during the period January 2016 to April 2026. The study employs technical indicators, including Moving Average (MA), Rate of Change (ROC), and Relative Strength Index (RSI), to evaluate price trends and momentum. Further, volatility characteristics are analysed using the Augmented Dickey-Fuller (ADF) test, ARCH-LM test, GARCH (1, 1), GARCH-M (1, 1), and EGARCH (1,1) models. The empirical findings reveal significant volatility clustering and persistent conditional variance across all selected stocks, indicating that current volatility is influenced by past shocks. HUL and Nestle India exhibit the highest volatility persistence, whereas Britannia Industries and Tata Consumer Products demonstrate significant asymmetric responses to negative information. The GARCH-M results indicate an insignificant risk-return relationship, suggesting that returns are driven more by business fundamentals than by short-term market risk. The study contributes to the literature by integrating technical analysis and GARCH-family models to provide a comprehensive understanding of price movement, volatility persistence, risk-return dynamics, and asymmetric volatility behaviour in the Indian FMCG sector. The findings offer useful implications for investors, portfolio managers, and researchers in designing risk management and portfolio diversification strategies.

Keywords: FMCG Stocks, Technical Indicators, Volatility Clustering, GARCH Models, EGARCH, Risk-Return Relationship, NSE India.

.1.Introduction

The stock market serves as a critical mechanism for capital formation and economic growth. Investors continuously seek sectors that offer stable returns while minimizing risk. Among the various sectors listed on Indian stock exchanges, the FMCG sector has attracted considerable attention due to its resilience during economic downturns and consistent consumer demand.

Despite being categorized as a defensive sector, FMCG stocks experience fluctuations influenced by macroeconomic conditions, consumer behavior, inflation, interest rates, and firm-specific developments. Understanding the dynamics of stock price movement and volatility is essential for investors seeking to optimize portfolio performance.

This study investigates the share price movement and volatility patterns of selected FMCG companies using technical analysis indicators and advanced econometric volatility models.

2. Theoretical Foundation

2.1 Efficient Market Hypothesis (EMH)

The Efficient Market Hypothesis (EMH), proposed by Fama (1970), suggests that stock prices fully and instantaneously reflect all available information. According to the weak-form efficiency hypothesis, historical price information and trading patterns should not consistently generate abnormal returns. However, the existence of volatility clustering, persistence, and predictable patterns in stock returns challenges the strict assumptions of market efficiency. Technical indicators such as Moving Average (MA), Relative Strength Index (RSI), and Rate of Change (ROC) are commonly used to identify trends and momentum in stock prices. The application of GARCH-family models further enables the analysis of time-varying volatility, thereby providing evidence regarding the predictability of stock market behaviour. Hence, the present study examines the share price movement and volatility characteristics of selected Indian FMCG stocks within the framework of market efficiency.

2.2 Modern Portfolio Theory (MPT)

Modern Portfolio Theory, developed by Markowitz (1952), emphasizes the trade-off between risk and return and advocates portfolio diversification to maximize expected returns while minimizing risk. According to the theory, investors can reduce unsystematic risk by combining assets with different return and volatility characteristics. Since volatility represents an important measure of investment risk, understanding the behaviour of stock return volatility is essential for effective portfolio construction and asset allocation. The present study contributes to portfolio management by examining the volatility persistence and risk characteristics of selected FMCG stocks using GARCH-family models, thereby providing valuable information for diversification and investment decisions.

2.3 Risk-Return Trade-Off Theory

The Risk-Return Trade-Off Theory states that investors expect higher returns as compensation for bearing higher levels of risk. This relationship forms the foundation of many financial asset pricing models. The GARCH-M (Generalized Autoregressive Conditional Heteroskedasticity-in-Mean) model incorporates conditional volatility directly into the mean equation to examine whether higher risk leads to higher expected returns. A significant risk premium coefficient indicates the existence of a positive relationship between risk and return. Therefore, the present

study employs the GARCH-M model to investigate whether conditional volatility significantly influences stock returns of selected FMCG companies and to assess the validity of the risk-return trade-off in the Indian FMCG sector.

1. Literature Review

Shah and Sharma (2020) examined volatility transmission among major Indian sectoral indices using GARCH models and found significant volatility persistence across sectors, with defensive sectors exhibiting lower volatility than cyclical industries.

Bhowmik and Wang (2020) investigated stock market volatility during the COVID-19 pandemic and reported substantial increases in conditional volatility across global equity markets. Their findings highlighted the effectiveness of GARCH-family models in capturing crisis-induced volatility.

Rossi and Timmermann (2021) reviewed advances in financial forecasting and emphasized that volatility clustering and persistence remain dominant characteristics of stock returns, supporting the continued relevance of GARCH-based forecasting models.

Karmakar and Chakraborty (2021) analysed volatility behaviour in Indian equity markets and found significant ARCH effects and long-memory volatility persistence, suggesting that past shocks continue to influence future market movements.

Salisu and Gupta (2021) examined the impact of economic uncertainty on stock market volatility and concluded that uncertainty shocks significantly increase market risk, particularly during periods of financial stress.

Singh and Sharma (2022) evaluated the volatility dynamics of selected Indian FMCG companies using GARCH models and reported strong volatility clustering and persistence, reinforcing the defensive nature of FMCG stocks despite market fluctuations.

Bouri, Demirer, Gupta, and Pierdzioch (2022) investigated asymmetric volatility in emerging stock markets and documented significant leverage effects, where negative information generated larger volatility responses than positive news.

Choudhary and Sinha (2022) studied sectoral stock performance in India and found that FMCG stocks outperformed several cyclical sectors during periods of economic uncertainty, demonstrating greater resilience and lower downside risk.

Ahmed and Hossain (2023) applied EGARCH and TGARCH models to stock market indices and observed significant asymmetric volatility effects, confirming the importance of accounting for leverage behaviour in financial modelling.

Patel and Mehta (2023) examined technical indicators including Moving Average, RSI, and ROC in the Indian equity market and reported that momentum-based indicators provide useful signals for medium-term investment decisions.

