

Assessment of Risk Uncertainty for Budget Session: An Event Study of the Indian Stock Market

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Abstract

This study investigates the dynamics of risk uncertainty and volatility clustering over the period of 26 years (2000–2026). Using event study methodology, the study segments the market performance into two major Blocks, and furthermore each Block is divided into Eras to understand how the market behavior evolves over time. Block 1 represents the Historical Baseline, containing the Nifty 50 (benchmark) and Nifty Next 50 over the period of 26-years to understand how market efficiency has evolved. Block 2 represents Modern Strategic Era, which compares the impact of the budget announcements on the Nifty 50 and Nifty Next 50 in comparison with new indices: Nifty Alpha 50, Nifty Smallcap 100, Nifty Midcap 100, Nifty Dividend Opportunities 50 (Nifty Div Opps 50), and Nifty F and O. Empirical results for the Nifty 50 benchmark demonstrate volatility persistence and leverage effect using Exponential Generalized Autoregressive Conditional Heteroskedasticity (E-GARCH). The asymmetric parameter (γ) was estimated at -0.105585 in Era 1, confirming that the market reacted more strongly to the negative news than to the positive news of the same magnitude; this value shifted to -0.13406 in Era 5. Furthermore, GARCH coefficient (β) was estimated at 0.925225 (close to 1) in Era 1, suggesting the market historically exhibited higher volatility persistence compared to the β value estimated at 0.416201 in Era 5, signifying that the market has matured over-time and absorbs shock much more efficiently. Moreover, the presence of fat tails, as evidenced by Student's t degree of freedom ranging from 10.24 in Era 1 to 3.57 in Era 5, underscores the recurring extreme outliers' events associated with budget sessions.

JEL Codes: G12, G14, C22, C58.

1.Introduction

The Indian Stock Market has undergone a structural transformation over the past few decades evolving from an emerging market into a global financial hub. At the center of this evolution is the Union Budget, a major macroeconomic event. The budget is considered as the economic barometer for the nation (Pandya 2014). As the most watched macroeconomic event, it not only outlines the fiscal deficit and taxations but also contributes significantly for the future policy directions (Srinivasu and Prathyusha 2025). The rationality of market place and the impact of the fiscal signals that are immediately reflected in the security prices, makes the Union Budget an ideal subject of Event study (MacKinlay 1997).

While the traditional indices like Nifty 50 have shown high volatility persistence (Kaur 2004), the modern era has seen a shift in the market from traditional indices to comparatively new thematic and strategic indices such as Nifty Smallcap 100 and Nifty Dividend Opportunities 50.

Using the E-GARCH(1,1) framework (Nelson 1991), we move beyond the simple returns to investigate risk uncertainty. Furthermore, the study uses a modified version of event study (MacKinlay 1997) by dividing the analysis in two Blocks and further dividing the Blocks into Eras. Block 1 represents the Historical Baseline while Block 2 represents the Modern Strategy Era, where Eras are considered as the event window.

This study contributes to the existing literature by conducting a comprehensive analysis of reaction of Indian Stock Market to budget announcements over the extended period of 26 years starting from year 2000, following the Block and Era approach.

1.1 Research Gap

The significant contributions have been made by the scholars over the years, but there are some gaps that this study aims to address, the study done by (Pandya 2014) and (Srinivasu and Prathyusha 2025) has documented the impact of fiscal policy on Indian stock market but their analysis is particularly focused on short term window. Secondly, the presence of “leverage effect” in the Indian Stock Market was earlier established by (Kaur 2004). There is a lack of studies that investigates whether the asymmetry still exists in the Indian market or whether with time and institutionalization this asymmetry has faded. Third, most studies are focused on the broad indices like Nifty 50, although (Nirban and Bhardwaj 2025) have investigated the performance of thematic indices but they did not investigate that how these indices will specifically react to the volatility shocks induced by the major macroeconomic event, the Indian Union Budget.

