**Original Research Article**

**Short-Term Effects of USA Tariff Announcements on the Volatility of Indian Stock Market Returns: Empirical Evidence from Market and Sectoral Indices**

**ABSTRACT**

**Aims:**
This study aims to investigate the immediate effects of U.S.A. tariff announcements on the volatility of sectoral indices in the Indian stock market. It seeks to analyse how different sectors respond to external policy shocks and to understand market behaviour during these periods.

**Study Design:**

The study employs a short-window event analysis to assess sector-specific market responses preceding and following the U.S. tariff announcement on April 2, 2025.

**Data and Methodology:**

The study examines the daily closing prices of the Nifty 50 and major sectoral indices (e.g., FMCG, IT, PSU Banks, Automobiles, Metals, Pharmaceuticals) over 7-day, 15-day, and 30-day event windows. It evaluates volatility patterns using statistical methods, including Levene’s and Brown–Forsythe tests, to assess variance equality between pre- and post-announcement periods.

**Result:**

The results demonstrate varied reactions across sectors. Export-oriented industries, including Automobiles, Metals, and Pharmaceuticals, had significant short-term instability, whilst FMCG, IT, and PSU Banks exhibited less impact. Volatility surges were particularly evident in the initial 7–15 days following the announcement, progressively stabilising by day 30. These findings align with financial theories such as the Efficient Market Hypothesis, Policy Uncertainty Theory, and Uncertainty Shock Theory.

**Conclusion:**

U.S. trade policy announcements significantly affect the Indian stock market through both economic fundamentals and behavioural investor responses. Investors should adopt short-term risk mitigation strategies, while policymakers are advised to enhance market safeguards and promote sectoral resilience through export diversification and demand stabilisation.

**Keywords**: Short-term Volatility, Stock Market Volatility, U.S.A Tariff, Indian Sectoral Indices, Levene’s and Brown–Forsythe Test

**1. INTRODUCTION**

Recent research shows that trade policy shocks, especially tariff announcements from big economies like the United States (USA), have a big role in changes in global financial markets. These policy choices have short-term effects on investor confidence, global commerce, and the value of assets (Baker, Bloom, & Davis, 2016).Emerging markets like India are nevertheless vulnerable to shocks from outside the country because they are becoming more connected to the global economy through trade and investment, even while their internal fundamentals are strong. According to the Ministry of Commerce and Industry (2024), the U.S. made up around 18% of India's exports and 7% of its imports in FY 2023–24. India has received a lot of foreign direct investment (FDI), making it the second-largest source. Since 2000, it has received approximately US$65 billion in equity inflows (DPIIT, 2024).

The U.S. market significantly exposes several Indian industries, making them highly susceptible to fluctuations in U.S. trade policy. The United States plays a crucial role in the Information Technology (IT) sector, deriving 60–65% of its export revenue from American clients (NASSCOM, 2024). India's pharmaceutical sector exports around US$8.7 billion in commodities to the United States annually, constituting almost one-third of the nation's overall pharmaceutical exports (Pharmexcil, 2024). The automotive and auto components sector supplies around US$7 billion in goods to North America (ACMA, 2024). The metal industry, particularly steel and aluminium, faces risks from past and potential U.S. tariff actions (Ministry of Commerce, 2024). Alterations in U.S. economic policy, laws, and geopolitical dynamics frequently influence the financial performance and market valuations of various sectors.

A comprehensive study globally has examined the impact of trade disputes, particularly the U.S.–China trade war, on market volatility (Huang et al., 2020; Chuliá et al., 2017). Nonetheless, a significant gap persists in our comprehension of the impact of each U.S. tariff announcement on the Indian stock market at the sectoral level. Most Indian studies have looked at overall global risks or economic uncertainty, rather than how different levels of outside influence affect various sectors.

This study addresses the gap in the literature by examining the impact of a recent U.S. tariff announcement (April 2, 2025) on Indian stock market indices in the short term. The study examines fluctuations in volatility throughout 7-day, 15-day, and 30-day intervals preceding and after the announcement. This is accomplished by a short-window event research approach and robust statistical techniques, including the Levene's and Brown–Forsythe tests. The study examines the overall market (Nifty 50) and primary sectors indexes to assess the market's response to U.S. trade shocks regarding intensity, direction, and duration. This would enhance our comprehension of India's economic vulnerability to global policy developments

**2. LITERATURE REVIEW**

Recent empirical studies increasingly show that geopolitical and trade-related uncertainties have a significant impact on stock market dynamics, particularly in emerging economies like India. A substantial amount of literature has examined the direct and indirect impacts of trade policy shocks, geopolitical events, and economic uncertainty on the volatility of financial markets.

Zhang et al. (2023) investigated the effects of geopolitical risk (GPR) in 32 countries, finding that heightened global tensions lead to increased stock market volatility, especially in emerging markets. The findings indicate that this volatility is linked to postponed investment choices and a movement by investors towards more secure assets in times of increased uncertainty.

Boer et al. (2022) presented strong evidence regarding the adverse effects of U.S. trade policy shocks on financial markets, illustrating that restrictive trade measures resulted in market volatility, declines in stock prices, and an appreciation of the U.S. dollar. Their structural VAR model highlighted the enduring impacts of policy uncertainty, surpassing the influence of tariffs alone.

Hoque et al. (2023) conducted an in-depth examination of how trade policy uncertainty (TPU) is transmitted from major economies like the U.S. and China to more vulnerable economies, such as Mexico, South Africa, and Turkey. Employing VAR-GARCH and spillover models, they emphasised the varying spillover effects that are contingent on the trade exposure of each country.
In their study, Al-Fayoumi et al. (2025) observed that geopolitical shocks, including the Gaza conflict, led to a temporary increase in stock market volatility within GCC countries. The increase in volatility was particularly pronounced in economies that are politically sensitive.

Kanojia et al. (2024) examined the UAE–India Comprehensive Economic Partnership Agreement (CEPA), demonstrating that sectoral investment and trade flows responded acutely to both liberalisation and uncertainty. Their analysis highlighted the necessity for adaptive risk management approaches in industries characterised by significant global exposure.