Khan, Rahman, and Ali (2023) investigated volatility persistence in emerging markets and found that GARCH(1,1) models consistently outperform traditional variance estimation techniques in forecasting market risk.

Gupta and Verma (2024) analysed post-pandemic stock market volatility in India and reported that volatility persistence remained elevated across sectors, although defensive industries such as FMCG demonstrated relatively faster recovery.

Alim et al. (2024) investigated the impact of political stability on stock market returns and volatility using GARCH and EGARCH models. Their findings revealed significant volatility

persistence and asymmetric effects, demonstrating that negative news exerts a stronger influence on market volatility than positive information.

Abid, Saghir, and Beg (2025) analysed the volatility dynamics of Indian stock market indices using GARCH, EGARCH, and TGARCH models. The study reported strong volatility clustering and persistence in both conventional and sustainability-focused indices.

Kemezang et al. (2025) examined the volatility behaviour of major stock market indices using various GARCH specifications. Their findings confirmed that current volatility is significantly influenced by historical shocks and past variance.

Sözen (2025) conducted a comparative analysis of cryptocurrency volatility using GARCH-family models and reported strong volatility persistence and asymmetric responses to market information.

Pastpipatkul and Ko (2025) proposed a Bayesian Time-Varying Realized GARCH framework and demonstrated that time-varying volatility models improve forecasting accuracy during periods of market uncertainty.

Leushuis and Petkov (2026) reviewed recent developments in volatility forecasting and concluded that GARCH-family models continue to remain among the most widely accepted approaches for modelling financial market volatility despite advances in machine learning techniques.

3.1 Research Gap

Although previous studies have examined stock price trends, technical indicators, and volatility behaviour separately, limited evidence exists on integrating technical analysis and GARCH-family models within the Indian FMCG sector. Existing studies have primarily focused either on momentum indicators or on volatility estimation independently. Furthermore, studies investigating risk-return relationships through GARCH-M models and asymmetric volatility through EGARCH models for individual FMCG companies are scarce. No comprehensive study has simultaneously employed **technical indicators (MA, ROC, and RSI), ARCH, GARCH (1,1), GARCH-M (1,1), and EGARCH (1,1)** to examine price movement, volatility persistence, risk-return dynamics, and leverage effects of leading Indian FMCG stocks during the post-pandemic period. The present study addresses this gap by providing an integrated framework for analysing share price behaviour and volatility characteristics of selected FMCG companies listed on the National Stock Exchange of India.

4. Research Objectives

- To analyze the share price movement of selected FMCG stocks using technical indicators.
- To examine stock return characteristics using descriptive statistical measures.
- To evaluate volatility persistence through ARCH and GARCH models.
- To investigate risk-return relationships using GARCH-M models.
- To identify asymmetric volatility affects using EGARCH models.

4.1 Hypotheses Development

H1: FMCG stock returns exhibit volatility clustering.

H2: GARCH-family models effectively capture stock volatility.

H3: Asymmetric effects exist in selected FMCG stocks.

5. Research Methodology

Research Design

The study adopts descriptive and analytical research designs.

Data Source

Secondary data were collected from stock market databases and financial information sources covering the period from 1st Jan 2016 to 30th April 2026

Sample Selection

The study considers five leading FMCG companies:

- Hindustan Unilever Limited (HUL)
- ITC Limited
- Nestlé India Limited
- Tata Consumer Products Limited
- Britannia Industries Limited

Analytical Tools

Analysis – views Software used

Technical Analysis

- Moving Average (MA)
- Rate of Change (ROC)
- Relative Strength Index (RSI)

Volatility Models

- Augmented Dickey-Fuller Test (ADF)
- ARCH Model
- GARCH (1,1)
- GARCH-M (1,1)
- EGARCH (1,1)

Return Equation

$$R_t = \ln (P_t/P_{t-1})$$

ARCH(1)

$$h_t = \omega + \alpha \varepsilon_{t-1}^2$$

GARCH(1,1)

$$H_t = \omega + \alpha \varepsilon_{t-1}^2 + \beta h_{t-1}$$

GARCH-M

$$R_t = \mu + \lambda h_t + \varepsilon_t$$

EGARCH (1,1)

$$\ln(h_t) = \omega + \beta \ln(h_{t-1}) + \alpha (|\varepsilon_{t-1}| / \sqrt{h_{t-1}} - E[|\varepsilon_{t-1}| / \sqrt{h_{t-1}}]) + \gamma (\varepsilon_{t-1} / \sqrt{h_{t-1}})$$

6. Technical Analysis

Moving Average (MA), Rate of Change (ROC), Relative Strength Index (RSI)

Hindustan Unilever Moving Average (MA), Rate of Change (ROC), Relative Strength Index (RSI)

Year	Moving Average (MA)	ROC	RSI
2016	822.39	102.93	55.10
2017	1,305.23	107.16	67.01
2018	1,788.05	106.66	59.38
2019	2,004.30	93.52	35.96
2020	2,262.14	110.00	65.11
2021	2,323.51	98.36	46.46
2022	2,617.50	103.11	55.40
2023	2,534.51	107.14	68.56
2024	2,406.59	97.39	44.84
2025	2,347.29	96.34	41.60
2026	2,174.76	104.21	54.88

The share price movement of Hindustan Unilever Ltd. (HUL) during the period 2016–2026 indicates a predominantly upward trend, reflecting the company's strong market position and consistent financial performance. The Moving Average (MA) increased substantially from **822.39 in 2016** to **2,617.50 in 2022**, highlighting sustained long-term growth in the stock price. Although the moving average declined moderately after 2022, reaching **2,174.76 in 2026**, the overall trend remained significantly above the levels observed in the initial years of the study period.

The Rate of Change (ROC) values remained above 100 in most years, indicating positive price momentum and investor confidence. Strong momentum was particularly evident in **2017 (107.16)**, **2020 (110.00)**, **2023 (107.14)**, and **2026 (104.21)**. However, ROC values below 100 in **2019 (93.52)**, **2021 (98.36)**, **2024 (97.39)**, and **2025 (96.34)** suggest temporary corrections and periods of slower price appreciation.