1.2 Research Questions for the study

In order to address these gaps as identified during the process of research, the following research questions are formulated:

1. Have there been any changes in the volatility persistence in the Nifty 50 across the five historical eras (Block 1)?
2. Is the “leverage effect” still exhibited by the Indian stock market during the Budget session in the Modern Strategy Era?
3. Is there any difference in the reaction of strategic and thematic indices (Block 2) as compared to the traditional market-cap-weighted benchmarks?

1.3 Objectives of the study

1. To analyze the changes in the volatility persistence in the Nifty 50 across the five historical eras of Historical Baseline.
2. To determine if the leverage effect is still exhibited by the Indian stock market during the budget session in the Modern Strategy Era.
3. To examine differences in the reaction of the strategic and thematic indices (Block 2) as compared to the traditional market-cap-weighted benchmarks.

1.4 Hypothesis for the study

Hypothesis 1

Analysis of Volatility Persistence

H_{01} (Null Hypothesis): There is no change in volatility persistence in the Nifty 50 across the five historical eras.

H_{11} (Alternative Hypothesis): There is change in the volatility persistence in the Nifty 50 across the five historical eras.

Hypothesis 2

Assessment of leverage effect

H_{02} (Null Hypothesis): The Indian stock market does not exhibit the leverage effect in the modern era.

H_{12} (Alternative Hypothesis): The Indian stock market exhibits the leverage effect in the modern era.

Hypothesis 3

Comparative Analysis of Index Reactions

H_{03} (Null Hypothesis): There is no difference in the reaction of the strategic and thematic indices as compared to the market-cap-weighted benchmark.

H_{13} (Alternative Hypothesis): There is a difference in the reaction of the strategic and thematic indices as compared to the market-cap weighted benchmark.

2. Review of Literature

2.1 Theoretical and Methodological Framework

The study is conducted on the broad time frame of 26 years, which requires a robust framework to handle both time varying volatility and events that generate macroeconomic “shocks” like Indian Union Budget.

2.1.1 Event Study Methodology and Market Efficiency

According to (Fama 1970) the market is efficient if it reacts to public information immediately. This theory is the primary benchmark for understanding the maturity of the Indian Market based on its Historical Baseline (Block 1).

Following (MacKinlay 1997) this study employs specialized adaptation of event study method, dividing the study period (2000–2026) into two Blocks: Block 1 (Historical Baseline) and Block 2 (Modern Strategy Era). Further these Blocks are divided into specific Eras, with each Era treated as the event.

2.1.2 Volatility Framework

The concept of volatility clustering where the periods of high volatility are followed by the periods of high volatility was first formalized by (Engle 1982) through the Autoregressive Conditional Heteroskedasticity (ARCH) model. This model is used to justify the presence of the ARCH effect, proving that budget-induced shocks are not random but clusters over time.

This study opted for E-GARCH(1,1) model (Nelson 1991) rather than simple GARCH(1,1) as it helps to capture asymmetry. Investors often react differently to good and bad news and this model provides the mathematical parameter (γ) needed to prove the existence of the panic factor.

2.2 Empirical Literature

(Pandya 2014) studied the impact of the Union Budget announcement on the stock prices in India during the year 1993–2013. Using event study methodology, the study assessed how the budget announcement impacts the stock prices in the Indian stock market. The study examined the abnormal returns and volatility across short (± 3), medium (± 15), and long-term (± 30) window. The result indicated that there were no consistent abnormal returns, which suggests that the market has become more efficient in digesting the event.

(Kaur 2004) examined the time-varying volatility in the Indian stock market, using econometric models. The study assessed the presence of volatility clustering, auto-correlation and negative asymmetry in returns during the period of 1993–2003. The evidence of negative asymmetry indicated that the impact of adverse news is stronger than the impact of positive news on market volatility.

A study done by (Srinivasu and Prathyusha 2025) dealt with an event study. The study conducted a comprehensive analysis of Union Budget announcements in India from 2000–2024. The study employed multiple methodological approaches to capture both price and volatility effects. The study confirms that budget announcements remain the significant market-moving event in the Indian context, though their impact has evolved considerably over time.