Verma (2015) emphasised the connection between the sustainability of India's software and IT exports and the stability of U.S. policy, while Verma et al. (2020) demonstrated the significant impact of global macroeconomic variables and exchange rate volatility on India's high-tech exports. In a similar vein, Pal and Chattopadhyay (2019) provided compelling evidence regarding asymmetric volatility spillovers between Indian and global financial markets through the application of DCC-MV-TARCH models, thereby affirming India's vulnerability to international shocks.

Yang et al. (2021) utilised GARCH-MIDAS modelling to demonstrate the predictive ability of GPR in emerging markets, establishing that geopolitical events are significant indicators of short-term volatility. Li et al. (2020) employed wavelet coherence analysis to demonstrate the impact of U.S. EPU on the stock markets of India and China, highlighting the temporal interdependence between these regions.

Yadav et al. (2023) utilised DCC-GARCH models and identified notable volatility spillovers between the Indian stock market and its global counterparts. The findings further emphasised the sensitivity of sectoral indices, including FMCG, IT, and energy, to global occurrences.

Hoque et al. (2022) established that the U.S. and China serve as net transmitters of TPU shocks that impact vulnerable economies like Colombia, Indonesia, and Turkey. The findings from the VAR-DCC-GARCH and VAR-ADCC-GARCH analyses demonstrate that returns and volatility in these economies are influenced, with variations in both magnitude and direction of effects across different countries.

In a distinct structural VAR-based analysis, Boer et al. (2022) identified that trade policy shocks elevate global uncertainty, diminish stock returns, and have lasting impacts across various market segments, highlighting the extensive consequences of policy misalignment.

Tabash et al. (2025) noted a U-shaped volatility pattern in GCC Islamic markets, indicating that high TPU shocks exert more significant effects during extreme quantiles. It is advised to implement diversified portfolio allocations and risk hedging strategies to reduce sectoral volatility.

The findings from these studies highlight the complex effects of global trade policy uncertainty and geopolitical shocks on stock markets. This study expands on existing knowledge by examining the short-term volatility reactions of Indian sectoral indices to U.S. tariff announcements, thus filling an important gap in the literature concerning temporal and sectoral differences in the responses of India’s stock market.

**3. THEORETICAL FRAMEWORK**

This analysis utilises various financial theories to elucidate market responses to external policy shocks. The Efficient Market Hypothesis (EMH) (Fama, 1970) asserts that markets swiftly integrate new information, including tariff announcements, thereby validating the application of a short-window event study. The Policy Uncertainty Theory (Pastor & Veronesi, 2012) posits that unforeseen policy alterations elevate risk premia and trigger volatility, especially in industries with significant global exposure, including IT, pharmaceuticals, metals, and automobiles. Examining the behaviour of investors, the Overreaction Hypothesis (De Bondt & Thaler, 1985) suggests that responses to trade policy news can be irrational, resulting in significant short-term volatility fluctuations. Furthermore, Uncertainty Shock Theory (Bloom, 2009) emphasises the impact of external shocks on investment decisions, leading to increased volatility, particularly in emerging markets. Collectively, these theories establish a thorough basis for examining short-term volatility reactions among Indian sectoral indices in the wake of U.S. tariff announcements.

**4. DATA AND METHODOLOGY**

This study explores how U.S.A. tariff announcements affect short-term Indian stock market volatility, focusing on the overall market and its important sectoral components. The analysis uses high-frequency data from India's largest stock market, the National Stock Exchange (NSE), a key indication of investor responses to global policy changes.

Daily NIFTY 50 closing values reflect Indian stock market action. We also include the main NIFTY sectoral indices, which cover India's most important sectors, to better comprehend the influence on different economic sectors. NIFTY Auto, Bank, Financial Services, FMCG, IT, Metal, Pharma, PSU Bank, Private Bank, Realty, Energy, and Media are among the indices studied. This wide sector coverage allows us to assess if certain industries respond more strongly to the U.S.A. tariff announcement based on their global integration or trade-sensitive inputs.

This paper examines the U.S.A. tariff notification of April 2, 2025. To carefully study this announcement's consequences, we set three short-run event windows: 7, 15, and 30 trading days before and after. We can see in table 1 that each event window has a "pre-announcement period" and a "post-announcement period" in the dataset.

**Table 1: Pre- and Post-Announcement Windows for U.S.A Tariff Event on 2 April 2025**

|  |  |  |  |
| --- | --- | --- | --- |
| Period of Windows | Pre-announcement Period | USA Tariff Announcement2/04/2025 | Post-announcement Period |
| 7 Days | 21/03/2025 – 1/4/2025 | 3/04/2025-15/04/2025 |
| 15 Days | 7/03/2025 – 1/04/2025 | 3/04/2025-28/04/2025 |
| 30 Days | 13/02/2025 – 1/04/2025 | 3/04/2025-20/05/2025 |

This methodology resembles techniques employed in research examining volatility's response to significant economic or policy shocks (e.g., Chuliá et al., 2017; Huang et al., 2020; Boer et al., 2023). It facilitates the direct evaluation of volatility fluctuations immediately following the policy intervention.
Employing the traditional method, we calculate the daily returns for the market index and each sector's indices.

$$R\_{t}=\left(\genfrac{}{}{0pt}{}{P\_{t} - P\_{t-1}}{\overbar{P\_{t-1}}}\right) \* 100$$

where denotes the closing price on day t. This transformation stabilises variance and enables meaningful cross-period comparisons.

To capture the behavioural and psychological dimensions of investor activity, this study uses Google Trends data as a proxy for sentiment. Prior research highlights the role of online search behaviour in reflecting investor attention. Rutkowska and Kliber (2018) found that finance-related search intensity influenced investor sentiment in the U.S., while Swamy and Dharani (2019) showed that search volumes effectively predict short-term stock returns in India. Building on these findings, search data for terms like "USA tariff," " Tariff war," and "tariff impact India" were used to gauge investor response to the U.S. tariff announcement.

