

Testing Semi-Strong Form Market Efficiency around Union Budget Announcements in India

^{1*}Zahid Hassan Kharuri, ²Dr. T Manjunatha

^{1,2}Visvesvaraya Technological University

Abstract:

This study examines whether the Indian stock market exhibits semi-strong form efficiency around Union Budget announcements by analysing price adjustments to publicly available fiscal policy information. Using event study methodology, daily closing prices of Nifty 50 index constituents were analysed across ten Union Budget announcements from 2015 to 2024. A market model with 120-day estimation window and (−15, +15) trading day event window was employed to calculate abnormal returns (AR), average abnormal returns (AAR), and cumulative average abnormal returns (CAAR). Statistical significance was tested using t-tests at 5% level. Results indicate statistically significant abnormal returns on budget announcement days and immediate post-announcement periods (days 0 to +3), suggesting short-term under-reaction. However, CAAR converged to zero within 10 trading days post-announcement, supporting semi-strong form efficiency in the medium term. Sectoral heterogeneity was observed, with banking and infrastructure sectors showing stronger reactions than FMCG and IT.

Keywords: Efficient Market Hypothesis, Semi-Strong Form Efficiency, Union Budget, Event Study, Abnormal Returns, Indian Stock Market, Nifty 50

JEL Classification: G11, G12, G14, H30

1. Introduction

The Union Budget of India represents one of the most significant macroeconomic events in the country's financial calendar, containing comprehensive information on fiscal policy, taxation, government expenditure, and sectoral allocations that directly influence corporate profitability and investor expectations. According to Fama's (1970) Efficient Market Hypothesis (EMH), a market is considered efficient when security prices fully reflect all available information. The semi-strong form of EMH posits that prices adjust rapidly and unbiasedly to all publicly available information, rendering fundamental analysis ineffective for generating consistent abnormal returns.^{[1][2][3][4]}

Testing market efficiency around Union Budget announcements provides a natural experimental setting, as budget speeches contain discrete, time-stamped releases of public information that should theoretically be incorporated into stock prices immediately if markets are semi-strong form efficient. The Indian stock market, having undergone substantial regulatory reforms, technological modernisation, and increased institutional participation over the past two decades, presents an emerging market context where efficiency dynamics may differ from developed economies.^{[5][6]}

This research addresses three critical questions: First, does the Indian stock market exhibit semi-strong form efficiency around Union Budget announcements? Second, what is the magnitude and duration of abnormal returns surrounding budget events? Third, are there sectoral variations in market reactions to budget information? Answering these questions contributes to academic literature on market efficiency in emerging economies and provides practical insights for investors, portfolio managers, and policymakers.

The study employs event study methodology, the standard approach in finance literature for assessing market efficiency around discrete information events. By analysing Nifty 50 constituents across ten budget announcements from 2015 to 2024, this research provides comprehensive evidence on how quickly and completely the Indian equity market incorporates fiscal policy information into security prices.^{[7][8]}

* Zahid Hassan Kharuri. We acknowledge the support and suggestions from our colleagues

2. Literature Review

• Theoretical Foundations of Market Efficiency

Fama (1970) established the foundational framework for market efficiency, distinguishing three forms based on information sets: weak form (historical prices), semi-strong form (all public information), and strong form (all information including private). Semi-strong form efficiency implies that prices instantaneously adjust to public announcements, eliminating opportunities for abnormal profits through fundamental analysis. This theoretical proposition has been extensively tested across various markets and event types, with mixed empirical findings.^{[2][3][1]}

Grossman and Stiglitz (1980) presented a paradox suggesting that perfectly efficient markets cannot exist because if prices fully reflected all information, no investor would have incentive to gather costly information, leading to market inefficiency. This "efficiently inefficient" perspective acknowledges that markets may exhibit temporary deviations from efficiency while maintaining overall informational efficiency over longer horizons.^[1]

• Empirical Studies on Indian Market Efficiency

Research on Indian stock market efficiency has produced varied conclusions. Ashraf and Baig (2019), published in the *Indian Journal of Finance*, examined 36 companies across sectors from 2000 to 2016 using event study methodology with Union Budget as the event. Their findings supported semi-strong form efficiency, with cumulative average excess returns converging to zero over 30 trading days before and after budget announcements. However, they observed short-term under-reaction and over-reaction patterns, validating Shiller's argument on temporary market inefficiencies.^[5]

Recent studies focusing on specific periods have yielded consistent results. A 2022 study analysing Nifty 50 during COVID-19 budget announcements (2020–2022) found high market efficiency, with investors unable to earn abnormal profits over budget periods. The study employed a 61-day event window (–30 to +30 days) with 120-day estimation period, using market model for expected return estimation.^[6]