(Varma et al. 2021) studied the short-term impact of Covid-19 on the Indian stock market. Using event study methodology, the study assessed the effect of the global pandemic on Nifty 50 and its constituents which were used as a proxy for the broader market. The findings suggest that the financial sector experienced the most severe impact, followed by real estate, tourism and the automobile sector. In contrast, the IT sector and consumer sector were least impacted, reflecting their relative resilience during the pandemic.

The study done by (Nirban and Bhardwaj 2025) analyzed the performance of sustainability indices as compared to thematic indices. Using econometric models, the study aimed to assess whether the sustainability indices performed better than thematic indices in various aspects. The results showed that the ESG indices deliver steady, moderate returns with acceptable risk-adjusted performance but are not superior in performance.

The study done by (Patel et al. 2025) aimed to analyze the effects of the Indian budget announcement on the Indian stock market with focus on the year 2024. This study utilizes fractal interpolation, paired with fractal dimensional analysis, to study the fluctuations arising from the budget announcements. The findings suggested that the budget announcement created pessimism in the market. The market performed worse than expected.

3. Data and Methodology

3.1 Data Collection

This study has utilized daily closing prices of Nifty 50 as a benchmark for the period of 2000–2026 that is Block 1 (Historical Baseline). Historical Baseline also includes daily closing prices of Nifty Next 50. This scope expands in the Block 2 (Modern Strategy Era). The Modern Strategy Era includes both thematic and strategic indices along with Nifty 50 and Nifty Next 50. Block 2 includes daily closing prices of Nifty 50, Nifty Next 50, Nifty Alpha 50, Nifty Midcap 100, Nifty Smallcap 100, Nifty Dividend Opportunities 50, and Nifty F and O. Data in Block 2 starts from inception of Nifty Alpha 50. Data is retrieved from the official website of the National Stock Exchange (NSE). Initial data cleaning, merging of 26 years of historical data (2000–2026), and logarithmic returns transformation were performed using Microsoft Excel. All statistical estimations and diagnostic tests were conducted using E-views (Econometric Views).

3.2 Methodology

3.2.1 Logarithmic Returns

The log returns are calculated using below formula,

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

Where:

R_t = Return of the series at time t.

Ln = Natural logarithmic function.

P_t = Closing price of the current day.

P_{t-1} = Closing price of the previous trading day.

3.2.2 Augmented Dickey Fuller Test (ADF Test)

This test is a pre-diagnostic test, necessary to move forward in the study. It is necessary for the data to be stationary, to avoid spurious regression results. This study applies ADF test to the log returns of the

Nifty indices as follows:

$$\Delta Y_t = \alpha + \beta t + \gamma Y_{t-1} + \sum_{i=1}^p \delta_i \Delta Y_{t-i} + \epsilon_t \quad (2)$$

Where:

ΔY_t = The change in Nifty returns from one day to next.

α = The constant term of the series.

βt = The deterministic time trend component.

γ = The coefficient tested for the unit root.

p = The optimal lag length chosen to eliminate serial correlation.

δ_i = The coefficient of the lagged first difference.

ϵ_t = The error terms.

3.2.3 ARCH-LM Test

The Lagrange Multiplier (LM) test, as proposed by (Engle 1982), is used to detect volatility clustering—a phenomenon where periods of high volatility are followed by periods of high volatility. The study tests for the volatility clustering using the following squared residual regression:

$$\epsilon_t^2 = \alpha_0 + \sum_{i=1}^q \alpha_i \epsilon_{t-i}^2 + v_t \quad (3)$$

Where:

ϵ_t^2 = The intensity of the budget shock.

α_0 = The lags of the volatility.

$\sum_{i=1}^q \alpha_i \epsilon_{t-i}^2$ = It represents the cumulative impact of historical volatility shocks.

v_t = The error term specific to the variance equation.

If the test rejects the null hypothesis of the “No ARCH effects”, it shows that budget creates volatility shocks that clusters over time.

3.3 E-GARCH(1,1)

The Exponential GARCH model is explained by the following equation:

$$\ln(\sigma_t^2) = \omega + \alpha \left| \frac{\epsilon_{t-1}}{\sigma_{t-1}} \right| + \gamma \frac{\epsilon_{t-1}}{\sigma_{t-1}} + \beta \ln(\sigma_{t-1}^2) \quad (4)$$

Where:

$\ln(\sigma_t^2)$ = log of the conditional variance.

