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A STUDY ON THE EVENT-BASED VOLATILITY ANALYSIS OF INDIAN TWO-WHEELER STOCKS: A COMPARATIVE STUDY OF TVS MOTOR AND BAJAJ AUTO

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ABSTRACT

This study examines Bajaj Auto and TVS Motor Company (2015–2024) to identify events that triggered share price shifts in India's two main two-wheeler companies. Using an event study methodology with a ±30-day event window, it investigates the impact of eight major macroeconomic and policy events: COVID-19 Lockdown (2020), Union Budget EV Incentives (2021), FAME II Policy Revision (2022), BS-VI Transition (2019), IL&FS Crisis (2018), GST Implementation (2016), Demonetization (2016), and EV Policy & PLI Scheme (2023). All eight events produced statistically significant volatility spikes for both companies using Descriptive Statistics, Paired Sample t-Test, Independent Sample t-Test, One-Way ANOVA, Pearson Correlation, Coefficient of Variation, Average True Range, and Bollinger Band Width. The COVID-19 Lockdown generated the highest volatility (post-event SD: 4.12% TVS, 3.78% Bajaj), while EV policy events created high-risk, high-reward scenarios. High correlation (r = 0.654–0.831) confirms systemic industry risk dominance.

Keywords: *Event Study, Stock Volatility, TVS Motor, Bajaj Auto, Two-Wheeler Industry, Indian Capital Market, EV Policy*

INTRODUCTION

India's capital markets have transformed significantly over the last decade, with digital trading, greater retail participation, and rising foreign institutional inflows heightening sensitivity to macroeconomic indicators. Within this landscape, the two-wheeler sector represented by firms like Bajaj Auto and TVS Motor serves as a proxy for national economic health, rural purchasing power, and mass-market consumer sentiment.Between 2015 and 2024, India witnessed an unusual convergence of structural shocks: demonetization (2016), GST (2017), the IL&FS credit crisis (2018), BS-VI transition (2019), COVID-19 (2020), and the government's accelerated EV push via FAME-II and PLI schemes (2021–2023). Despite the sector's scale and event sensitivity, academic research has rarely applied multi-tool event study techniques to comparatively examine volatility impacts. This study fills that gap through a structured analysis of TVS Motor and Bajaj Auto across eight well-defined event windows.

STATEMENT OF THE PROBLEM

India's equity markets respond strongly to economic shifts, legislative reforms, and industry specific information. While the two-wheeler industry is central to the national economy, there is a clear lack of empirical research examining how monetary shocks and policy events concurrently impact the stock price volatility of India's leading two-wheeler companies. Existing research concentrates on either market-level indices or individual businesses in isolation making it impossible to detect whether firms within the same industry react to similar shocks with comparable or different amplitudes. The rapid EV policy acceleration since 2021, with repeated FAME-II incentive revisions and PLI

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announcements, has further compounded investor uncertainty, leaving retail investors, fund managers, and regulators without factual evidence to understand market reactions.

OBJECTIVES

- To identify and chronologically list the major macroeconomic and industry-specific events that significantly affected the Indian two-wheeler industry during 2015–2024.
- To compare and measure the volatility patterns of TVS Motor Company and Bajaj Auto before and after the occurrence of key events.
- To assess the extent to which the identified macroeconomic and policy events have influenced stock market volatility and investor response for both companies.

RESEARCH METHODOLOGY

Research Design

Quantitative, empirical, and analytical. Descriptive Research identifies macroeconomic events chronologically; Comparative Research Design places TVS Motor Company and Bajaj Auto on the same analytical path. The study applies the event study methodology (Fama, Fisher, Jensen & Roll, 1969; Mackinlay, 1997) with a ±30-day event window around each Day 0.

Data Sources and Sample

TVS Motor (TVSMOTOR.NS) and Bajaj Auto (BAJAJ-AUTO.NS) daily closing prices sourced from Yahoo Finance and confirmed via NSE/BSE historical databases. Market benchmarks: NSE Nifty and BSE Sensex. Event dates verified through official government announcements, SEBI documents, and confirmed financial news archives.

Analytical Tools

(1) Descriptive Statistics; (2) Paired Sample t-Test; (3) Independent Sample t-Test; (4) One-Way ANOVA; (5) Pearson Correlation; (6) Coefficient of Variation (CV); (7) Average True Range (ATR, 14-day EMA); (8) Bollinger Band Width (BBW).

REVIEW OF LITERATURE

Event study methodology traces to Ball and Brown (1968) and Fama et al. (1969), with MacKinlay (1997) providing the canonical framework adopted here. Fama's (1970) Efficient Market Hypothesis specifically its semi-strong form supplies the theoretical foundation, positing instantaneous price adjustment to public information, a premise this study tests in an emerging market context.

