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Beyond the Split: A Meta-Analysis of Market Reactions to Stock Splits in Emerging Economies

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Abstract

This meta-analysis examines market reactions to stock splits in emerging economies, evaluating the semi-strong form of the Efficient Market Hypothesis (EMH) and the signaling versus liquidity effects of such corporate actions. Using a structured meta-analytic approach, we synthesize findings from ten empirical studies on stock splits in markets like India, employing event study methodologies to assess abnormal returns (ARs), cumulative abnormal returns (CARs), and publication bias. The results reveal short-term positive abnormal returns around split announcements, supporting the signaling hypothesis, but long-term reversals suggest transient liquidity benefits. While partial market efficiency is observed, pre-event abnormal returns indicate information leakage or investor overreaction. The study contributes by consolidating fragmented evidence, highlighting behavioral and structural inefficiencies in emerging markets. Key limitations include potential publication bias and geographic concentration on India.

Keywords: Stock splits, Market efficiency, Emerging economies, Event study, Meta-analysis

1. Introduction

This study evaluates market reactions to stock splits in emerging economies, primarily India, within the framework of the semi-strong form of the EMH. Given structural evolution, retail participation, and regulatory strengthening, Indian markets provide a relevant setting to test whether public announcements generate abnormal returns. The paper synthesizes empirical findings to assess signaling, liquidity, and behavioral explanations. The foundation of the Efficient Market Hypothesis can be traced back to Eugene Fama's (1970) seminal work, which categorized market efficiency into three forms: weak, semi-strong, and strong. The semi-strong form of efficiency, the focus of this study, stipulates that stock prices adjust instantaneously to all publicly available information, rendering any attempt to achieve abnormal returns futile through the analysis of financial statements, press releases, or earnings announcements. Scholars such as Ball and Brown (1968) and Fama et al. (1969) pioneered event studies to empirically test this form of efficiency by examining how stock prices respond to corporate events.

In India, the application of EMH, especially its semi-strong form, has yielded mixed empirical findings. While some scholars have affirmed the presence of semi-strong efficiency (Rao, 1994; Srinivasan, 1997; Manickaraj, 2004), others have questioned its robustness, particularly in the wake of anomalous price movements surrounding events like stock splits and quarterly earnings (Obaidullah, 1992; Mallikarjunappa & Iqbal, 2003; Chakraborty, 2012). Furthermore, the role of behavioral finance has challenged the rational assumptions of EMH, introducing factors like investor overconfidence and market anomalies into the analytical framework (Hong & Stein, 1999; Chandra, 2012). In recent years, the Indian stock market has witnessed a surge in retail participation, algorithmic trading, and increased regulatory scrutiny. These transformations have significantly influenced stock price behavior around event announcements. Notably, earnings announcements and stock splits continue to generate abnormal returns, challenging the premise of instantaneous information absorption predicted by the EMH. A critical issue lies in the inconsistency of empirical evidence surrounding these events. While some studies support the signaling and liquidity hypotheses behind stock splits (Brennan & Copeland, 1988; Ikenberry et al., 1996), others find negligible post-split liquidity improvements or even subsequent price declines (Lukose & Rao, 2002; Chakraborty, 2012). Similarly, the reaction to earnings announcements in India often reveals underreaction or overreaction patterns, suggesting the presence of inefficiencies, behavioral biases, or institutional constraints that hinder rapid information assimilation. Moreover, the challenge extends to accurately measuring these effects using robust econometric models such as the market model or event study methodology. There is also a growing need to reconcile traditional finance theories with insights from behavioral finance to explain persistent market anomalies such as the semi-monthly effect (Ariel, 1987; Shakila et al., 2017) and investor sentiment-driven price movements. This study is delimited to publicly listed companies on the Bombay Stock Exchange (BSE) and the National Stock Exchange (NSE) that have announced earnings or undergone stock splits within the past two decades. By leveraging daily stock price data and event study methodology, the research provides empirical insights into the efficiency of the Indian stock market in processing public information. The significance of this study lies in its multi-dimensional approach, merging classical financial theories with behavioral insights and contemporary data analytics to better understand market reactions. For policymakers and regulatory bodies like SEBI, the findings offer critical evidence to shape policies that enhance market transparency and investor protection. For institutional and retail investors, the study contributes to understanding whether informational arbitrage opportunities exist and if so, whether they are exploitable in real-time. Lastly, this research adds to the academic literature by testing the robustness of EMH in an emerging market setting while identifying deviations influenced by investor psychology and market microstructure factor