ω = The constant term.

α = The ARCH parameter, used to measure the magnitude of yesterday's shock.

γ = The Asymmetry parameter.

β = The shock persistence parameter.

Once the stationarity of the data is proved and the presence of ARCH effect is confirmed then study employs E-GARCH(1,1) by (Nelson 1991) model to capture asymmetry—the tendency of the market to react more strongly to the bad news than the good news of the same magnitude.

3.4 Data Synchronization and Proxy

To facilitate the comprehensive 26-year analysis for Block 2 (Modern Strategy Era), certain indices required back-calculation and proxy adjustment. Data for Block 2 was manually adjusted and cleaned according to the availability of the back calculated data. Data was adjusted according to the inception date of the Nifty Dividend Opportunities 50 (back-calculated).

The Nifty 50 Total Returns (Nifty TR 50) is used as proxy for derivatives (F and O) segment. This was done to analyze the risk uncertainty associated with derivative (F and O) segment. It provided more accurate measure for the total market risk as it accounts for both capital gains and dividends.

4. Results and Discussion

4.1 Results for ADF Test

Table 1 shows the ADF test results, applied to the log returns of the indices in the Block 1 (Historical Baseline), while Table 2 contains the results of Block 2 (Modern Strategy Era) containing all the seven indices.

Table 2
ADF (Unit Root) (Eras 1–5, Historical Baseline, Block 1)

Index	Era 1	Era 2	Era 3	Era 4	Era 5
Nifty 50					
t-statistic	-27.517***	-35.48255***	-34.2904***	-12.9037***	-30.077***
Probability	0	0	0	0	0
Nifty Next 50					
t-statistic	-25.8025***	-32.79331***	-32.8896***	-35.79072***	-29.856***
Probability	0	0	0	0	0
Note. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. The null hypothesis (H_0) is that series has a unit root (non-stationary). Critical values are based on Mackinnon 1996 (MacKinnon 1996).					

The results show that data of Block 1 is stationary and fit for further study. Higher negative values—such as -27.517 for Nifty 50 index in Era 2—confirm that data is highly stationary and integrated of order 0. Similarly, in Era 4 t-statistic of -12.9037 for the Nifty 50 index indicates that data is stationary at the level form. Furthermore, data for the Nifty Next 50 is highly stationary throughout the Historical Baseline across all the five eras.

Table 3
ADF (Unit Root) (Eras 1–4, Modern Strategy Era, Block 2)

Index	Era 1	Era 2	Era 3	Era 4
Nifty 50				
t-statistic	-31.76489***	-30.9582***	-11.54935***	-33.66436***
Probability	0	0	0	0
Nifty Next 50				
t-statistic	-29.42259***	-30.0743***	-11.24743***	-33.28815***
Probability	0	0	0	0
Nifty Smallcap 100				
t-statistic	-26.56067***	-28.4234***	-10.30718***	-30.0496***
Probability	0	0	0	0
Nifty Midcap 100				
t-statistic	-27.68483***	-29.995***	-10.88732***	-32.44577***
Probability	0	0	0	0
Nifty Div Opps 50				
t-statistic	-29.4995***	-30.7245***	-11.15567***	-33.79259***
Probability	0	0	0	0
Nifty F and O				
t-statistic	-32.77092***	-31.8193***	-11.51796***	-34.24007***
Probability	0	0	0	0
Nifty Alpha 50				
t-statistic	-29.02793***	-28.6063***	-30.92602***	-31.63889***
Probability	0	0	0	0
Note. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. The null hypothesis (H_0) is that series has a unit root (non-stationary). Critical values are based on Mackinnon 1996 (MacKinnon 1996).				

Similarly, the Block 2 results show that the data is overall stationary throughout the Modern Strategy Era and across all the four sub-eras. Era 1, Era 2, and Era 4 show strong stationarity, while in Era 3, all the

indices other than Nifty Alpha 50 show stationarity at the level form. Even in Era 3, Nifty Alpha 50 shows highly robust stationarity.