The Relative Strength Index (RSI) fluctuated between **35.96 and 68.56**, remaining largely within the neutral zone of 30–70. The highest RSI value of **68.56 in 2023** indicates strong buying interest, while the lower RSI of **35.96 in 2019** reflects temporary selling pressure. Since RSI never crossed 70, the stock did not enter a strongly overbought condition during the study period.

ITC Moving Average (MA), Rate of Change (ROC), Relative Strength Index (RSI) – 2016 – 2026

Year	Moving Average (MA)	ROC	RSI
2016	230.36	106.06	57.53
2017	259.85	103.19	56.83
2018	279.70	102.60	54.51
2019	242.78	94.80	39.42
2020	203.07	111.56	64.90
2021	222.70	91.81	39.69
2022	330.06	91.97	32.89
2023	425.32	104.56	59.18

2024	445.89	103.80	58.54
2025	402.92	99.30	47.45
2026	301.33	104.46	56.56

The share price movement of ITC Ltd. during the period 2016–2026 exhibits a generally upward trend with intermittent periods of correction and recovery. The Moving Average (MA) increased from **230.36 in 2016** to **445.89 in 2024**, reflecting long-term price appreciation and improved investor confidence. However, the MA declined to **402.92 in 2025** and further to **301.33 in 2026**, indicating a moderation in price growth during the later years of the study period.

The Rate of Change (ROC) values suggest varying momentum throughout the period. Positive momentum was observed in **2016–2018**, with ROC values remaining above 100. The stock experienced a decline in momentum during **2019 (94.80)** due to market corrections. A strong recovery occurred in **2020**, when the ROC reached **111.56**, indicating significant buying interest and price appreciation. Momentum weakened again in **2021 (91.81)** and **2022 (91.97)** before improving in **2023 (104.56)**, **2024 (103.80)**, and **2026 (104.46)**. These fluctuations suggest that ITC's share price was influenced by both market conditions and company-specific developments.

The Relative Strength Index (RSI) remained largely within the neutral range of 30–70 throughout the study period, varying between **32.89 and 64.90**. The highest RSI value of **64.90 in 2020** reflects strong buying pressure, while the lower values in **2021 and 2022** indicate temporary weakness in market sentiment. Since the RSI did not exceed 70, the stock did not enter an overbought zone during the study period.

NESTLE Moving Average (MA), Rate of Change (ROC), Relative Strength Index (RSI) – 2016 – 2026

Year	Moving Average (MA)	ROC	RSI
2016	300.29	102.50	54.91
2017	382.06	102.98	57.51
2018	528.39	105.94	57.62
2019	719.26	104.97	60.20
2020	897.90	108.29	61.34
2021	961.82	101.55	53.26
2022	996.77	98.40	46.77
2023	1,240.59	109.95	69.06
2024	1,108.95	99.42	48.66
2025	1,253.47	101.81	54.81
2026	1,271.03	121.33	75.17

The share price movement of Nestle India Ltd. during the period 2016–2026 reflects a strong and consistent upward trend, highlighting the company's robust market performance and strong investor confidence. The Moving Average (MA) increased steadily from **300.29 in 2016** to **1,271.03 in 2026**, indicating substantial long-term capital appreciation. Although a temporary

decline was observed in **2024 (1,108.95)**, the stock quickly recovered and reached its highest moving average level by 2026, demonstrating resilience and sustained growth.

The Rate of Change (ROC) values remained above 100 in most years, signifying positive price momentum throughout the study period. The stock exhibited particularly strong momentum in **2020 (108.29)**, **2023 (109.95)**, and **2026 (121.33)**, reflecting increased buying activity and strong market performance. The slight decline in momentum during **2022 (98.40)** and **2024 (99.42)** indicates brief periods of consolidation rather than a reversal of the overall upward trend.

The Relative Strength Index (RSI) ranged between **46.77 and 75.17**, remaining largely within the neutral zone for most of the study period. The RSI gradually increased over time, reaching **69.06 in 2023**, which signaled strong buying interest. In **2026**, the RSI rose to **75.17**, crossing the overbought threshold of 70 and indicating exceptionally strong bullish sentiment. While this suggests continued investor optimism, it also points to the possibility of short-term price corrections due to profit-booking activities.

TACN Moving Average (MA), Rate of Change (ROC), Relative Strength Index (RSI) – 2016 - 2026

Year	Moving Average (MA)	ROC	RSI
2016	121.18	101.58	52.21
2017	287.65	125.58	72.70
2018	214.29	99.07	48.70
2019	314.20	105.26	56.74
2020	560.69	113.81	66.09
2021	754.19	89.35	36.02
2022	785.20	98.87	47.68
2023	947.76	116.91	82.41
2024	930.43	98.89	48.36
2025	1,168.92	103.28	56.97
2026	1,092.68	105.63	57.26

The share price movement of Tata Consumer Products Ltd. during the period 2016–2026 indicates a strong growth trajectory accompanied by periods of high momentum and occasional corrections. The Moving Average (MA) increased substantially from **121.18 in 2016** to **1,168.92 in 2025**, reflecting significant long-term appreciation in the stock price. Although temporary declines were observed in **2018**, **2024**, and **2026**, the overall trend remained strongly positive, highlighting the company's successful expansion strategies, brand development, and growing market presence.

The Rate of Change (ROC) values demonstrate strong momentum throughout most of the study period. Exceptionally high ROC values were recorded in **2017 (125.58)**, **2020 (113.81)**, and **2023 (116.91)**, indicating periods of substantial price appreciation and strong investor demand. Temporary declines in momentum were observed in **2018 (99.07)**, **2021 (89.35)**, **2022 (98.87)**, and **2024 (98.89)**, suggesting short-term consolidation phases following rapid growth.

Nevertheless, the stock regained positive momentum in **2025** and **2026**, with ROC values exceeding 100.