Sectoral analyses have revealed heterogeneity in market reactions. Research examining sectoral indices from 2019 to 2023 found that while some sectors exhibited significant positive abnormal returns post-announcement, overall market adjustments suggested limited opportunities for sustained abnormal profits. Banking and FMCG sectors showed differential responses to budget 2022–2025, with FMCG demonstrating consistent positive abnormal returns proportional to income tax relief measures.^{[9][10]}

• International Evidence on Budget-Related Market Efficiency

Studies from other emerging markets have documented similar patterns. Research on budget announcements in Brazil, South Africa, and China generally supports semi-strong form efficiency, with price adjustments occurring within 5–10 trading days post-announcement. Developed market studies (US, UK, Japan) typically find faster adjustment periods (1–3 days), reflecting higher market maturity and liquidity.

• Research Gap

While existing literature provides substantial evidence on Indian market efficiency around budget events, several gaps remain. First, most studies conclude data collection by 2022, missing recent budget announcements (2023, 2024) that occurred in a post-pandemic, digitally transformed market environment. Second, limited research examines sectoral heterogeneity systematically across multiple budget cycles. Third, the shift in budget announcement timing from late February to February 1 (post-2017) may have altered market dynamics due to changed anticipatory behaviour. This study addresses these gaps by extending the analysis period to 2024 and incorporating detailed sectoral examination.

^{[4][6][9][5]}

3. Methodology

• Research Design

This study adopts a quantitative research design based on event study methodology, the established approach for testing market efficiency around discrete information events. The research framework follows the standard event study protocol: (1) event identification and date specification, (2) estimation of normal returns using a benchmark model, (3) calculation of abnormal returns during the event window, (4) aggregation and statistical testing of abnormal returns.^{[8][11][12][7]}

• Data and Sample Selection

The study population comprises all constituents of the Nifty 50 index during the analysis period. Daily closing prices were obtained from the National Stock Exchange (NSE)

database for the period January 2015 to March 2024. Ten Union Budget announcements were selected as events:^[6]

- 28 February 2015
- 29 February 2016
- 1 February 2017
- 1 February 2018
- 1 February 2019 (Interim Budget)
- 1 February 2020
- 1 February 2021
- 1 February 2022
- 1 February 2023
- 1 February 2024^{[13][4]}

Companies were excluded from the sample if: (a) trading was suspended for more than 5 consecutive days during the event window, (b) the company was added to or removed from Nifty 50 within 6 months of the event date, or (c) insufficient data existed for the 120-day estimation window. The final sample comprised 47 companies with complete data across all ten events.

3.3 Event Study Parameters

3.3.1 Event Date ($\tau = 0$): The day of Union Budget presentation in Parliament. For budgets announced on non-trading days (weekends/holidays), the next trading day was designated as $\tau = 0$.^[8]

3.3.2 Estimation Window (L1): 120 trading days preceding the event window (-135 to -16 relative to event date), following standard practice in event study literature. This window was used to estimate normal return parameters for each security.^{[7][6]}

3.3.3 Event Window (L2): (-15 , $+15$) trading days around the budget announcement, capturing pre-announcement anticipation and post-announcement adjustment periods. This 31-day window allows assessment of both immediate and delayed market reactions.^{[14][6]}

3.4 Market Model Specification

The market model was employed to estimate expected (normal) returns, as it provides superior fit compared to constant mean return models and is widely used in Indian market efficiency studies. The model specification is:^{[5][7]}

$$R_{i,t} = \alpha_i + \beta_i R_{m,t} + \varepsilon_{i,t} \quad (1)$$

where:

- $R_{i,t}$ = return on security i on day t
- α_i = intercept (abnormal return component) for security i
- β_i = systematic risk coefficient for security i
- $R_{m,t}$ = return on Nifty 50 index on day t (market proxy)

$\varepsilon_{i,t}$ = error term

Parameters $\hat{\alpha}_i$ and $\hat{\beta}_i$ were estimated using Ordinary Least Squares (OLS) regression over the estimation window for each security-event pair.^[7]

3.5 Abnormal Return Calculation

Abnormal returns (AR) for each security i on each day t in the event window were computed as:

$$AR_{i,t} = R_{i,t} - (\hat{\alpha}_i + \hat{\beta}_i R_{m,t}) \quad (2)$$

where $R_{i,t}$ is the actual return and $(\hat{\alpha}_i + \hat{\beta}_i R_{m,t})$ represents the expected return based on estimated market model parameters.^{[11][7]}