4.2 Results for ARCH-LM Test

Table 3 shows the ARCH-LM test results for the Historical Baseline, whereas Table 4 shows the results for the Modern Strategy Era.

Table 4
Results of ARCH-LM (Eras 1–5, Historical Baseline, Block 1)

Index	Era 1	Era2	Era 3	Era 4	Era 5
Nifty 50					
Obs*R-squared	312.8983***	93.70768***	29.93201***	258.5913***	0.020243
F-statistic	80.36096	20.00472	6.091353	63.21376	0.004022
Prob. Chi-Square(5)	0	0	0	0	1
Nifty Next 50					
Obs*R-squared	377.8914***	182.9896***	15.42531***	137.9721***	81.44242***
F-statistic	103.2669	41.94231	3.106139	30.49148	17.79524
Prob. Chi-Square(5)	0	0	0.0087	0	0
Note. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. The Obs*R represents the Engle's LM statistic. A significant p-value (< 0.05) indicates the presence of ARCH effects, confirming volatility clustering and the use of E-GARCH model.					

The results of ARCH-LM test for Nifty 50 (Block 1), the market benchmark indicate that market has become mature and efficient at processing the information. Engle's LM statistic decreased from 312.8983 in Era 1 to 0.020243 in Era 5; this reduction confirms that market has become mature over time. The Nifty Next 50 also shows the same trend.

4.2.1 Era 4: Period of External Volatility Overload

Era 4 emerged as a period of structural break, where the external factors temporarily overwhelmed the market maturity. During this Era, the LM statistic rose to 258.5913, due to the concentration of black-swan events, including the 2016 Demonetization, the 2017 GST implementation, and the 2020 COVID-19 pandemic. These events created persistent noise during this era. The uncertainty surrounding the budget was compounded by these external macroeconomic shocks.

Table 5
Result of ARCH-LM (Eras 1–4, Modern Strategy Era, Block 2)

Index	Era 1	Era 2	Era 3	Era 4
Nifty 50				
Obs*R-squared	66.86759***	20.85227***	217.6088***	0.020518
F-statistic	14.13704	4.226	53.54973	0.004082
Prob. Chi-Square(5)	0	0.0009	0	1
Nifty Next 50				
Obs*R-squared	134.1542***	15.395***	123.9541***	99.85468***
F-statistic	30.27331	3.104815	27.6802	21.78517
Prob. Chi-Square(5)	0	0.0088	0	0
Nifty Smallcap 100				
Obs*R-squared	221.5561***	20.64436***	144.4809***	68.00934***
F-statistic	54.7908	4.183083	32.93197	14.39384
Prob. Chi-Square(5)	0	0.0009	0	0
Nifty Midcap 100				
Obs*R-squared	143.079***	12.35163**	112.7688***	85.79824***
F-statistic	32.57837	2.484289	24.90713	18.46724
Prob. Chi-Square(5)	0	0.0303	0	0
Nifty Div Opps 50				
Obs*R-squared	157.633***	17.53034***	166.7236***	88.51205***
F-statistic	36.4278	3.542213	38.87389	19.10086
Prob. Chi-Square(5)	0	0.0036	0	0
Nifty F and O				
Note. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. The Obs*R represents the Engle's LM statistic. A significant p-value (< 0.05) indicates the presence of ARCH effects, confirming volatility clustering and the use of E-GARCH model.				

Index	Era 1	Era 2	Era 3	Era 4
Obs*R-squared	78.54659***	20.52477***	216.6293***	96.23121***
F-statistic	16.79012	4.158404	53.25187	20.92127
Prob. Chi-Square(5)	0	0.001	0	0
Nifty Alpha 50				
Obs*R-squared	164.418***	23.92083***	129.3743***	68.90495***
F-statistic	38.26194	4.861261	29.04613	14.59567
Prob. Chi-Square(5)	0	0.0002	0	0
Note. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. The Obs*R represents the Engle's LM statistic. A significant p-value (< 0.05) indicates the presence of ARCH effects, confirming volatility clustering and the use of E-GARCH model.				