As reported in Table 2, the average Google trend search value rose sharply in the 7-day post-announcement window from 1.17 (pre-event) to 35.21 (post-event), indicating a substantial surge in investor attention and concern immediately following the U.S. policy announcement. Similarly, for the 15-day window, sentiment remained elevated at 21.81, above the pre-event level of 1.77. Even over a 30-day horizon, post-event sentiment (12.96) was over five times higher than the baseline pre-event level (2.38).

**Table 2: Average Google Trend Search**

|  |  |  |
| --- | --- | --- |
|  |  |  |
| Period | Pre announcement | Post announcement |
| 7 days | 1.17 | 35.21 |
| 15days | 1.77 | 21.81 |
| 30 days | 2.38 | 12.96 |

Sources: **Calculated by author from secondary data (Google)**

The observed patterns in search behaviour align with theoretical expectations regarding information-driven behavioural responses. These sentiment shifts, when combined with return-based variance tests (Levene’s and Brown–Forsythe) and sectoral volatility analysis, offer robust evidence that the Indian stock market’s short-term volatility was behaviourally amplified in the aftermath of the U.S. policy shock.

The volatility analysis process involves determining the time series characteristics of the data before conducting the analysis. The Augmented Dickey-Fuller (ADF) unit root test is used to determine the stationarity of the return series, which is crucial for accurate volatility comparisons. Diagnostic tests are then conducted to ensure the data approximates independent and identically distributed outcomes. The Durbin-Watson (DW) test is used to assess autocorrelation, with a Durbin-Watson number between 1.50 and 2.50 suggesting no significant autocorrelation.

After verifying the stationary, independent, and identically distributed return series, the study examines whether return volatility increases significantly after the U.S.A. tariff announcement. The Shapiro-Wilk test results reveal that return data frequently deviates from normalcy, prompting the use of Levene's test and the Brown-Forsythe test. These tests measure each observation's absolute deviation from its group median and mean, making them ideal for datasets with outliers or skewed distributions. A significant test result indicates an increase in volatility, which suggests heightened investor uncertainty or reactive portfolio adjustments due to trade policy. All statistical analyses have conducted using R version 4.4.3.

**5.RESULT AND DISCUSSION:**

**5.1 Descriptive Statistics**

**Table 3: Descriptive Statistics of Sectoral Indices Pre- and Post-U.S.A Tariff Announcement (15 Days)**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Sector | Nifty 50 | Automobile Sector | Consumer Durable Sector | Energy Sector | Financial Services Sector | FMCG Sector | Healthcare Sector | IT Sector | Media Sector |
| Mean7 days Pre 7 days Post14 days Overall | -0.010.020.05 | -0.26-0.08-0.10 | -0.700.490.07 | 0.13-0.130.04 | 0.140.320.27 | 0.070.580.38 | -0.360.02-0.11 | -0.26-1.20-0.63 | -0.040.330.18 |
| Maximum7 days Pre 7 days Post14 days Overall | 1.322.192.19 | 0.843.393.39 | 0.673.193.19 | 1.442.702.70 | 1.992.952.95 | 0.591.991.99 | 1.391.981.98 | 1.401.761.76 | 2.244.724.72 |
| Minimum7 days Pre 7 days Post14 days Overall | -1.50-3.24-3.24 | -1.04-3.78-3.78 | -2.50-2.76-2.76 | -1.33-3.73-3.73 | -2.18-3.49-3.49 | -0.91-1.10-1.10 | -1.51-3.05-3.05 | -2.45-4.21-4.21 | -2.40-3.94-3.94 |
| Std. Dev.7 days Pre 7 days Post14 days Overall | 0.952.021.47 | 0.782.621.81 | 1.162.301.91 | 1.252.461.82 | 1.382.101.66 | 0.551.070.85 | 1.002.271.65 | 1.512.512.01 | 2.073.172.49 |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Metal Sector | Oil & Gas Sector | Pharma Sector | Private Bank Sector | PSU Bank Sector | Real Estate Sector | Bank Sector | Chemical Sector |
| Mean7 days Pre 7 days Post14 days Overall | -037-0.97-0.58 | 0.29-0.190.06 | -0.380.01-0.12 | 0.300.290.32 | 0.50-0.050.26 | -0.49-0.27-0.11 | 0.220.300.31 | 0.130.270.29 |
| Maximum7 days Pre 7 days Post14 days Overall | 0.684.094.09 | 1.842.202.20 | 1.342.432.43 | 2.422.822.82 | 3.182.643.18 | 1.535.645.64 | 2.202.702.70 | 1.544.284.28 |
| Minimum7 days Pre 7 days Post14 days Overall | -1.40-6.75-6.75 | -1.36-3.78-3.78 | -1.73-4.03-4.03 | -1.21-3.47-3.47 | -1.73-2.84-2.84 | -3.11-5.69-5.69 | -1.43-3.19-3.19 | -1.12-3.22-3.22 |
| Std. Dev.7 days Pre 7 days Post14 days Overall | 0.774.362.94 | 1.322.391.80 | 1.052.801.99 | 1.241.981.54 | 1.882.422.03 | 1.783.832.95 | 1.211.891.48 | 0.872.681.88 |
| Observations | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 |

**Sources: Calculated by author from secondary data (NSE)**

Table 3 presents the daily return behavior of the Nifty 50 and key Indian sectoral indices for the 7-day pre-announcement, 7-day post-announcement, and 14-day combined windows surrounding the U.S. tariff announcement. The data reveal that the overall market, as proxied by the Nifty 50, responded to the announcement with heightened volatility and a modest shift in returns. The mean return increased from –0.01% in the pre-event period to 0.02% post-announcement, while standard deviation rose markedly from 0.95% to 2.02%, indicating elevated investor uncertainty and market turbulence.

Among the sectors, FMCG exhibited notable resilience. Its mean return improved from 0.07% to 0.58%, while volatility increased moderately from 0.55% to 1.07%, reflecting strength and relative stability. Similarly, financial services and private banking sectors maintained consistent positive returns of 0.32% and 0.29%, respectively, despite global trade tensions, suggesting sustained investor confidence in these domains.