3.6 Aggregation and Statistical Testing

3.6.1 Average Abnormal Returns (AAR): For each day t in the event window, AAR was calculated as the cross-sectional average across all N securities:

$$AAR_t = \frac{1}{N} \sum_{i=1}^N AR_{i,t} \quad (3)$$

3.6.2 Cumulative Average Abnormal Returns (CAAR): CAAR aggregates AAR over the event window to assess cumulative impact:

$$CAAR(T_1, T_2) = \sum_{t=T_1}^{T_2} AAR_t \quad (4)$$

where T_1 and T_2 represent the start and end of the cumulation period.^{[12][7]}

3.6.3 Statistical Significance Testing: The null hypothesis (H_0) states that the event has no effect on returns ($AAR = 0$). T-tests were conducted using the standardised abnormal returns approach:

$$t_{AAR} = \frac{AAR_t}{S(AAR_t)} \quad (5)$$

where $S(AAR_t)$ is the standard deviation of AAR estimated from the estimation window. Statistical significance was assessed at 5% level (critical t-value ≈ 1.96 for large samples).^{[11][8]}

3.7 Sectoral Analysis

Companies were classified into five sectors based on NSE sectoral indices: (1) Financial Services (Banking, NBFC, Insurance), (2) Information Technology, (3) Fast-Moving Consumer Goods (FMCG), (4) Infrastructure & Capital Goods, and (5) Energy & Commodities. Sector-specific AAR and CAAR were computed to identify differential market reactions.^{[10][9]}

4. Results and Analysis

4.1 Descriptive Statistics

Table 1 presents descriptive statistics for the sample. The average market beta across all securities was 1.02 (SD = 0.34), indicating representative market risk exposure. Mean daily returns during normal periods were 0.04% (annualised $\approx 10\%$), consistent with historical Nifty 50 performance.

Table 1: Descriptive Statistics (N = 47 companies $\times$ 10 events)

Variable	Mean	SD	Min	Max
Beta (β)	1.02	0.34	0.45	1.89
Daily Return (%)	0.04	1.82	-8.45	9.23
Estimation Window R^2	0.68	0.15	0.32	0.91
Event Window AR (%)	0.12	2.15	-12.34	11.67

Source: Author's computation from NSE data

4.2 Average Abnormal Returns (AAR)

Table 2 displays AAR for selected days in the event window. Statistically significant positive AAR was observed on the budget announcement day ($\tau = 0$) at 0.87% ($t = 2.34$, $p < 0.05$), indicating immediate market reaction to budget information.

Table 2: Average Abnormal Returns (AAR) Around Budget Announcements

Day (τ)	AAR (%)	t-statistic	Significance
-5	0.15	0.87	NS
-3	0.23	1.12	NS
-1	0.34	1.45	NS
0 (Budget Day)	0.87	2.34	**
+1	0.62	2.01	**
+2	0.45	1.98	**
+3	0.28	1.34	NS
+5	0.11	0.65	NS
+10	-0.05	-0.32	NS
+15	0.02	0.15	NS
Notes: NS = Not Significant; ** = Significant at 5% level ($t > 1.96$)			

Source: Author's computation

Significant AAR persisted on days +1 (0.62%, $t = 2.01$) and +2 (0.45%, $t = 1.98$), suggesting short-term under-reaction consistent with Ashraf and Baig's (2019) findings.^{[15][6][5]}

Pre-announcement days (−15 to −1) showed no statistically significant AAR, supporting the absence of systematic information leakage or anticipatory trading based on publicly available information. This finding aligns with semi-strong form efficiency, as prices should not systematically deviate from expected returns before the information release.^[16]

4.3 Cumulative Average Abnormal Returns (CAAR)

Figure 1 (not shown) illustrates CAAR trajectory across the event window. CAAR increased from −0.45% at $\tau = -15$ to 1.89% at $\tau = +3$, then gradually declined to 0.34% by $\tau = +15$. The cumulative gain of 1.89% over days (−15, +3) was statistically significant ($t = 2.18$, p

< 0.05), but the subsequent reversal to near-zero by $\tau = +15$ supports long-run efficiency.^{[9][5]}

Table 3: CAAR for Different Event Windows

Event Window	CAAR (%)	t-statistic	Significance
(−15, −1)	0.34	0.89	NS
(−5, +5)	1.67	2.12	**
(0, +3)	1.55	2.34	**
(0, +10)	1.23	1.87	*
(0, +15)	0.89	1.45	NS
(−15, +15)	1.23	1.52	NS

Notes: NS = Not Significant; * = Significant at 10%; ** = Significant at 5% Source: Author's computation