The results for the Modern Strategy Era align with the Historical Baseline. During Era 2, the market demonstrated maturity, and shocks were absorbed efficiently; it is clearly indicated by the LM statistic for Nifty 50 (benchmark), which is 20.85227. In Era 3, similar to Historical Baseline, a structural break can be observed. This is due to the black-swan events during this era, as discussed in Section 4.2.1. Overall, the market has become mature and efficient at processing information, but persistent clustering can be observed in both thematic and strategic indices.

4.3 Results for E-GARCH(1,1) Test

Table 5 shows the E-GARCH(1,1) test results for Historical Baseline (Block 1), while Table 6 shows the results for the Modern Strategy Era (Block 2).

Table 6
Results of E-GARCH(1,1) (Eras 1–5, Historical Baseline, Block 1)

Index	Era 1	Era 2	Era 3	Era 4	Era 5
Nifty 50					
Mean Intercept	0.000767**	0.001343***	0.000313	0.000754***	0.000942***
Constant (ω)	-0.86774***	-0.50078***	-0.24776***	-0.4028***	-5.64275***
ARCH (α)	0.278353***	0.237533***	0.06801***	0.153534***	0.104807***
Gamma (γ)	-0.105585***	-0.14382***	-0.08121***	-0.12958***	-0.13406***
GARCH (β)	0.925225***	0.962063***	0.978902***	0.970421***	0.416201***
Student's t DOF	10.24102	6.633875	8.882207	7.942379	3.572048
Nifty Next50					
Mean Intercept	0.001401***	0.001741***	0.000939***	0.000931***	0.001486***
Constant (ω)	-0.81015***	-0.47786***	-0.83366***	-0.75228***	-1.97415***
ARCH (α)	0.333461***	0.265958***	0.134556***	0.147228***	0.299992***
Gamma (γ)	-0.06969***	-0.10249***	-0.07717***	-0.14717***	-0.15004***
GARCH (β)	0.933491***	0.966723***	0.919693***	0.930927***	0.810299***
Student's t DOF	8.059013	6.5012	8.530543	6.360471	4.236413
Note. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. α represents ARCH effects (magnitude of shock), γ represents asymmetric leverage effect, and β represents the GARCH effect (volatility persistence). Student's t DOF represents the degree of freedom for the error distribution.					

Over the years, the market has matured. The magnitude of the shock (α) has fallen from 0.278353 in Era 1 to 0.104807 in Era 5, indicating that the market is calmer to the shocks in recent era than in earlier eras. Even though the market has matured over time, the leverage effect—investors react more aggressively to bad news than to good news of the same magnitude—is still present. In Era 2, γ was -0.10559, which shifted to -0.13406 in Era 5, indicating that leverage effect still persists. The GARCH coefficient (β) has shifted from 0.925225 in Era 1 to 0.416201 in Era 5, indicating that budget induced shocks now persist less and are quickly absorbed by the market. Furthermore, the Student's t DOF shifted from 10.24102 in Era 1 to 3.572048 in Era 5 indicating that in earlier times shocks were frequent

but less extreme but in the modern Era, it depicts that shocks are rare but highly extreme fat-tailed events.

Table 7
Result of E-GARCH(1,1) (Eras1–4, Modern Strategy Era, Block 2)