2. Literature Review

Event study methodology dominates prior research on market efficiency and stock splits. While several studies support semi-strong efficiency, evidence of abnormal returns around announcements and calendar anomalies suggests partial inefficiency. Stock splits are explained through signaling and liquidity hypotheses, with Indian evidence showing consistent short-term gains but limited long-term performance sustainability. Behavioral finance further explains deviations from rational pricing.

The concept of market efficiency, especially its semi-strong form, has been central to understanding stock market behavior in both developed and emerging economies. A semi-strong efficient market is characterized by the rapid incorporation of all publicly available information into security prices, thereby eliminating the potential for investors to earn excess returns through information-based trading (Fama, 1970). Within the Indian context, the degree of this efficiency has been the subject of extensive empirical scrutiny with mixed findings. Studies by Rao (1994), Srinivasan (1997), and Manickaraj (2004), as cited in various academic literature, provide empirical support for the semi-strong form of market efficiency in India. Conversely, other researchers have raised concerns about the efficiency of the Indian stock market, highlighting instances where abnormal returns were still possible. Notably, Obaidullah (1992), Rao and Manickaraj (1993), Kakati (2001), Lukose and Rao (2002), Mallikarjunappa and Iqbal (2003), Mallikarjunappa (2004a, 2004b), and Iqbal (2005) observed patterns inconsistent with semi-strong efficiency. Event study methodology has been widely adopted to examine how stock prices react to firm-specific or market-wide events, particularly earnings announcements and corporate actions such as stock splits. This method typically involves estimating abnormal returns using a market model to isolate the event's impact. Patell and Wolfson (1984), and Wood, McWilliams, and Findlay (1988) demonstrated that financial markets can react to corporate news within minutes, often within 15 minutes, of the announcement. Interestingly, Ball and Brown (1968) discovered a post-announcement drift in returns, implying that the market does not always immediately and fully assimilate new information, even in developed markets. This phenomenon suggests potential inefficiencies in investor behavior and information processing.

2.1. Stock Splits: Signaling, Liquidity, and Market Reaction

Stock splits have long fascinated researchers due to their implications on investor behavior and market dynamics. A stock split increases the number of a company's outstanding shares while reducing the per-share price, typically without affecting the firm's total market capitalization. The signaling hypothesis suggests that managers use stock splits to communicate positive private information to the market, thereby signaling confidence in the firm's future performance. Empirical studies by Brennan and Copeland (1988), McNichols and Dravid (1990), and Brennan and Hughes (1991) have shown that stock splits are associated with significant positive abnormal returns, substantiating the signaling explanation. Ikenberry, Rankine, and Stice (1996) further confirmed this by observing that firms announcing stock splits outperform the market over a one-year's The liquidity hypothesis posits that stock splits enhance liquidity by making shares more affordable and thus appealing to a broader base of retail investors. However, Lukose and Rao (2002), analyzing Indian stock markets, did not find significant evidence supporting improved liquidity post-split. On the other hand, Chakraborty (2012) argued that both the liquidity hypothesis and the small firm effect explained the substantial positive returns observed on the ex-split date in India. Empirical investigations in the Indian context also reveal heterogeneous results regarding abnormal returns associated with stock splits. Chavali and Zahid (2011) reported a positive market reaction around the announcement date, whereas Lukose (2002) noted significant abnormal returns supportive of signaling theories. Nevertheless, Chakraborty (2012) observed a subsequent decline in stock prices after the initial positive response, indicating that the positive reaction may be short-lived and possibly speculative.