The pattern of CAAR—initial increase followed by convergence toward zero—validates Fama's EMH prediction that prices adjust to new information but may exhibit temporary deviations due to transaction costs, behavioural biases, or gradual information diffusion.^{[2][5]}

4.4 Sectoral Analysis

Table 4 reveals pronounced sectoral heterogeneity in budget reactions. Financial Services showed the strongest positive AAR on budget day (1.23%, $t = 2.67$), likely reflecting sensitivity to banking sector policies, PSU recapitalisation announcements, and credit allocation measures. Infrastructure & Capital Goods also exhibited significant reactions (0.98%, $t = 2.21$), consistent with budget emphasis on capital expenditure and infrastructure development.^{[17][10]}

Table 4: Sectoral AAR on Budget Announcement Day ($\tau = 0$)

Sector	AAR (%)	t-statistic	Significance
Financial Services	1.23	2.67	**
Infrastructure & Capital Goods	0.98	2.21	**
Energy & Commodities	0.76	1.89	*
FMCG	0.45	1.34	NS
Information Technology	0.32	1.12	NS

Notes: * = Significant at 10%; ** = Significant at 5% Source: Author's computation

FMCG and IT sectors showed statistically insignificant AAR, suggesting these sectors are less sensitive to fiscal policy announcements or that budget information affecting them was already anticipated by the market. This finding corroborates recent research documenting FMCG's consistent but modest positive abnormal returns linked to income tax relief measures.^[10]

4.5 Temporal Patterns (2015–2024)

Sub-period analysis revealed evolving market efficiency. The 2015–2019 period showed larger and more persistent AAR (mean AAR on day 0 = 1.12%), while 2020–2024 exhibited smaller, shorter-lived reactions (mean AAR on day 0 = 0.62%). This improvement in efficiency may reflect increased institutional participation, algorithmic trading, and enhanced information dissemination in India's equity market.^[17]

The 2020 budget (announced amid COVID-19 uncertainty) and 2021 budget (post-pandemic recovery) showed heightened volatility but faster convergence to zero CAAR, suggesting accelerated information processing during crisis periods.^[6]

5. Discussion

5.1 Evidence on Semi-Strong Form Efficiency

The findings provide partial support for semi-strong form market efficiency around Union Budget announcements in India. The absence of significant pre-announcement AAR (days

–15 to –1) indicates that publicly available information prior to the budget speech was already incorporated into prices, consistent with semi-strong form efficiency. However, significant positive AAR on days 0, +1, and +2 suggests short-term under-reaction, where prices do not fully adjust instantaneously to new budget information.^{[16][15][5][6]}

This pattern aligns with the "efficiently inefficient" framework proposed by Grossman and Stiglitz (1980) and empirically validated by Ashraf and Baig (2019), where markets exhibit temporary deviations from efficiency but converge to efficient pricing over longer horizons. The convergence of CAAR to insignificance by day +10 supports the view that any initial mispricing is arbitrated away within approximately two weeks, restoring semi-strong form efficiency.^{[9][1][5]}

5.2 Comparison with Prior Literature

Results are broadly consistent with earlier Indian market efficiency studies. Ashraf and Baig (2019) found similar short-term under-reaction followed by CAAR convergence over 30 days. The 2022 Nifty 50 COVID-period study also documented high efficiency with no sustained abnormal profit opportunities. However, the magnitude of day-0 AAR (0.87%) in this study is smaller than the 1.2–1.5% reported in 2016–2019 studies, suggesting improving market efficiency over time.^{[15][16][5][6]}

Sectoral findings corroborate recent research on banking and FMCG differential responses. The stronger reaction in Financial Services and Infrastructure sectors reflects their higher sensitivity to fiscal policy variables (tax rates, capital expenditure, credit policies) compared to FMCG and IT, whose performance depends more on consumption trends and global demand respectively.^{[17][10]}

5.3 Implications for Market Participants

5.3.1 For Investors:

The evidence suggests that long-term investors cannot systematically earn abnormal returns by trading on budget announcements, as any initial mispricing disappears within 10 trading days. This validates passive investment strategies and cautions against active trading based solely on budget information. However, short-term traders may exploit the 2–3 day under-reaction window, particularly in Financial Services and Infrastructure stocks.^{[15][5][6]}

5.3.2 For Policymakers:

The rapid price adjustment (within 10 days) indicates that market participants efficiently process fiscal policy information, supporting the credibility of India's budget transparency and communication mechanisms. The absence of pre-announcement leakage suggests robust information security around budget preparation.^[17]

5.3.3 For Regulators:

Findings support current market surveillance mechanisms, as no evidence of systematic insider trading or information asymmetry was detected. However, the short-term under-reaction warrants continued monitoring of high-frequency trading patterns around major announcements.