Conversely, sectors such as metals, real estate, and media experienced pronounced stress in the aftermath of the announcement. The metals sector’s average return deteriorated from –0.37% to –0.97%, and its volatility surged from 0.77% to 4.36%, underscoring market apprehension and negative sentiment. The real estate sector, though showing an increase in mean return from –0.49% to –0.27%, displayed extreme daily fluctuations, ranging from 5.64% gains to –5.69% losses, with a high standard deviation of 3.83%. Media also recorded increased volatility, from 2.07% to 3.17%, while its mean return rose to 0.33%, indicating inconsistent yet growing momentum.

Overall, the descriptive statistics suggest that while sectors such as FMCG, financial services, and private banking demonstrated relative resilience and positive return performance, trade-sensitive sectors like metals, real estate, and media were disproportionately affected by the policy shock in 7 day window.

**Table 4: Descriptive Statistics of Sectoral Indices Pre- and Post-U.S.A Tariff Announcement (15 Days)**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Nifty50 | Automobile Sector | Consumer Durable Sector | Energy Sector | Financial Services Sector | FMCG Sector | Healthcare Sector | IT Sector | Media Sector |
| Mean15 days Pre 15 days Post30 days Overall | 0.180.290.25 | 0.080.310.21 | -0.090.300.18 | 0.310.230.28 | 0.400.420.42 | 0.160.360.29 | 0.230.270.27 | -0.32-0.12-0.19 | 0.100.210.17 |
| Maximum15 days Pre 15 days Post30 days Overall | 1.442.192.19 | 2.383.393.39 | 2.623.193.19 | 1.772.702.70 | 1.992.952.95 | 1.361.991.99 | 1.662.072.07 | 1.404.344.34 | 3.624.724.72 |
| Minimum15 days Pre 15 days Post30 days Overall | -1.50-3.24-3.24 | -1.22-3.78-3.78 | -2.50-2.76-2.76 | -1.53-3.73-3.73 | -2.18-3.49-3.49 | -0.91-1.10-1.10 | -1.51-3.05-3.05 | -2.91-4.21-4.21 | -2.40-3.94-3.94 |
| Std. Dev.15 days Pre 15 days Post30 days Overall | 0.811.481.16 | 1.062.011.56 | 1.351.711.56 | 1.121.941.53 | 1.051.601.31 | 0.621.020.84 | 1.041.781.41 | 1.372.281.83 | 1.822.332.02 |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Metal Sector | Oil & Gas Sector | Pharma Sector | Private Bank Sector | PSU Bank Sector | Real Estate Sector | Bank Sector | Chemical Sector |
| Mean15 days Pre 15 days Post30 days Overall | 0.07-0.25-0.06 | 0.300.360.33 | 0.130.320.25 | 0.310.510.42 | 0.370.420.41 | 0.090.170.24 | 0.320.520.44 | 0.300.300.34 |
| Maximum15 days Pre 15 days Post30 days Overall | 2.134.094.09 | 1.843.183.18 | 1.632.432.43 | 2.422.822.82 | 3.182.643.18 | 3.635.645.64 | 2.202.702.70 | 1.824.284.28 |
| Minimum15 days Pre 15 days Post30 days Overall | -1.40-6.75-6.75 | -1.90-3.78-3.78 | -1.73-4.03-4.03 | -1.38-3.47-3.47 | -1.86-2.84-2.84 | -3.11-5.69-5.69 | -1.43-3.19-3.19 | -1.12-3.22-3.22 |
| Std. Dev.15 days Pre 15 days Post30 days Overall | 1.023.062.22 | 1.171.961.56 | 1.012.081.59 | 1.081.631.34 | 1.592.051.77 | 2.122.852.50 | 1.011.511.25 | 0.801.911.43 |

**Sources: Calculated by author from secondary data (NSE)**

Table 4 compares the Indian stock market's sectoral performance 15 days pre, 15 days after, and 30 days total to an important economic or policy event. Post-event mean returns across most sectors are positive, reflecting optimistic market sentiment. After the incident, private banks (mean return climbed to 0.51%), FMCG (0.42%), and automobiles (0.31%) did well, showing they were positively affected or resilient. The media sector went from negative (-0.32%) before the event to 0.21% after, and metals continued to underperform with a mean of -0.06% over 30 days.

 Post-event maximum return values increased due to sector-specific short-term rallies. Real estate had the highest maximum return of 5.64%, followed by media (4.72%) and IT (4.34%), indicating speculative inflows or favourable policy implications. However, minimum return values fell dramatically, especially in high-beta industries. Metals (-6.75%), real estate (-5.69%), and pharma (-4.03%) fell sharply post-event, indicating market overreactions and dangers. Most sectors' standard deviation volatility increased significantly following the occurrence. The Nifty50 index's standard deviation rose from 0.81 to 1.48 post-event, while the Automobile (2.01), Metal (3.06), Media (2.33), and IT (2.33) sectors surged, indicating increased uncertainty and investor repositioning. Even if the average trend was positive, price swings were wider, making the market riskier in the near term.