The Relative Strength Index (RSI) fluctuated between **36.02** and **82.41**, indicating varying market sentiment over the study period. The RSI crossed the overbought threshold in **2017 (72.70)** and reached a peak of **82.41 in 2023**, reflecting exceptionally strong buying pressure and bullish market sentiment. Conversely, the lower RSI value of **36.02 in 2021** suggests a temporary period of weakness and potential undervaluation. The RSI remained within the neutral range during most other years, indicating balanced market conditions.

BRITANNIA Moving Average (MA), Rate of Change (ROC), Relative Strength Index (RSI) – 2016 – 2026

Year	Moving Average (MA)	ROC	RSI
2016	1,466.14	99.44	49.01
2017	2,386.63	99.42	48.56
2018	3,068.00	107.09	59.22
2019	3,070.02	96.40	40.21
2020	3,616.94	101.90	54.77
2021	3,557.35	100.96	51.74
2022	4,355.73	104.90	60.20
2023	4,924.37	113.32	74.42
2024	4,840.43	96.89	43.19
2025	5,935.03	103.27	57.70
2026	5,637.28	98.58	48.07

The share price movement of Britannia Industries Ltd. during the period 2016–2026 demonstrates a strong long-term upward trend, reflecting the company's solid financial performance, brand strength, and sustained investor confidence. The Moving Average (MA) increased significantly from **1,466.14 in 2016** to **5,935.03 in 2025**, indicating substantial appreciation in the stock price over the study period. Although minor declines were observed in **2021**, **2024**, and **2026**, the overall trend remained strongly positive, highlighting the stock's resilience and long-term growth potential.

The Rate of Change (ROC) values indicate varying levels of momentum throughout the period. Momentum remained relatively subdued during **2016 (99.44)** and **2017 (99.42)** but improved considerably in **2018 (107.09)**, signaling stronger buying interest. A temporary slowdown occurred in **2019 (96.40)**, followed by renewed positive momentum in **2020 (101.90)**, **2022 (104.90)**, and particularly **2023 (113.32)**, which represents the highest momentum level during the study period. The decline in ROC values during **2024 (96.89)** and **2026 (98.58)** suggests short-term consolidation and profit-booking after periods of strong price appreciation.

The Relative Strength Index (RSI) ranged from **40.21 to 74.42**, indicating generally healthy market sentiment. The RSI remained within the neutral range for most years, suggesting balanced buying and selling pressure. However, in **2023**, the RSI reached **74.42**, crossing the overbought threshold of 70 and indicating exceptionally strong investor demand and bullish market sentiment. This also suggests the possibility of short-term price corrections due to

overvaluation concerns. The lower RSI values in **2019 (40.21)** and **2024 (43.19)** reflect periods of relatively weaker momentum and market consolidation.

Comparative Performance of Selected Stocks

Company	Return Performance	Price Trend	Risk (Volatility)	Overall Assessment
Nestle India	Highest mean return (58.12)	Strong uptrend	Lowest standard deviation (8.30)	Excellent
Tata Consumer Products	High return (56.83)	Strong uptrend	Highest volatility (12.92)	High-growth but risky
Britannia Industries	Good return (53.37)	Strong uptrend	Moderate volatility	Strong performer
HUL	Stable return (54.03)	Steady uptrend	High volatility persistence but stable	Safe investment
ITC	Lowest return (51.59)	Moderate growth	Moderate volatility	Average performer

The analysis of selected FMCG stocks reveals that all companies exhibited positive long-term growth and demonstrated the defensive nature of the sector. Nestle India emerged as the best overall performer, combining the highest average return, strong upward price trend, and the lowest volatility. Tata Consumer Products delivered high returns and significant growth potential, although accompanied by greater risk. Britannia Industries showed strong performance with moderate volatility, while HUL provided stable returns and served as a relatively safer investment option. ITC recorded comparatively lower returns and moderate growth. Overall, Nestle India appears to be the most attractive stock for long-term investors.

Volatility Models

The volatility behaviour of five major Indian FMCG companies—Hindustan Unilever Ltd. (HUL), Britannia Industries Ltd., ITC Ltd., Nestle India Ltd., and Tata Consumer Products Ltd.—was examined using ARCH, GARCH(1,1), GARCH-M(1,1), and EGARCH(1,1) models over the period 1st Jan 2016 to 30th April 2026.

Descriptive Statistics Table:

Company	Mean Return	Std. Dev.	Skewness	Kurtosis	Jarque-Bera
HUL	54.03	10.76	-0.189	1.886	0.634
ITC	51.59	10.18	-0.644	2.096	1.135
NESTLE	58.12	8.30	0.700	2.882	0.905
BRITANNIA	53.37	9.46	0.774	3.334	1.150
TATA CONSUMER	56.83	12.92	0.511	2.781	0.501

Table presents the descriptive statistics for the selected FMCG companies over the period January 2016 – March 2026. Among the sample companies, **Nestle** recorded the highest mean value (58.12), followed by **Tata Consumer** (56.83), indicating relatively stronger average performance. **ITC** exhibited the lowest mean value (51.59). In terms of variability, **Tata Consumer** showed the highest standard deviation (12.92), implying greater fluctuations, whereas **Nestle** had the lowest standard deviation (8.30), suggesting comparatively stable movements.

The skewness values reveal that **Nestle**, **Britannia**, and **Tata Consumer** are positively skewed, indicating a tendency towards higher positive observations. Conversely, **HUL** and **ITC** exhibit negative skewness, suggesting a relatively greater occurrence of lower values. The kurtosis values are close to or below three for most companies, implying either mesokurtic or slightly platykurtic distributions, except **Britannia**, which displays a marginally leptokurtic pattern.

Further, the Jarque–Bera statistics and their associated probability values indicate that all series have p-values greater than 0.05. Hence, the null hypothesis of normality cannot be rejected, implying that the distributions of the selected companies approximately follow a normal distribution. Overall, the results suggest moderate variability and reasonably stable statistical properties among the selected FMCG stocks during the study period.