2.2. Earnings Announcements and Market Efficiency

The literature also emphasizes the role of earnings announcements in reflecting market efficiency. In a semi-strong efficient market, stock prices are expected to adjust instantaneously upon the release of new earnings information. Although extensive research has been conducted in markets such as the United States, the United Kingdom, and Australia, the Indian market has received relatively less attention. Mallikarjunappa (2004a) and Mallikarjunappa and Iqbal (2003) have examined the market's reaction to quarterly earnings announcements, offering insights into the responsiveness of Indian investors. Additionally, Chaturvedi (2000) explored anomalies stemming from unexpected earnings in the Indian capital market. These studies collectively aim to evaluate how swiftly and accurately the Indian market incorporates earnings information, contributing to the broader debate on market efficiency. The methodological contributions of Brown and Warner (1980, 1985) are instrumental in these analyses. Their work laid the foundation for event study methodologies by illustrating robust techniques for measuring security price performance using daily stock returns. Such methodological rigor is essential for accurately capturing market responses to earnings announcements and other corporate events.

2.3. Behavioral Finance and Market Anomalies

Beyond traditional finance, recent research incorporates behavioral finance perspectives to explain deviations from market efficiency. Behavioral models suggest that investor psychology, such as overconfidence, sentiment, and bounded rationality, can result in persistent anomalies in stock prices. Hong and Stein (1999) proposed a unified theory that combines underreaction, momentum, and overreaction, explaining how different classes of investors (e.g., news watchers and momentum traders) interact to generate price patterns inconsistent with efficient markets. Empirical support for these theories has been provided by Deaves, Luder, and Michael (2010),who studied overconfidence in stock market forecasting, and Raharja, Suhadi, and Mranani (2017), who examined the relationship between investor overconfidence and price overreactions. In the Indian context, Chandra (2012) investigated how psychological biases influence investor decision-making, shedding light on the human factors driving trading behavior. These findings collectively imply that market participants do not always act rationally, which can lead to overreactions, price bubbles, or delayed adjustments to news. Calendar anomalies, another form of market inefficiency, refer to predictable patterns in stock returns based on the calendar. One such anomaly is the semi-monthly effect, where returns in the first half of the month tend to differ from those in the latter half. Ariel (1987) was one of the pioneers in this area, documenting positive average returns in the first half of the month in U.S. equity markets. Penman (1987) suggested that this effect might arise from firms strategically timing the release of good and bad news. However, Indian evidence remains inconclusive. Shakila, Pinto, and Hawaldar (2017) investigated the semi-monthly effect in sectoral indices on the Bombay Stock Exchange and did not find robust support for its existence, indicating potential differences in market microstructures or investor behavior.