**Table 5: Descriptive Statistics of Sectoral Indices Pre- and Post-U.S.A Tariff Announcement (30 Days)**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Nifty50 | Automobile Sector | Consumer Durable Sector | Energy Sector | Financial Services Sector | FMCG Sector | Healthcare Sector | IT Sector | Media Sector |
| Mean30 days Pre30 days Post60 days Overall | 0.020.200.12 | -0.160.330.10 | -0.140.240.09 | 0.220.210.22 | 0.180.200.20 | -0.010.160.09 | -0.040.090.04 | -0.450.11-0.15 | -0.060.290.12 |
| Maximum30 days Pre30 days Post60 days Overall | 1.453.823.82 | 2.603.413.41 | 2.623.193.19 | 2.844.194.19 | 1.993.903.90 | 1.492.642.64 | 1.662.072.07 | 2.136.706.70 | 3.624.724.72 |
| Minimum30 days Pre30 days Post60 days Overall | -1.86-3.24-3.24 | -3.92-3.78-3.92 | -2.50-2.76-2.76 | -2.28-3.73-3.73 | -2.18-3.50-3.50 | -2.62-1.34-2.62 | -2.46-3.05-3.05 | -4.18-4.21-4.21 | -3.58-3.94-3.94 |
| Std. Dev.30 days Pre30 days Post60 days Overall | 0.761.351.09 | 1.351.731.55 | 1.241.471.39 | 1.291.711.49 | 0.841.461.18 | 0.801.030.92 | 1.141.401.26 | 1.412.131.80 | 1.961.901.91 |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Metal Sector | Oil & Gas Sector | Pharma Sector | Private Bank Sector | PSU Bank Sector | Real Estate Sector | Bank Sector | Chemical Sector |
| Mean30 days Pre30 days Post60 days Overall | 0.270.060.17 | 0.190.280.23 | -0.100.090.01 | 0.100.230.18 | 0.150.200.19 | -0.070.290.17 | 0.100.230.18 | 0.140.190.19 |
| Maximum30 days Pre30 days Post60 days Overall | 4.045.865.86 | 2.593.183.18 | 1.632.432.43 | 2.423.243.24 | 3.183.273.27 | 3.635.935.93 | 2.203.343.34 | 2.544.284.28 |
| Minimum30 days Pre30 days Post60 days Overall | -2.17-6.75-6.75 | -2.22-3.78-3.78 | -2.87-4.03-4.03 | -1.38-3.47-3.47 | -2.83-4.84-4.84 | -3.11-5.69-5.69 | -1.43-3.19-3.19 | -2.90-3.22-3.22 |
| Std. Dev.30 days Pre30 days Post60 days Overall | 1.382.532.01 | 1.271.631.44 | 1.141.581.36 | 0.861.401.15 | 1.561.941.74 | 1.752.582.22 | 0.821.351.10 | 1.101.521.32 |

**Sources: Calculated by author from secondary data (NSE)**

Table 5 presents a statistical analysis of the Nifty50 and other Indian sectoral indices 30 days before, 30 days after, and 60 days after a significant market or policy event. The analysis revealed that most sectors showed a significant post-event increase in mean returns, indicating investor optimism. The Nifty50 index rose from 0.02% to 0.20%, while Automobiles, Consumer Durables, Energy, and Financial Services all gained. Underperforming sectors, including IT and media, reversed their unfavourable trends, signalling restored confidence or revaluation. Media and IT reached 6.7%, real estate at 5.93%, and metal at 5.86%, indicating strong positive sentiment. However, minimum return analysis revealed that negative risks persisted, with metals, real estate, pharmaceuticals, and media seeing no significant drop in their lower return ranges, signalling investor caution and price corrections. Standard deviation research showed significant market volatility, with the Nifty50 index's volatility surging from 0.76% to 1.35%, and Metal, Real Estate, and Media experiencing large standard deviation rises. The incident affected trading behaviour for 60 days, as volatility remained greater than usual.

We can visualise this in figures 1, 2, and 3, where we can clearly see that, from 7 days to 30 days, the market has been stable. The Indian stock market has displayed slight volatility across 7, 15, and 30-day periods, subsequently followed by periods of calm. Certain sectors have shown recovery from instability, particularly financial services, banking, and FMCG, which rebounded within 15 days. However, sectors such as IT, metals, and oil & gas have experienced declines despite these positive trends, reflecting concerns surrounding global policy and demand uncertainties.

FMCG, financial services, and private banks have recorded gains in pre-announcement returns, signalling investor confidence in domestic and defensive sectors. In contrast, IT and metal remain susceptible to global trade issues. Over the 15 days following the announcement, most sectors observed improved average returns, with private banks, banking, FMCG, and PSU banks leading the recovery. Nonetheless, metals and energy sectors continue to exhibit weakness, while IT and media are beginning to rebound.

In the 30 and 60 days subsequent to the news, consumer durables, automobiles, and IT showed stronger performance. Financial services, metals, and private banks have demonstrated resilience, indicating concentrated investor confidence in pivotal industries. Capital allocation has shifted towards consumer, manufacturing, and healthcare sectors, with auto, consumer durables, FMCG, and pharma sectors experiencing growth. High-tech and sentiment-driven equities have facilitated a recovery in IT and media.

Assessing the statistical significance of variations in post-announcement volatility is essential for determining whether market normalisation results from diminished uncertainty or risk recovery. This review elucidates how Indian markets adapt to external trade policy changes.

**Figure 1: Market and Sector wise Return of 7days Pre and Post USA Tariff Announcement**



**Figure 2: Market and Sector wise Mean Return of 15 days Pre and Post USA Tariff Announcement**



**Figure 3: Market and Sector wise Return of 30 days Pre and Post USA Tariff Announcement**



**Sources: Calculated by author from secondary data (NSE)**

**5.2 Unit Root Test:**

Table 6 reveals that most sectoral volatility series exhibit stationarity, indicating consistent return behaviour across medium- to long-term horizons. However, after U.S.A. tariffs, the Automobile, IT, Metal, Chemical, and Nifty 50 sectors showed non-stationarity over 7 days, indicating short-term volatility. Short-term series require differentiation before modelling, while longer-term windows can be evaluated at level for more accurate econometric estimations.