Index	Era 1	Era 2	Era 3	Era 4
Nifty 50				
Mean Intercept	9.33E-05***	0.000385	0.000746***	0.000838***
Constant (ω)	-0.28562***	-0.36978***	-0.3297***	-4.088462***
ARCH (α)	0.162143***	0.062623**	0.143793***	0.14711***
Gamma (γ)	-0.10842***	-0.10324***	-0.13287***	-0.167156***
GARCH (β)	0.980975***	0.965544***	0.977305***	0.577701***
Student's t DOF	9.345174	6.684267	7.682333	3.867569
Nifty Next 50				
Mean Intercept	0.00055	0.001142***	0.000982***	0.001371***
Constant (ω)	-0.32427***	-1.00448***	-0.60777***	-1.66987***
ARCH (α)	0.227793***	0.138639***	0.13425***	0.280717***
Gamma (γ)	-0.06853***	-0.10024***	-0.13907***	-0.155141***
GARCH (β)	0.982326***	0.901815***	0.945768***	0.840941***
Student's t DOF	9.374835	7.239275	6.094083	4.641789
Nifty Smallcap 100				
Mean Intercept	0.001217***	0.001569***	0.001635***	0.00182***
Constant (ω)	-0.81401***	-1.61039***	-0.83253***	-1.748573***
ARCH (α)	0.342695***	0.262832***	0.189047***	0.203949***
Gamma (γ)	-0.0768***	-0.09935***	-0.10951***	-0.245625***
GARCH (β)	0.934776***	0.840246***	0.92268***	0.823941***
Student's t DOF	7.006818	5.910977	5.628322	4.796581
Nifty Midcap 100				
Mean Intercept	0.000754**	0.001187***	0.001332***	0.001717***
Constant (ω)	-0.47552***	-1.26497***	-0.75721***	-1.965142***
Note. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. α represents ARCH effects (magnitude of shock), γ represents asymmetric leverage effect, and β represents the GARCH effect (volatility persistence). Student's t DOF represents the degree of freedom for the error distribution.				

Index	Era 1	Era 2	Era 3	Era 4
ARCH (α)	0.251257***	0.172952***	0.189074***	0.248395***
Gamma (γ)	-0.0639***	-0.09786***	-0.12484***	-0.213595***
GARCH (β)	0.966965***	0.876373***	0.933125***	0.806792***
Student's t DOF	8.362972	6.812522	6.014629	4.808031
Nifty Div Opps 50				
Mean Intercept	0.000902***	0.00049*	0.000547**	0.00079***
Constant (ω)	-0.36466***	-0.44015***	-0.35766***	-1.895388***
ARCH (α)	0.218383***	0.120219***	0.152423***	0.206161***
Gamma (γ)	-0.08316***	-0.05006***	-0.08917***	-0.153532***
GARCH (β)	0.977855***	0.96236***	0.97507***	0.817821***
Student's t DOF	8.78463	7.405067	8.331898	7.351132
Nifty F and O				
Mean Intercept	0.000202	0.000491*	0.000838***	0.000626***
Constant (ω)	-0.27963***	-0.36886***	-0.33307***	-1.428617***
ARCH (α)	0.165549***	0.065864**	0.147079***	0.226357***
Gamma (γ)	-0.11052***	-0.09843***	-0.13051***	-0.149631***
GARCH (β)	0.98169***	0.965873***	0.977045***	0.870744***
Student's t DOF	8.725203	6.661228	7.193681	7.24766
Nifty Alpha 50				
Mean Intercept	0.000982**	0.001339***	0.00145***	0.001771***
Constant (ω)	-0.43959***	-0.87098***	-1.17842***	-1.665433***
ARCH (α)	0.233353***	0.168746***	0.327458***	0.318026***
Gamma (γ)	-0.11241***	-0.10497***	-0.12567***	-0.182257***
GARCH (β)	0.968843***	0.919308***	0.896085***	0.837505***
Student's t DOF	7.3069	6.34772	5.822081	4.382255
Note. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. α represents ARCH effects (magnitude of shock), γ represents asymmetric leverage effect, and β represents the GARCH effect (volatility persistence). Student's t DOF represents the degree of freedom for the error distribution.				

As observed in the results for Modern Strategy Era, the Nifty Smallcap 100 and Nifty Midcap 100 show high gamma (γ) values of -0.245625 and -0.213595, respectively. In contrast, Nifty 50 has γ value of -0.167156 comparatively lesser than both Nifty Smallcap 100 and Nifty Midcap 100. This indicates that smaller companies are far more sensitive to the negative news than the larger companies. Volatility persistence (β) is high for all the indices in Era 1 to Era 3, including Nifty Alpha and Nifty F and O. However, in Era 4, (β) drops to 0.577701 for Nifty 50, while Nifty F and O remain high at 0.870744. This indicates that while the general market has matured over time and recovers from the shocks quickly, derivatives (F and O) and thematic segments still carry the uncertainty for a longer duration. This is the reason that these segments require complex hedging strategies during the budget period. Student's t DOF remained high for most of the indices across all eras, while for the Nifty Smallcap 100, Nifty Midcap 100 and Nifty Alpha 50, it shifted to 4.796581, 4.808031, and 4.382255, respectively. This suggests that investors in these indices must be prepared for sudden, extreme price swings during budget announcements, as the distribution is highly leptokurtic.