Volatility modelling draws on Engle (1982), Bollerslev (1986), and Glosten, Jagannathan & Runkle (1993) for the ARCH–GARCH–GJR-GARCH progression, with Schwert (1989) and Mandelbrot (1963) underpinning the time-varying and clustering properties central to the ATR and BBW analyses.

On demonetization, Bantwa (2017), Kumar & Bhatia (2018), Sivakumar et al. (2017), Sunil & Shenoy (2017), and Upadhyay & Suvarna (2018) collectively document significant negative abnormal returns, with pronounced automobile sector contraction. GST studies Rao (2017), Maheshwari et al. (2024), and Gahlot (2017) find moderate but significant reactions, particularly in manufacturing. Union Budget event studies (Thomas & Shah, 2002; Dey & Pathy, 2019; Das & Das, 2022; Shafiq & Qureshi, 2018; Jain & Arora, 2025) consistently confirm short-term volatility spikes, with financial services and automobile sectors most sensitive.

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COVID-19 literature Guru & Das (2021), Jena & Mishra (2022), Manu & Shetty (2022), and Rajamohan et al. (2020) documents historically unprecedented initial volatility, while Ali et al.

(2022), Mahajan et al. (2022), and Harichandan & Jena (2021) supply GARCH-based sectoral evidence. Kaur (2016) and Srinivasan & Ibrahim (2010) establish the BSE/NSE volatility baseline against which this study's findings are benchmarked.

SCOPE OF THE STUDY

The study is confined to the following boundaries:

- It covers the period from 2015 to 2024, a decade characterized by exceptional policy and macroeconomic turbulence in India.
- It analyses only two companies TVS Motor Company Limited and Bajaj Auto Limited selected based on continuous listing on both NSE and BSE, sustained market leadership by market capitalization, and complete data availability throughout the study period.
- The analysis employs a ±30-day event window around each of the eight identified event dates, using daily closing stock price data sourced from NSE, BSE, and Yahoo Finance.
- It uses exclusively secondary data; primary data collection through surveys or interviews is outside the scope of this work.
- The study does not extend to fundamental valuation analysis, technical trading strategy testing, or forecasting future stock price movements.

RESULTS & DISCUSSION

Identified Events and Chronological Summary

Eight major macroeconomic and policy events were identified and verified for the study period. These events fall into three categories: macroeconomic demand shocks (Demonetization, IL&FS Crisis, COVID-19 Lockdown), regulatory and structural transitions (GST Implementation, BS-VI Transition), and industry-specific EV policy interventions (Budget EV Incentives 2021, FAME II Revision 2022, EV Policy & PLI 2023).

Table 1: Identified Events Chronological Summary

S.No	Event	Date (Day 0)	Category
1	Demonetization	Nov 8, 2016	Demand Shock
2	GST Implementation	Jul 1, 2017	Structural Transition
3	IL&FS Crisis & Market Crash	Sep 2018	Credit Market Shock
4	BS-VI Transition Announcement	Mar 2019	Regulatory Transition
5	COVID-19 National Lockdown	Mar 24, 2020	Demand Shock
6	Union Budget EV Incentives	Feb 1, 2021	EV Policy
7	FAME II Policy Revision	Jun 2022	EV Policy
8	EV Policy & PLI Scheme	Mar 2023	EV Policy

Pre vs. Post Event Volatility Descriptive Statistics

Paired Sample t-Tests for all eight events and both companies confirmed statistically significant volatility increases ($p < 0.05$) in all 16 event-company pairs. COVID-19 was the most severe event: TVS Motor's SD surged from 1.89% to 4.12% (+118%) and Bajaj Auto's from 1.74% to 3.78% (+117%). EV policy events produced high positive-mean-return volatility, indicating strategic re-rating rather than panic-driven selling.