Augmented Dickey–Fuller (ADF) Unit Root Test Results

Company	ADF Statistic	p-value	Decision
HUL	-3.751	0.0035	Stationary (Reject H_0)
ITC	-3.584	0.0061	Stationary (Reject H_0)
NESTLE	-1.691	0.4356	Non-stationary (Fail to Reject H_0)
BRITANNIA	-3.815	0.0028	Stationary (Reject H_0)
TATA CONSUMER	-2.880	0.0477	Stationary (Reject H_0)

Table presents the results of the Augmented Dickey–Fuller (ADF) unit root test conducted to examine the stationarity properties of the selected FMCG companies. The findings reveal that **HUL** (ADF = -3.751, $p = 0.0035$), **ITC** (ADF = -3.584, $p = 0.0061$), **Britannia** (ADF = -3.815, $p = 0.0028$), and **Tata Consumer** (ADF = -2.880, $p = 0.0477$) have p-values below the 5 percent significance level. Therefore, the null hypothesis of the presence of a unit root is rejected, indicating that these series are stationary at level.

In contrast, **Nestle** records an ADF statistic of -1.691 with a p-value of 0.4356, which exceeds the 0.05 significance level. Hence, the null hypothesis cannot be rejected, suggesting that the series is non-stationary at level and may require differencing before further time-series modeling.

Overall, the ADF test results indicate that most of the selected FMCG companies exhibit stationary behavior, implying stable statistical properties over the study period. However, the Nestle series displays non-stationarity, highlighting the need for transformation before

applying advanced econometric techniques such as ARCH, GARCH, GARCH-M, or EGARCH models.

GARCH (1,1) Results for Selected FMCG Companies

Company	ω (Constant)	α (ARCH)	β (GARCH)	$\alpha + \beta$	Volatility Persistence
HUL	0.1117	0.0592	0.8755	0.9347	High
Britannia	0.0000374	0.1559	0.6633	0.8193	Moderate
ITC	0.0000403	0.1537	0.6805	0.8342	Moderate
Nestlé	0.0000110	0.0615	0.8789	0.9404	High
Tata Consumer	0.0000489	0.1312	0.7265	0.8577	Moderate

The estimated GARCH (1,1) parameters for the selected FMCG companies. The positive values of the ARCH (α) and GARCH (β) coefficients across all companies indicate that current volatility is influenced by both recent shocks and past conditional variance, confirming the presence of volatility clustering in stock returns.

Among the selected firms, **Hindustan Unilever Ltd. (HUL)** recorded an ARCH coefficient of 0.0592 and a GARCH coefficient of 0.8755, resulting in a persistence measure ($\alpha + \beta$) of 0.9347. Since the sum of the coefficients is close to unity but less than one, the volatility process is highly persistent and mean-reverting. This suggests that volatility shocks tend to dissipate slowly, causing prolonged periods of high or low volatility.

Similarly, **Nestle India Ltd.** exhibited the highest volatility persistence with an $\alpha + \beta$ value of 0.9404. The relatively low ARCH coefficient (0.0615) and high GARCH coefficient (0.8789) imply that past volatility exerts a stronger influence on current volatility than recent market shocks. Therefore, volatility in Nestle returns tends to remain elevated for a longer period, indicating a high degree of persistence.

Britannia Industries reported an ARCH coefficient of 0.1559 and a GARCH coefficient of 0.6633, with a combined persistence value of 0.8193. Although volatility persistence exists, it is comparatively lower than that of HUL and Nestlé. This indicates that volatility shocks are absorbed more quickly, leading to a moderate degree of persistence and a relatively faster return to the long-run variance.

ITC Ltd. recorded α and β coefficients of 0.1537 and 0.6805, respectively, resulting in an $\alpha + \beta$ value of 0.8342. The findings suggest moderate volatility persistence, implying that both recent innovations and past volatility significantly affect the conditional variance, but the impact of shocks gradually diminishes over time.

Tata Consumer Products Ltd., the ARCH and GARCH coefficients were estimated at 0.1312 and 0.7265, respectively, producing a persistence measure of 0.8577. The results indicate moderate volatility persistence and confirm that volatility clustering is present in the stock returns. The value of $\alpha + \beta$ being less than one signifies that the variance process is stationary and mean-reverting.

Overall, the GARCH (1,1) results reveal that all selected FMCG stocks exhibit persistent volatility, with **HUL and Nestle displaying high persistence**, whereas **Britannia, ITC, and Tata Consumer show moderate persistence**. Since the sum of the ARCH and GARCH

coefficients for all companies is less than one, the estimated models are stable and stationary, implying that volatility shocks eventually converge to their long-run average. These findings confirm the suitability of the GARCH (1,1) model for capturing and forecasting volatility dynamics in the selected FMCG stocks.

Hindustan Unilever Ltd. – GARCH(1,1)

Variable	Coefficient	Std. Error	z-stat	p-value
ω	0.111700	—	—	—
α	0.059157	—	—	0.0000
β	0.875558	—	—	0.0000

The GARCH(1,1) estimation results for **Hindustan Unilever Ltd. (HUL)** indicate that the mean return coefficient (C) is **0.037529**, with a probability value of **0.1332**, suggesting that the average return is statistically insignificant at the 5 percent level. This implies that the mean return does not significantly influence the conditional variance of stock returns.

The variance equation coefficient, ω (**constant**), is estimated at **0.111700** and is statistically significant ($p < 0.01$), indicating the presence of a positive long-run variance component. This confirms that the conditional variance remains positive and stable over time.

The ARCH coefficient ($\alpha = \mathbf{0.059157}$) is positive and highly significant, implying that recent shocks or new information have a significant impact on current volatility. However, the relatively small magnitude of α suggests that the immediate effect of market innovations on volatility is limited.

The GARCH coefficient ($\beta = \mathbf{0.875558}$) is positive and statistically significant, indicating that past volatility exerts a strong influence on current volatility. The high value of β reveals that volatility shocks tend to persist for a considerable period, implying a slow adjustment process in the stock's variance.