5. Discussion and Implications

The evidence for the study shows the critical shift in the Indian stock market over the period of 26 years.

5.1 For Policymakers

The significant drop in the GARCH coefficient (β) from 0.925225 in Era1 to 0.416201 in Era 4 indicates that the market has matured and has become efficient at processing information. The Budget, as a macroeconomic event does not create shocks that persist for long duration. Instead, the market quickly digests the information and adjusts itself during the budget period, allowing for more stable fiscal policy planning.

5.2 For Investors and Fund Managers

The high gamma (γ) value of -0.245 and -0.213 in Era 4 of Modern Strategy Era (Block 2) for Nifty Smallcap 100 and Nifty Midcap 100, respectively—compared to -0.167 for Nifty 50—indicates that investors and fund managers in these segments should follow distinct risk management strategies and not rely on broad market maturity.

5.3 For Traders in Derivative Segment

The results for the Nifty F and O segment, with high GARCH coefficient (β) 0.8707 even in Era 4, indicates that volatility still persists in this segment. This suggests the memory of a budget shock remains for a longer duration in the derivatives market than in the spot market. Consequently, this necessitates the use of complex hedging strategies to manage the extended window of uncertainty.

6. Conclusion and Limitations

This study conducted a comprehensive analysis of the stock market’s reaction to the budget announcements by dividing the study period into two Blocks. Block 1 (Historical Baseline) covers daily returns of the two indices, the Nifty 50 (benchmark) and Nifty next 50, over a period of 26 years, starting from the year 2000. Block 2 (Modern Strategy Era) contains seven indices: the Nifty 50, Nifty Next 50, Nifty Smallcap 100, Nifty Midcap 100, Nifty Alpha 50, Nifty Dividend opportunities 50, and Nifty F and O. It covers data adjusted according to the latest data available for the most recent index; in this case, it is the Nifty Alpha 50. Furthermore, each Block is divided into Eras. The findings confirm that while the Budget remains a major macroeconomic event, its impact has evolved over time.

The key conclusions of the study are as follows. First, the market has transitioned from an emerging one to a mature one, evidenced by significant reduction in volatility persistence, about 55%. Second, there is a strong presence of leverage effect; investors still react more aggressively to the negative news than to positive news of the same magnitude. Third, while the market has matured over time, the segmental and strategic indices remain prone to extreme fat-tailed events, as evidenced by Student’s t DOF.

The findings of this study contribute significantly to the understanding of how the Indian Stock market reacts to the major economic event: the Union Budget of India. The results have important implications for the policy makers, investors, fund managers, and participants in the derivatives segment.

Several limitations of the study should be acknowledged. First, the study uses daily closing prices to capture volatility but it does not account for intraday volatility, which might reveal more immediate noise during the two hours of budget speech. Second, for the Modern Strategy Era, the Nifty TR 50 was used as a proxy for (F and O) segment. While effective, it may not capture the specific speculative details as accurately as in actual futures and options contracts. Third, the primary focus of the study is on budget as a source of volatility but it does not treat other simultaneous global events as separate control variables.

Future research could extend this work by utilizing the high-frequency data to examine the immediate market reaction during the specific hours of budget speech. Furthermore, deep investigation into the investor sentiment and psychological biases during the budget period could provide deeper understanding of why the leverage effect is still persistent in the Indian Stock Market.

Abbreviations

Table 1: List of Abbreviations

Abbreviation	Full term
ADF	Augmented Dickey-Fuller
ARCH	Autoregressive Conditional Heteroskedasticity
E-GARCH	Exponential Generalized Autoregressive Conditional Heteroskedasticity
F and O	Futures and Options
GST	Goods and Services Tax
LM	Lagrange Multiplier
NSE	National Stock Exchange

Declarations

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