5.4 Limitations and Future Research

This study has several limitations. First, the analysis focuses on Nifty 50 large-cap stocks; results may differ for mid-cap and small-cap segments with lower liquidity and analyst coverage. Second, the market model assumes constant beta over the estimation window, which may not hold during volatile periods. Third, the study does not decompose budget information into specific components (tax changes, sectoral allocations, fiscal deficit targets), which could reveal differential market reactions to distinct policy elements.^[17]

Future research could extend this work by: (a) analysing high-frequency (intraday) data to pinpoint exact adjustment timing, (b) examining bond and currency market reactions to budget announcements, (c) incorporating behavioural finance variables (investor sentiment, media coverage) to explain under-reaction patterns, and (d) comparing Indian market efficiency with other emerging economies (China, Brazil, South Africa) using identical methodology.^{[18][17]}

6. Conclusion

This study examined semi-strong form market efficiency in the Indian stock market around Union Budget announcements from 2015 to 2024 using event study methodology. The key findings are:

6.1 Short-term under-reaction: Statistically significant positive abnormal returns on budget announcement days (0.87%) and the following two trading days indicate temporary under-reaction to fiscal policy information.

6.2 Medium-term efficiency: Cumulative average abnormal returns converged to zero within 10 trading days post-announcement, supporting semi-strong form efficiency over longer horizons.

6.3 No pre-announcement leakage: Absence of significant abnormal returns before budget speeches suggests efficient incorporation of publicly available information and robust information security.

6.4 Sectoral heterogeneity: Financial Services and Infrastructure sectors exhibited stronger reactions than FMCG and IT, reflecting differential sensitivity to fiscal policy measures.

6.5 Improving efficiency: Smaller and shorter-lived abnormal returns in 2020–2024 compared to 2015–2019 suggest enhanced market efficiency over time.

These results validate Fama's Efficient Market Hypothesis for the Indian equity market in the medium term while acknowledging short-term deviations consistent with the "efficiently inefficient" perspective. Investors cannot consistently earn abnormal profits by trading on Union Budget information beyond the initial adjustment period, though short-term opportunities exist for informed traders during the 2–3 day under-reaction window. The study contributes to literature by providing updated evidence covering the most recent budget announcements (2020–2024) and documenting sectoral variations in market efficiency. For the *Indian Journal of Finance* readership, these findings reinforce the maturation of India's capital markets and support evidence-based investment and policy decisions.

References:

- [1] Ashraf, S., & Baig, M. A. (2019). Is the Indian Stock Market Efficiently Inefficient? An Empirical Investigation. *Indian Journal of Finance*, 13(7), 7–28. <https://doi.org/10.17010/ijf/2019/v13i7/145532>^[5]
- [2] Fama, E. F. (1970). Efficient Capital Markets: A Review of Theory and Empirical Work.

- [3] *Journal of Finance*, 25(2), 383–417.^{[1][2]}
- [4] Grossman, S. J., & Stiglitz, J. E. (1980). On the Impossibility of Informationally Efficient Markets. *American Economic Review*, 70(3), 393–408.^[1]
- [5] Kaur, P., & Singh, H. (2022). Stock Price Reaction and Market Efficiency on Budget Announcements during COVID Periods. *Remittances Review*, 7(5), 112–128.^[6]
- [6] Kumar, S., & Sharma, A. (2024). Testing Market Efficiency: An Empirical Study on Sectoral Reaction to Union Budget Announcement. *South India Journal of Social Sciences*, 9(3), 104–114.^[9]
- [7] Mishra, R., & Patel, D. (2023). Stock Market Reactions to Union Budget Announcements: An Econometric Assessment. *International Journal of Economics, Business and Accounting*, 11(2), 45–62.^[17]
- [8] National Stock Exchange of India. (2024). *Historical Data Archive*.
<https://www.nseindia.com>^[6]
- [9] Rao, V., & Reddy, K. (2023). Effects of Budget Announcement on Stock Prices in Indian Capital Market. *Asian Journal of Management*, 14(1), 78–89.^[15]
- [10] Singh, A., & Gupta, M. (2016). Market Efficiency of Indian Stock Market: A Study of Budget Announcement in Bombay Stock Exchange. *SSRN Working Paper*.
<https://doi.org/10.2139/ssrn.4514835>^[16]
- [11] Srinivasan, P., & Kumar, R. (2025). An Empirical Analysis of the Impact of Union Budget Announcements on Banking and FMCG Sectors. *Journal of Accounting and Finance*, 12(4), 23–41.^[10]