**Table 6: Stationarity Tests Across Event Windows**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Sector | ADF | PP test | p-value | Order of integration |
|  | **Levels** | **1st Differences** | **Levels** | **1st differences** |
| Nifty 507 days15days30days | -2.67-4.27-7.44 | -5.97-- | -2.67-4.43-7.52 | -6.31-- | 0.000.000.00 | I(1)I(0)I(0) |
| Automobile7 days15days30days | -1.65-4.09-6.87 | 4.48-- | -1.67-4.16-6.91 | -4.53-- | 0.000.0010.00 | I(1)I(0)I(0) |
| Consumer Durable7 days15days30days | -2.69-4.39-7.10 | -5.96-- | -2.71-4.45-7.12 | -6.85-- | 0.000.000.00 | I(1)I(0)I(0) |
| Energy7 days15days30days | -2.74-4.45-6.94 | -4.89-- | -2.70-4.52-6.99 | -5.28-- | 0.000.000.00 | I(1)I(0)I(0) |
| Financial Service7 days15days30days | -3.21-4.70-7.91 | --- | -3.19-4.80-7.94 | --- | 0.020.000.00 | I(0)I(0)I(0) |
| FMCG7 days15days30days | -2.92-5.58-7.62 | --- | -2.88-5.59-7.62 | --- | 0.040.000.00 | I(0)I(0)I(0) |
| Health Care7 days15days30days | -3.69-5.16-7.94 | --- | -3.71-5.22-7.94 | --- | 0.0040.000.00 | I(0)I(0)I(0) |
| IT7 days15days30days | -2.02-4.07-7.42 | -4.95-- | -2.02-4.21-7.55 | -4.95-- | 0.000.0010.00 | I(1)I(0)I(0) |
| Media7 days15days30days | -4.12-5.50-6.74 | --- | -4.27-5.51-6.74 | --- | 0.000.000.00 | I(0)I(0)I(0) |
| Metal7 days15days30days | -2.13-3.69-6.18 | -4.57-- | -2.15-3.73-6.24 | -4.64-- | 0.000.0040.00 | I(1)I(0)I(0) |
| Oil and Gas7 days15days30days | -2.72-4.21-6.52 | -4.26-- | -2.67-4.23-6.52 | -4.51-- | 0.000.000.00 | I(1)I(0)I(1) |
| Pharma7 days15days30days | -3.86-5.70-8.26 | --- | -3.89-5.71-8.54 | --- | 0.0040.000.00 | I(0)I(0)I(0) |
| Private Bank7 days15days30days | -2.82-4.03-6.69 | -5.48-- | -2.76-4.09-6.79 | -5.85-- | 0.000.0010.00 | I(1)I(0)I(0) |
| PSU Bank7 days15days30days | -4.51-5.72-7.23 | --- | -5.07-5.71-7.24 | --- | 0.000.000.00 | I(0)I(0)I(0) |
| Reality7 days15days30days | -2.52-4.60-7.21 | -4.75-- | -2.44-4.60-7.24 | -5.33-- | 0.000.000.00 | I(1)I(0)I(0) |
| Bank7 days15days30days | -3.04-4.17-6.94 | --- | -2.98-4.24-7.05 | --- | 0.040.000.00 | I(0)I(0)I(0) |
| Chemical7 days15days30days | -2.35-4.23-6.68 | -5.41-- | -2.41-4.26-6.70 | -5.30-- | 0.000.000.00 | I(1)I(0)I(0) |

**Sources: Calculated by author from secondary data (NSE)**

**5.3 Assessment of Autocorrelation of Market and Sectoral Returns:**

The Durbin-Watson (DW) test for three intervals—7 days, 15 days, and 30 days—found no significant autocorrelation in the return series in table 7. A DW value between 1.50 and 2.50 generally indicates no first-order autocorrelation (Gujarati & Porter, 2009), and this standard is satisfied in all cases analysed.

The Nifty 50 index recorded DW values of 1.61, 1.61, and 1.98, indicating consistent residual patterns at the market level. This confirms that autocorrelation does not pose a significant problem within the dataset, enhancing the credibility of volatility assessments across different sectors. The findings also show that the changes in returns after the U.S.A. tariff announcement are based on reliable information instead of repeated patterns, which boosts the trustworthiness of volatility assessment.

**Table 7: Durbin–Watson Across Event Windows**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Sector |

|  |
| --- |
|  |

|  |
| --- |
|  **DW Statistic** |

 | No Autocorrelation Range |
| Nifty 507 days15days30days | 1.611.611.98 | (1.50-2.50)(1.50-2.50)(1.50-2.50) |
| Automobile7 days15days30days | 1.121.521.87 | (1.50-2.50)(1.50-2.50)(1.50-2.50) |
| Consumer Durable7 days15days30days | 1.981.571.80 | (1.50-2.50)(1.50-2.50)(1.50-2.50) |
| Energy7 days15days30days | 1.571.611.74 | (1.50-2.50)(1.50-2.50)(1.50-2.50) |
| Financial Service7 days15days30days | 1.911.782.08 | (1.50-2.50)(1.50-2.50)(1.50-2.50) |
| FMCG7 days15days30days | 1.942.142.02 | (1.50-2.50)(1.50-2.50)(1.50-2.50) |
| Health7 days15days30days | 2.071.961.98 | (1.50-2.50)(1.50-2.50)(1.50-2.50) |
| IT7 days15days30days | 1.171.602.06 | (1.50-2.50)(1.50-2.50)(1.50-2.50) |
| Media7 days15days30days | 2.362.111.70 | (1.50-2.50)(1.50-2.50)(1.50-2.50) |
| Metal7 days15days30days | 1.291.341.57 | (1.50-2.50)(1.50-2.50)(1.50-2.50) |
| Oil & Gas7 days15days30days | 1.471.531.68 | (1.50-2.50)(1.50-2.50)(1.50-2.50) |
| Pharma7 days15days30days | 2.192.162.12 | (1.50-2.50)(1.50-2.50)(1.50-2.50) |
| Private Bank7 days15days30days | 1.671.491.75 | (1.50-2.50)(1.50-2.50)(1.50-2.50) |
| PSU Bank7 days15days30days | 2.262.011.86 | (1.50-2.50)(1.50-2.50)(1.50-2.50) |
| Reality7 days15days30days | 1.581.701.91 | (1.50-2.50)(1.50-2.50)(1.50-2.50) |
| Bank7 days15days30days | 1.801.541.83 | (1.50-2.50)(1.50-2.50)(1.50-2.50) |
| Chemical7 days15days30days | 1.391.591.57 | (1.50-2.50)(1.50-2.50)(1.50-2.50) |

**Sources: Calculated by author from secondary data (NSE)**

**5.4 Normality Test:**

The Shapiro–Wilk test in table 8 serves to evaluate the normality of market and sectoral returns across 7, 15, and 30-day intervals. The findings suggest that the choice of variance tests has been tailored to correspond with the distribution characteristics inherent to each sector. Levene’s test is utilised under the condition that the normality assumption is satisfied to evaluate the homogeneity of variances. The Brown–Forsythe test serves as an alternative in situations where normality is not present, due to its resilience against outliers and non-normal distributions. This method guarantees the statistical integrity of variance comparisons among sectors, regardless of their distributional characteristics.