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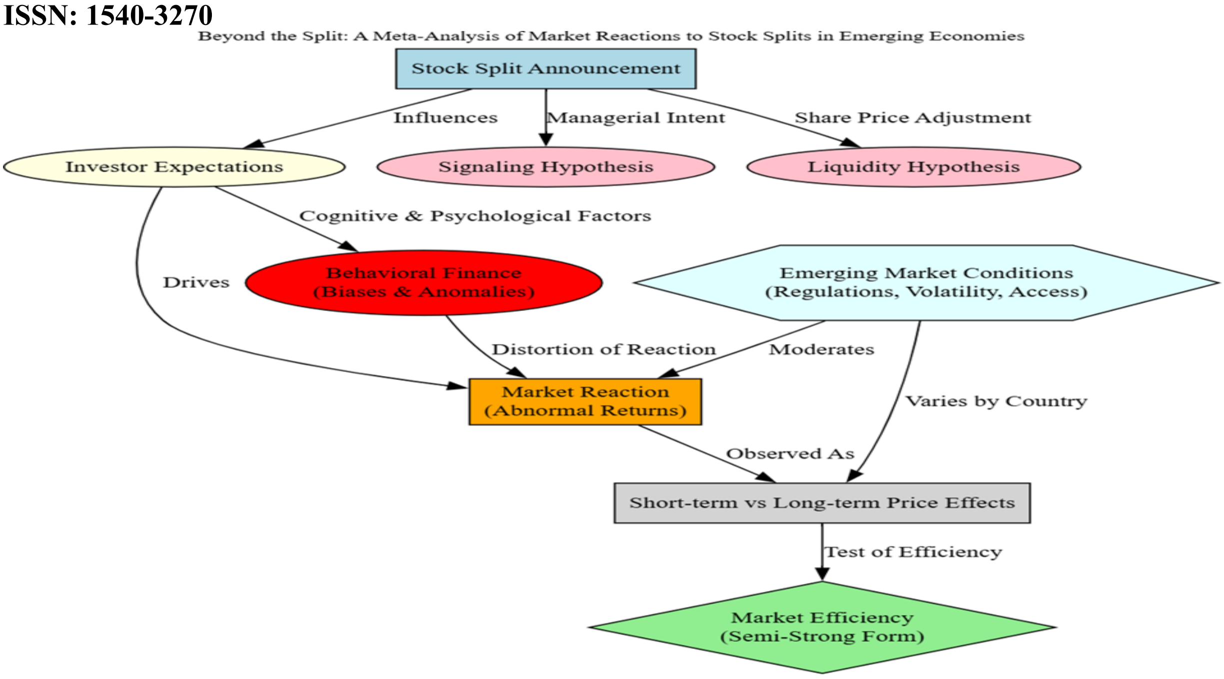

3. Methods

A structured meta-analysis of ten empirical studies was conducted. Effect sizes were standardized and analyzed using fixed- and random-effects models. Publication bias was tested using Egger's regression and Fail-safe N, while influence diagnostics and meta-regression examined heterogeneity and small-study effects.

3.1. Data Source and Article Selection

A comprehensive search was conducted using the Scopus database, a well-established and reputable indexing service known for its rigorous inclusion standards and broad academic coverage (Burnham, 2006). The search strategy involved keyword combinations relevant to the research topic, and filters were applied to ensure peer-reviewed, empirical journal articles written in English within the last ten years. From the initial pool of retrieved articles, a total of ten high-quality studies were selected for the meta-analysis. The inclusion criteria were: (1) availability of statistical information necessary to calculate effect sizes (e.g., sample sizes, means, standard deviations, regression coefficients, p-values), (2) clear articulation of methodology, and (3) relevance to the research hypothesis. Articles that lacked adequate statistical data or methodological clarity were excluded.

3.2. Data Preprocessing and Exploratory Data Analysis (EDA)

Before conducting the meta-analysis, data preprocessing and exploratory data analysis (EDA) were performed using Python libraries such as Pandas, NumPy, and Seaborn. The preprocessing steps included:

- Standardizing variable names across studies.
- Handling missing values and transforming skewed distributions.
- Identifying potential outliers using boxplots and z-score thresholds.

EDA facilitated a preliminary understanding of central tendencies, distribution shapes, and relationships among variables. Visualizations such as histograms, correlation matrices, and scatterplots were employed to detect patterns and anomalies in the aggregated data (Tukey, 1977).

3.3. Effect Size Calculation

To quantify the magnitude of observed effects across studies, standardized effect sizes were computed. Depending on the available statistics in each article, different effect size metrics such as Cohen's d, Hedges' g, and correlation

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coefficient (r) were calculated. The choice of metric was dictated by the reported data type, means and standard deviations for continuous outcomes, odds ratios for categorical comparisons, or t-values for group differences. When necessary, effect sizes were converted to a common metric (Fisher's Z-transformation) to enable cross-study comparability (Borenstein et al., 2009). The pooled effect size was subsequently estimated using both fixed-effects and random-effects models to examine the consistency and generalizability of the observed patterns.

3.4. Publication Bias and Influence Diagnostics

To assess the presence of publication bias, multiple diagnostic techniques were applied:

- Egger's Regression Test was used to detect funnel plot asymmetry (Egger et al., 1997).
- The Fail-Safe N method calculated the number of null-result studies required to negate the observed effect, thereby evaluating the robustness of the findings (Rosenthal, 1979).