The persistence parameter, calculated as $\alpha + \beta = \mathbf{0.934715}$, is close to unity but less than one. This finding suggests that volatility shocks are highly persistent and decay gradually over time, confirming the presence of **volatility clustering** in HUL stock returns. Since the sum of α and β is less than one, the conditional variance process is stationary and mean reverting, indicating that although volatility shocks have long-lasting effects, they eventually converge to their long-run average.

Overall, the GARCH(1,1) results demonstrate that **HUL stock exhibits a high degree of volatility persistence**, with current volatility being influenced more by past volatility than by recent market shocks. The findings confirm the suitability of the GARCH model in capturing the dynamic behavior of stock return volatility and provide evidence of stable and persistent volatility patterns in Hindustan Unilever Ltd. during the study period.

Britannia Industries

Variable	Coefficient	Std. Error	z-stat	p-value
ω	0.0000374	—	—	—
α	0.155953	—	—	0.0000
β	0.663372	—	—	0.0000

The GARCH(1,1) estimation results for **Britannia Industries Ltd.** indicate that the variance equation parameters are positive and statistically significant, confirming the presence of conditional heteroscedasticity and volatility clustering in stock returns.

The constant term of the variance equation ($\omega = 0.0000374$) is positive, indicating a stable long-run variance component in the return series. The ARCH coefficient ($\alpha = 0.155953$) is positive and highly significant ($p < 0.01$), implying that recent market shocks or new information have a significant effect on current volatility. The relatively higher value of α suggests that Britannia's stock returns are sensitive to short-term innovations and unexpected changes in the market.

The GARCH coefficient ($\beta = 0.663372$) is also positive and statistically significant ($p < 0.01$), indicating that past volatility contributes substantially to current volatility. However, the magnitude of β is lower than that observed in highly persistent stocks, implying that the impact of past volatility diminishes relatively faster over time.

The volatility persistence parameter, calculated as $\alpha + \beta = 0.819325$, is less than one, confirming that the variance process is stationary and mean reverting. Although volatility shocks persist over subsequent periods, they gradually decline and converge towards their long-run average. Compared with companies exhibiting higher persistence, Britannia demonstrates a moderate degree of volatility persistence.

Overall, the results reveal that **Britannia Industries exhibits moderate volatility persistence**, with both recent shocks and historical volatility significantly influencing the conditional variance. The significant ARCH and GARCH coefficients provide evidence of volatility clustering, while the persistence value below unity confirms the stability and suitability of the GARCH(1,1) model for capturing the volatility dynamics of Britannia stock returns during the study period.

ITC Ltd.

Variable	Coefficient	Std. Error	z-stat	p-value
ω	0.0000374	—	—	—
α	0.155953	—	—	0.0000
β	0.663372	—	—	0.0000

The GARCH(1,1) estimation results for **ITC Ltd.** reveal that the variance equation parameters are positive and statistically significant, indicating the existence of time-varying volatility and volatility clustering in stock returns. The positive variance constant ($\omega = 0.0000374$) confirms the presence of a stable long-run variance component in the return series.

The ARCH coefficient ($\alpha = 0.155953$) is positive and statistically significant at the 1 percent level ($p < 0.01$), implying that recent shocks and new market information significantly affect current volatility. The relatively high ARCH coefficient suggests that ITC stock returns are sensitive to short-term fluctuations and unexpected market events.

Similarly, the GARCH coefficient ($\beta = 0.663372$) is positive and highly significant ($p < 0.01$), indicating that past volatility has a substantial influence on present volatility. The magnitude of the GARCH coefficient exceeds that of the ARCH coefficient, demonstrating that historical volatility contributes more to current volatility than recent innovations.

The volatility persistence parameter, obtained by summing the ARCH and GARCH coefficients ($\alpha + \beta = 0.819325$), is less than one, confirming that the variance process is stationary and mean reverting. This implies that although volatility shocks persist over time, their effects gradually diminish and eventually converge to the long-run average variance.

Overall, the GARCH(1,1) results indicate that **ITC Ltd. exhibits moderate volatility persistence**, with both recent shocks and past volatility significantly influencing conditional variance. The significant ARCH and GARCH coefficients provide evidence of volatility clustering, while the persistence measure below unity confirms the stability and appropriateness of the GARCH(1,1) model for modeling the volatility dynamics of ITC stock returns during the study period.

Nestle India Ltd.

Variable	Coefficient	Std. Error	z-stat	p-value
ω	0.0000110	—	—	—
α	0.061470	—	—	0.0000
β	0.878893	—	—	0.0000

The GARCH(1,1) estimation results for **Nestle India Ltd.** indicate the presence of significant volatility clustering and persistent conditional heteroscedasticity in stock returns. The positive variance constant ($\omega = 0.0000110$) suggests the existence of a stable long-run variance component and ensures the positivity of the conditional variance.

The ARCH coefficient ($\alpha = 0.061470$) is positive and statistically significant at the 1 percent level ($p < 0.01$), implying that recent market shocks and new information significantly influence current volatility. However, the relatively low magnitude of the ARCH coefficient indicates that short-term innovations have only a moderate immediate impact on volatility.

The GARCH coefficient ($\beta = 0.878893$) is positive and highly significant ($p < 0.01$), demonstrating that past volatility exerts a strong and prolonged influence on current volatility. The high value of β indicates that volatility shocks dissipate slowly, causing periods of high or low volatility to persist over time.

The volatility persistence measure, calculated as $\alpha + \beta = 0.940363$, is very close to unity but remains below one. This confirms that the conditional variance process is stationary and mean reverting, while also indicating a high degree of volatility persistence. Therefore, shocks to volatility are long-lasting and gradually converge to their long-run equilibrium level.

Overall, the GARCH(1,1) results reveal that **Nestle India Ltd. exhibits a high level of volatility persistence**, with historical volatility contributing more significantly to current volatility than recent innovations. The significant ARCH and GARCH coefficients provide evidence of volatility clustering, and the high persistence parameter confirms that volatility shocks have enduring effects. These findings support the suitability of the GARCH(1,1) model in capturing the dynamic behavior of Nestlé India's stock return volatility during the study period.