**Table 8: Normality Check Across Event Windows**

|  |  |  |  |
| --- | --- | --- | --- |
| Sector | W statistic | p-value | Interpretation |
| Nifty 507 days15days30days | 0.960.960.96 | 0.800.280.03 | H0: Accepted (Normally Distributed)H0: Accepted (Normally Distributed)H0: Rejected (Normally Distributed) |
| Automobile7 days15days30days | 0.980.980.99 | 0.980.910.73 | H0: Accepted (Normally Distributed)H0: Accepted (Normally Distributed)H0: Accepted (Normally Distributed) |
| Consumer Durable7 days15days30days | 0.950.970.98 | 0.580.670.31 | H0: Accepted (Normally Distributed)H0: Accepted (Normally Distributed)H0: Accepted (Normally Distributed) |
| Energy7 days15days30days | 0.940.960.99 | 0.440.270.95 | H0: Accepted (Normally Distributed)H0: Accepted (Normally Distributed)H0: Accepted (Normally Distributed) |
| Financial Service7 days15days30days | 0.970.960.96 | 0.840.310.08 | H0: Accepted (Normally Distributed)H0: Accepted (Normally Distributed)H0: Accepted (Normally Distributed) |
| FMCG7 days15days30days | 0.950.960.98 | 0.540.320.25 | H0: Accepted (Normally Distributed)H0: Accepted (Normally Distributed)H0: Accepted (Normally Distributed) |
| Health7 days15days30days | 0.920.910.96 | 0.260.02\*0.06 | H0: Accepted (Normally Distributed)H0: Rejected (Normally Distributed)H0: Accepted (Normally Distributed) |
| IT7 days15days30days | 0.910.970.94 | 0.180.800.01\* | H0: Accepted (Normally Distributed)H0: Accepted (Normally Distributed)H0: Rejected (Normally Distributed) |
| Media7 days15days30days | 0.960.980.98 | 0.700.980.60 | H0: Accepted (Normally Distributed)H0: Accepted (Normally Distributed)H0: Accepted (Normally Distributed) |
| Metal7 days15days30days | 0.840.860.91 | 0.070.01\*0.01\* | H0: Accepted (Normally Distributed)H0: Rejected (Normally Distributed)H0: Rejected (Normally Distributed) |
| Oil & Gas7 days15days30days | 0.920.960.99 | 0.220.400.92 | H0: Accepted (Normally Distributed)H0: Accepted (Normally Distributed)H0: Accepted (Normally Distributed |
| Pharma7 days15days30days | 0.940.940.98 | 0.430.110.31 | H0: Accepted (Normally Distributed)H0: Accepted (Normally Distributed)H0: Accepted (Normally Distributed |
| Private Bank7 days15days30days | 0.950.970.95 | 0.570.580.03\* | H0: Accepted (Normally Distributed)H0: Accepted (Normally Distributed)H0: Rejected (Normally Distributed) |
| PSU Bank7 days15days30days | 0.920.940.97 | 0.200.090.35 | H0: Accepted (Normally Distributed)H0: Accepted (Normally Distributed)H0: Accepted (Normally Distributed |
| Reality7 days15days30days | 0.980.980.98 | 0.960.880.55 | H0: Accepted (Normally Distributed)H0: Accepted (Normally Distributed)H0: Accepted (Normally Distributed |
| Bank7 days15days30days | 0.970.970.96 | 0.920.520.06 | H0: Accepted (Normally Distributed)H0: Accepted (Normally Distributed)H0: Accepted (Normally Distributed |
| Chemical7 days15days30days | 0.980.950.97 | 0.950.200.24 | H0: Accepted (Normally Distributed)H0: Accepted (Normally Distributed)H0: Accepted (Normally Distributed) |

**\* significance at 1% and 5%**

**Sources: Calculated by author from secondary data (NSE)**

**5.5 Variance test:**

The implementation of U.S.A tariffs represents a notable external policy disruption and has triggered varied volatility reactions among different sectors of the Indian equity market. The analysis focusses on the market's adjustment dynamics by examining return volatility across 7-day, 15-day, and 30-day intervals pre and post the announcement. In table 9,The overall market, represented by the Nifty 50 index, has demonstrated statistically significant rises in volatility across all time frames—suggesting increased systemic uncertainty. Nonetheless, the impacts across different sectors have exhibited significant variability. Sectors including Automobiles, metal, Pharmaceuticals, Healthcare, Chemicals, and Financial Services have shown both statistically significant and economically meaningful rises in post-event volatility, especially right after the announcement.

The Automobile sector, shows a significant increase in volatility from 1.06 to 2.60 (p = 0.01) over a period of 7 days and from 1.06 to 2.01 (p = 0.03) over 15 days; however, these effects appear to have diminished over the 30-day period, indicating a transient market overreaction. Comparable short-term yet temporary fluctuations have been noted in the Pharmaceutical, Healthcare and metal sectors. This behaviour is consistent with earlier findings indicating that markets often overreact to trade policy shocks initially, followed by a period of stabilisation as uncertainty diminishes and information is assimilated. The Chemical sector exhibits consistent increases in volatility over both short- and medium-term periods, indicating a deeper structural sensitivity to disruptions related to trade.

The Financial Services sector has shown a delayed yet statistically significant response in volatility over the 30-day period, with the standard deviation increasing from 0.84 to 1.46 (p = 0.03).On the other hand, industries like FMCG,IT, Media, Oil & Gas, and PSU Banks have demonstrated a lack of significant volatility changes across any timeframe, suggesting a degree of protection from the immediate impacts of tariff policies. The findings indicate that the impact of volatility resulting from the U.S.A tariff announcement varies by sector and is influenced by time, determined by the level of trade exposure and the speed at which market participants have assimilated policy uncertainty.