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Table 2: Consolidated Pre vs. Post Event Volatility — TVS Motor & Bajaj Auto (All paired t-tests significant at p < 0.05 or p < 0.001)

	'S Pre SD	TVS Post SD	Bajaj Pre SD	Bajaj Post SD	Pearson r	olatility Class
COVID-19 Lockdown	1.89%	4.12%	1.74%	3.78%	0.831	Extreme
IL&FS Crisis	1.52%	2.87%	1.41%	2.54%	0.748	Very High
Demonetization	1.38%	2.64%	1.29%	2.31%	0.781	Very High
EV Policy & PLI	1.21%	2.24%	1.12%	1.96%	0.768	High
FAME II Revision	1.18%	2.12%	1.09%	1.89%	0.729	High
EV Budget Incentives	1.14%	1.98%	1.06%	1.77%	0.714	Moderate-High
BS-VI Transition	1.09%	1.72%	1.02%	1.61%	0.654	Moderate
GST Implementation	1.04%	1.58%	0.98%	1.43%	0.692	Moderate

ANOVA, ATR and Bollinger Band Width Findings

One-Way ANOVA confirmed event type as a statistically significant determinant of post-event volatility for both TVS Motor ($F = 5.17$, $p < 0.001$) and Bajaj Auto ($F = 4.36$, $p < 0.001$). ATR analysis showed TVS Motor recording consistently higher percentage expansions than Bajaj Auto most starkly during COVID-19 (+139.8% vs. +103.2%) reflecting TVS Motor's deeper reliance on domestic retail demand. Bollinger Band Width classified events into three tiers: Band Explosion (>100% increase) for COVID-19, IL&FS, and Demonetization; Band Expansion (50–90%) for EV policy events; and Moderate Widening (<50%) for GST and BS-VI Transition.

Pearson Correlation and Portfolio Implications

All Pearson Correlation coefficients between TVS Motor and Bajaj Auto post-event returns were statistically significant ($p < 0.001$), ranging from $r = 0.654$ (BS-VI Transition) to $r = 0.831$ (COVID-19 Lockdown). This persistent co-movement confirms that systemic industry-level risk dominates firm-specific factors during major event windows. Holding both stocks simultaneously does not provide meaningful volatility hedging during macro or policy shocks; effective diversification requires cross-sector rather than intra-sector allocation.

POLICY IMPLICATIONS

For Retail Investors

- Tighten stop-loss levels or reduce position sizes in the 30-day window preceding scheduled events such as Union Budgets and FAME policy revisions.
- Distinguish between crisis-driven volatility (associated with sharply negative returns) and EV policy volatility (which often accompanies positive mean returns) before making trading decisions.
- Avoid panic selling during Band Explosion events; BBW analysis shows that extreme band expansions during COVID-19 and IL&FS reversed sharply within 30 trading days.

For Institutional Fund Managers

- Incorporate event-conditional volatility multipliers into Value-at-Risk models, using the post-

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event standard deviation benchmarks established in this study.

- standard deviation above its 14-day average.
- Assign higher volatility loading to TVS Motor than Bajaj Auto in demand-shock stress test scenarios.

For Corporate Management

- Proactively release EV transition roadmaps and forward guidance within 48–72 hours of any government EV policy announcement to contain information-uncertainty-driven volatility.
- Accelerate international market penetration (particularly for TVS Motor) to structurally reduce dependence on domestic demand shocks.

For Policy Regulators

- Provide long advance notice and clear implementation timelines for structural reforms pre-announced events produce significantly lower volatility (BBW change: 27–33%) than abrupt ones (Demonetization: 130%).
- Commit to minimum 24–36-month stability windows for approved EV incentive structures to reduce investor uncertainty.

CONCLUSION

This study provides robust evidence that major macroeconomic and policy events systematically amplify stock return volatility in India's two-wheeler sector. Across all eight events and both companies, every null hypothesis is rejected events matter, measurably and economically.

COVID-19 stands apart as the most extreme event, with Bollinger Band Width expansions exceeding 187% and post-event standard deviations nearly double those of the second-ranked IL&FS Crisis. Yet Demonetization and the IL&FS collapse independently generated very high volatility a finding relevant to risk modellers who may discount non-pandemic tail risks.

EV policy events of 2021–2023 tell a structurally different story: elevated volatility accompanied by positive mean returns, signalling strategic re-rating rather than panic. This distinction between fear-driven and opportunity-driven volatility is a nuance single-metric models routinely miss, but that the multi-tool framework here captures precisely.

Apply ATR-based dynamic position sizing, scaling down holdings as ATR expands beyond one TVS Motor consistently exhibited higher ATR changes than Bajaj Auto, reflecting its greater domestic retail orientation. Bajaj Auto's export base and premium positioning offer a partial structural hedge. However, high Pearson Correlation values across all events confirm that macro shocks erase firm-level distinctions portfolio diversification within the two-wheeler sector provides limited protection, making cross-sector exposure necessary for effective hedging.

As the sector accelerates its EV transition, policy-driven event windows will likely intensify. This study's empirical baseline eight events, two firms, ten years offers a replicable foundation for benchmarking future volatility and informing decisions of investors, fund managers, corporate strategists, and regulators alike.

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