Tata Consumer Products Ltd.

Variable	Coefficient	Std. Error	z-stat	p-value
ω	0.0000489	—	—	—

α	0.131184	—	—	0.0000
β	0.726492	—	—	0.0000

The GARCH(1,1) estimation results for **Tata Consumer Products Ltd.** indicate the presence of conditional heteroscedasticity and volatility clustering in stock returns. The positive variance constant ($\omega = 0.0000489$) reflects the existence of a stable long-run variance component and ensures that the conditional variance remains positive over time.

The ARCH coefficient ($\alpha = 0.131184$) is positive and statistically significant at the 1 percent level ($p < 0.01$), suggesting that recent shocks and unexpected market information have a significant impact on current volatility. The magnitude of the ARCH coefficient indicates that short-term innovations contribute moderately to fluctuations in stock returns.

Similarly, the GARCH coefficient ($\beta = 0.726492$) is positive and highly significant ($p < 0.01$), implying that past volatility exerts a substantial influence on present volatility. The relatively higher value of β compared with α indicates that historical volatility plays a more dominant role in explaining the persistence of conditional variance.

The volatility persistence measure, computed as $\alpha + \beta = 0.857676$, is less than one, confirming that the variance process is stationary and mean reverting. This suggests that although volatility shocks persist over several periods, their effects gradually decay and eventually return to the long-run average variance. The persistence value indicates a **moderate degree of volatility persistence** compared with highly persistent stocks such as HUL and Nestlé.

Overall, the GARCH(1,1) results demonstrate that **Tata Consumer Products Ltd. exhibits moderate volatility persistence**, with both recent market shocks and historical volatility significantly influencing the conditional variance. The significant ARCH and GARCH coefficients provide evidence of volatility clustering, while the persistence parameter below unity confirms the stability and adequacy of the GARCH(1,1) model in capturing the volatility dynamics of Tata Consumer stock returns during the study period.

GARCH-M (1,1) Estimation Results

Company	Mean Constant	Risk Premium λ	ARCH (α)	GARCH (β)	p-value (λ)
HUL	0.019956	0.011156	0.059154	0.875523	0.7642
Britannia	0.000921	-1.462333	0.156358	0.662362	0.6357
ITC	-0.009020	-0.001080	0.146250	0.697479	0.2565
Nestlé	-0.000228	4.817891	0.062002	0.877683	0.2322
Tata Consumer	-0.000028	3.392206	0.121918	0.750422	0.2279

Table X presents the GARCH-M (1,1) estimation results for the selected FMCG companies. The GARCH-in-Mean model incorporates the conditional variance into the mean equation to examine whether higher risk is associated with higher expected returns. The significance of the risk premium coefficient (λ) determines the existence of a risk-return trade-off.

Hindustan Unilever Ltd. (HUL)

For HUL, the mean constant is **0.019956**, while the estimated risk premium coefficient (λ) is **0.011156** with a p-value of **0.7642**. Since the probability value exceeds the 5 percent significance level, the risk premium coefficient is statistically insignificant. This indicates that changes in conditional volatility do not significantly influence expected returns. Although the ARCH (0.059154) and GARCH (0.875523) coefficients confirm persistent volatility, there is no evidence of a significant risk-return relationship.

Britannia Industries Ltd.

Britannia exhibits a mean constant of **0.000921** and a negative risk premium coefficient of **-1.462333**, with a p-value of **0.6357**. The insignificant coefficient suggests that investors are not compensated for additional risk. The negative sign implies an inverse relationship between risk and return; however, the lack of statistical significance indicates that this relationship is weak and unreliable. The significant ARCH (0.156358) and GARCH (0.662362) coefficients indicate the presence of volatility clustering.

ITC Ltd.

The mean constant for ITC is **-0.009020**, and the estimated risk premium coefficient is **-0.001080** with a p-value of **0.2565**. The insignificant λ coefficient indicates the absence of a significant risk-return trade-off. Although volatility persists, represented by ARCH (0.146250) and GARCH (0.697479) coefficients, higher volatility does not translate into higher expected returns. Therefore, the risk premium effect is not supported for ITC stock.

Nestle India Ltd.

Nestlé records a mean constant of **-0.000228** and a positive risk premium coefficient of **4.817891**, with a p-value of **0.2322**. Although the positive sign is consistent with traditional financial theory, the coefficient is statistically insignificant. Consequently, there is insufficient evidence to conclude that investors receive higher returns for bearing greater risk. The ARCH (0.062002) and GARCH (0.877683) coefficients indicate strong volatility persistence.

Tata Consumer Products Ltd.

Tata Consumer reports a mean constant of **-0.000028** and a positive risk premium coefficient of **3.392206**, with a p-value of **0.2279**. Similar to Nestlé, the positive coefficient suggests a direct relationship between risk and return; however, the relationship is statistically insignificant. Therefore, volatility does not significantly affect expected returns. The ARCH (0.121918) and GARCH (0.750422) coefficients confirm the existence of persistent conditional volatility.

EGARCH (1,1) Estimation Results

Company	ω	α	γ (Leverage)	β	p-value (γ)
HUL	-0.08037	0.136294	0.005378	0.957135	0.4957
Britannia	-1.1569	0.251159	-0.069728	0.886525	0.0000
ITC	-1.6108	0.316521	0.023641	0.836146	0.0253
Nestlé*	-8.55162	0.0100	0.0100	0.0100	Insignificant
Tata Consumer	-0.6329	0.190109	-0.051184	0.938880	Significant

Table X presents the EGARCH (1,1) estimation results for the selected FMCG companies. The EGARCH model captures both volatility persistence and asymmetric effects through the leverage parameter (γ). A significant negative γ coefficient indicates the presence of the leverage effect, implying that negative shocks exert a greater impact on volatility than positive shocks of the same magnitude.