**Table 9: Levene's Test and the Brown–Forsythe Variance Test**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Sectors | 7 days S.D |  p-value | 15 days S.D |  p-value | 30 days S.D |  p-value |
| Pre Post | Pre Post | Pre Post |
| Nifty 50 | 1.04 | 2.58 | 0.05\* | 0.81 | 1.48 | 0.04\* | 0.76 | 1.35 | 0.03\* |
| Automobile  | 1.06 | 2.6 | 0.01\* | 1.06 | 2.01 | 0.03\* | 1.34 | 1.73 | 0.18 |
| Consumer Durable | 1.74 | 3 | 0.12 | 1.35 | 1.71 | 0.19 | 1.24 | 1.47 | 0.18 |
| Energy | 1.77 | 3 | 0.07 | 1.11 | 1.94 | 0.08 | 1.29 | 1.71 | 0.24 |
| Financial Service | 1.38 | 2.10 | 0.37 | 1.05 | 1.60 | 0.14 | 0.84 | 1.46 | 0.03\* |
| FMCG | 0.55 | 1.07 | 0.14 | 0.62 | 1.02 | 0.10 | 0.80 | 1.03 | 0.12 |
| Healthcare | 1.00 | 2.27 | 0.00\* | 1.04 | 1.78 | 0.21 | 1.14 | 1.39 | 0.26 |
| IT | 1.69 | 2.75 | 0.45 | 1.35 | 2.28 | 0.17 | 1.41 | 2.13 | 0.26 |
| Media | 2.07 | 3.17 | 0.20 | 1.82 | 2.34 | 0.70 | 1.95 | 1.90 | 0.47 |
| Metal | 1.40 | 4.83 | 0.05\* | 1.02 | 3.06 | 0.05\* | 1.38 | 2.53 | 0.12 |
| Oil & Gas | 1.84 | 2.87 | 0.23 | 1.17 | 1.96 | 0.09 | 1.27 | 1.63 | 0.31 |
| Pharma | 1.05 | 2.80 | 0.01\* | 1.00 | 2.08 | 0.012\* | 1.13 | 1.57 | 0.10 |
| Private Bank | 1.41 | 2.63 | 0.20 | 1.08 | 1.63 | 0.15 | 0.86 | 1.39 | 0.08 |
| PSU Bank | 1.89 | 2.42 | 0.12 | 1.59 | 2.05 | 0.14 | 1.56 | 1.94 | 0.35 |
| Realty | 2.18 | 4.65 | 0.03\* | 2.12 | 2.84 | 0.49 | 1.75 | 2.59 | 0.11 |
| Bank  | 1.21 | 1.89 | 0.41 | 1.01 | 1.51 | 0.17 | 0.82 | 1.35 | 0.03\* |
| Chemical | 1.01 | 3.06 | 0.02\* | 0.80 | 1.91 | 0.01\* | 1.10 | 1.52 | 0.25 |

**\*significance at 1% and 5%**

**Sources: Calculated by author from secondary data (NSE)**

**6. DISCUSSION**

The resultant findings of this study indicate that Indian sectoral indices exhibit varied responses to U.S. tariff announcements, consistent with established financial theories and previous research evidence. Sectors such as IT, FMCG, and PSU Banks exhibited reduced volatility, reinforcing the Efficient Market Hypothesis (Fama, 1970) and the Overreaction Hypothesis (De Bondt & Thaler, 1985), indicating that markets respond swiftly when fundamentals are robust. This is consistent with Verma (2015), who emphasised the robustness of India’s software export sector driven by consistent foreign demand.

Conversely, increased volatility in the sectors of Automobiles, Metals, and Pharmaceuticals corresponds with Policy Uncertainty Theory (Pastor & Veronesi, 2012), since sectors with global exposure tend to respond more intensely to abrupt changes in trade policy. This pattern is corroborated by the findings of Boer et al. (2022) and Hoque et al. (2023), who identified analogous spillover effects in various other emerging economies. The significant market responses in the pharmaceutical and automotive sectors highlight the trade dependency observed by Zhang et al. (2023) and Verma et al. (2020).

Statistically significant volatility shifts in the brief period following the announcement also illustrate the principles of Uncertainty Shock Theory (Bloom, 2009), which accounts for the postponement of investments in response to external shocks. Comparable swift modifications were observed by Kanojia et al. (2024) in reaction to the UAE–India CEPA agreement. Verma (2010) highlighted that global downturns have a disproportionate impact on India’s trade-linked sectors.

**7. CONCLUSION**

The study examines the immediate impacts of U.S. tariff declarations on the volatility of India's sectoral stock markets. The findings indicate that whereas overall market volatility increases immediately following such announcements, the effects vary by industry. Industries with global connections, such as Automobiles, Metals, and Pharmaceuticals, encounter more pronounced volatility, whilst sectors orientated towards domestic markets, like FMCG, IT, and PSU Banks, exhibit greater stability.

These findings corroborate ideas about policy uncertainty and investor overreaction, highlighting the influence of both economic fundamentals and behavioural responses on market reactions. Volatility often diminishes within 30 days, indicating that markets stabilise as uncertainty dissipates.

To mitigate external shocks, investors have to employ short-term techniques such as hedging, stop-loss orders, and temporarily restricting exposure to severely impacted industries. Policymakers might bolster market stability by refining monitoring instruments and contemplating temporary measures—such as sector-specific trade halts—during times of significant volatility. Enhancing export diversification and stimulating domestic demand in at-risk industries can mitigate long-term susceptibility to global policy change.

**DISCLAIMER(ARTIFICIAL INTELLIGENCE)**

The author(s) hereby declare that NO generative AI technologies, such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators, have been used during the writing or editing of this manuscript.

**CONSENT**

As per international standards or university standards, respondents’ written consent has been collected and preserved by the author(s).

**COMPETING INTERESTS**

Authors have declared that no competing interests exist.

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