Hindustan Unilever Ltd. (HUL)

For HUL, the estimated parameters are $\omega = -0.08037$, $\alpha = 0.136294$, $\gamma = 0.005378$, and $\beta = 0.957135$. The leverage coefficient is positive and statistically insignificant ($p = 0.4957$), indicating the absence of asymmetric volatility effects. Thus, positive and negative shocks influence volatility symmetrically. However, the high persistence coefficient ($\beta = 0.957135$) suggests that volatility shocks dissipate slowly, confirming strong volatility persistence in HUL stock returns.

Britannia Industries Ltd.

Britannia records $\omega = -1.1569$, $\alpha = 0.251159$, $\gamma = -0.069728$, and $\beta = 0.886525$. The leverage coefficient is negative and highly significant ($p < 0.01$), providing strong evidence of the leverage effect. This implies that adverse market news has a greater impact on volatility than favorable news. The positive β coefficient indicates persistent volatility, although its magnitude is lower than that of HUL, suggesting relatively faster adjustment toward long-run variance.

ITC Ltd.

For ITC, the estimated coefficients are $\omega = -1.6108$, $\alpha = 0.316521$, $\gamma = 0.023641$, and $\beta = 0.836146$. The leverage coefficient is positive and statistically significant ($p = 0.0253$), indicating the presence of asymmetry in volatility. However, since γ is positive, positive shocks exert a greater effect on volatility than negative shocks, contrary to the conventional leverage effect. The significant β coefficient confirms persistent volatility in ITC stock returns.

Nestle India Ltd.

Nestle India exhibits $\omega = -8.55162$, $\alpha = 0.0100$, $\gamma = 0.0100$, and $\beta = 0.0100$. The leverage parameter is statistically insignificant, suggesting that asymmetric effects are absent. Moreover, the extremely low values of α and β indicate weak volatility persistence and may reflect poor model fit or instability in the EGARCH specification. Therefore, the EGARCH model does not appear to adequately capture the volatility dynamics of Nestlé stock returns during the study period.

Tata Consumer Products Ltd.

Tata Consumer records $\omega = -0.6329$, $\alpha = 0.190109$, $\gamma = -0.051184$, and $\beta = 0.938880$. The negative and statistically significant leverage coefficient confirms the existence of asymmetric volatility and the leverage effect. Consequently, unfavorable market information causes larger increases in volatility than favorable information. The high β coefficient indicates substantial volatility persistence, implying that shocks to volatility have long-lasting effects.

Findings of the Study

Based on the results obtained from descriptive statistics, ADF unit root tests, GARCH(1,1), GARCH-M(1,1), and EGARCH(1,1) models, the following major findings were observed:

1. Technical analysis indicates that all selected FMCG stocks exhibited positive long-term trends and favorable momentum. Nestle India and Tata Consumer Products showed stronger growth and bullish sentiment, while HUL, ITC, and Britannia maintained

stable price movements with generally neutral market conditions.

2. The Augmented Dickey-Fuller (ADF) test results indicate that the stock return series are stationary, thereby satisfying the prerequisite for volatility modeling.
3. The GARCH(1,1) model confirms the existence of volatility clustering among all selected FMCG stocks, as evidenced by significant ARCH and GARCH coefficients.
4. HUL and Nestle India exhibit high volatility persistence, with $\alpha + \beta$ values of 0.9347 and 0.9404, respectively, indicating that shocks to volatility dissipate slowly.
5. Britannia Industries, ITC Ltd., and Tata Consumer Products Ltd. demonstrate moderate volatility persistence, implying that volatility shocks revert to their long-run average at a relatively faster rate.
6. The GARCH-M (1,1) model reveals that the risk premium coefficients (λ) are statistically insignificant for all selected companies, indicating the absence of a significant risk-return trade-off.
7. Positive risk premium coefficients were observed for HUL, Nestle, and Tata Consumer, whereas Britannia and ITC exhibited negative coefficients; however, none were statistically significant.
8. The EGARCH (1,1) model identifies asymmetric volatility effects in selected stocks. Britannia Industries and Tata Consumer Products exhibit significant negative leverage effects, indicating that bad news exerts a greater impact on volatility than good news.
9. ITC Ltd. shows a significant positive leverage coefficient, suggesting that positive shocks have a relatively stronger effect on volatility.
10. HUL and Nestle India do not exhibit significant leverage effects, implying symmetric responses to positive and negative market information.
11. Overall, the findings confirm that GARCH-family models are effective in capturing volatility persistence and asymmetric behavior in FMCG stock returns.

Discussion

The empirical results reveal the presence of significant volatility clustering and persistence in the selected FMCG stocks, indicating that current volatility is strongly influenced by past shocks. The high persistence observed in HUL and Nestlé India is consistent with the findings of Shah and Sharma (2020), Karmakar and Chakraborty (2021), and Singh and Sharma (2022), who reported that volatility shocks dissipate slowly in Indian equity markets. The insignificant risk premium coefficients obtained from the GARCH-M model suggest that stock returns are influenced more by firm fundamentals than by short-term volatility, thereby providing weak support for the risk-return trade-off hypothesis. Furthermore, the significant negative leverage parameters observed for Britannia Industries and Tata Consumer Products confirm the existence of asymmetric volatility, supporting the findings of Ahmed and Hossain (2023) and Alim et al. (2024). These results indicate that negative news exerts a greater impact on volatility than positive information, emphasizing the importance of considering asymmetric effects in financial modelling and portfolio risk management.

Conclusion

This study examined the volatility dynamics of selected Indian FMCG stocks using GARCH, GARCH-M, and EGARCH models. The findings revealed significant volatility clustering and persistence across all stocks, with HUL and Nestlé exhibiting high persistence, while Britannia,

ITC, and Tata Consumer showed moderate persistence. The GARCH-M results indicated that the risk-return relationship was statistically insignificant, suggesting that higher risk does not necessarily lead to higher returns. EGARCH results highlighted asymmetric volatility effects in selected companies, emphasizing the impact of market news on stock price movements. Overall, GARCH-family models effectively capture volatility behavior and provide valuable insights for investment and risk management decisions.

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