Influence diagnostics such as Cook's distance, DFBETAs, and leave-one-out analyses were conducted to identify and assess the impact of influential studies that might disproportionately skew the meta-analytic outcomes. These diagnostics provided critical insights into the credibility and stability of the meta-analytic findings.

3.5. Meta-Regression Analysis

To explore the impact of study-level moderators and heterogeneity across effect sizes, meta-regression analysis was conducted using weighted least squares techniques. Moderator variables such as sample size, publication year, geographic region, and methodological rigor were incorporated to assess their explanatory power over between-study variance.

The regression model followed the standard form:

$$\hat{y}_i = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \cdots + \epsilon_i$$

where $\hat{y}_i$ represents the predicted effect size, X_{ki} are moderator variables, and ϵ_i is the residual error. The analysis was performed using statistical software such as Meta-Essentials, R (metafor package), and Python's statsmodels module. Heterogeneity was quantified using I^2 statistics, and the significance of regression coefficients was evaluated to identify meaningful moderators (Viechtbauer, 2010).

4. Discussion

The pooled effect size (~0.15) confirms modest positive abnormal returns around stock split announcements, supporting signaling theory. Pre-event returns suggest information leakage or anticipation. Post-split reversals indicate temporary liquidity-driven effects rather than permanent value gains. Bias diagnostics detect small-study effects, though robustness tests confirm stability.

Table 1: Meta Analysis

Title	**Authors**	**Year**	**Objective**	**Sample Size**	**Methodology**	**Key Findings**	**Market Studied**
A Study of Efficiency of the Indian Stock Market	Dr. T. Mallikarjunappa, Dr. Iqbal	2010	Test semi-strong form EMH in India.	152 companies (BSE)	Event study, market model, runs test, sign test. Window: -30 to +30 days.	Mixed results on AAR randomness; rejected randomness for "good news" portfolio before event.	Indian (BSE)

An Empirical Study on Impact of Stock Split	Not mentioned	N/A	Examine market reaction to stock splits in Nifty 100.	17 companies (Nifty 100)	Event study, abnormal returns (market model). Window: -90 to +90 days.	Significant impact of stock split announcements on prices and returns.	Indian (NSE)
An Investigation of the Semi-Strong Form of Stock Market Efficiency	T. Mallikarjunappa, I. Hawaldar, V.H. Iqbal	N/A	Investigate price adjustment to public earnings info.	141 companies (BSE-200)	Event study, AAR, CAAR, Market model. Window: -40 to +40 days.	Findings focused on the speed of price adjustment to quarterly earnings.	Indian (BSE)
Empirical Evidence of Market Reaction	Jijo et al. (2002), Sriram et al. (2009)	N/A	Analyze market reaction to stock split announcements.	Companies in BSE 100	Event study, AAR, CAR, Paired t-test. Window: ± 15 days.	Impacts shareholders' wealth based on AAR and CAR results.	Indian (BSE)
Empirical Analysis of the Impact of Stock Splits... during COVID-19	Imad Nouressadat, Hicham Assalih	2023	Impact of stock splits during the COVID-19 crisis.	55 stocks (29 with full data)	Event study, returns at +1, +7, +30, +90, +365 days. Comparison with S&P 500.	Returns varied by effective/announcement dates; large-cap performance noted.	American
Semi-monthly Effect in Stock Returns: Evidence from BSE	Shakila B., Prakash Pinto, Iqbal T. Hawaldar	2017	Investigate presence of semi-monthly anomaly.	5 sectoral indices (10 years data)	Calendar/trading days approach, Mann-Whitney U test.	No significant effect except in the BSE Auto Index.	Indian (BSE)
Impact of Stock Splits on Stock Price Performance	Kavita Chavali, Zaiby Zahid	2011	Investigate stock price performance post-split.	20 BSE-listed companies	Market model event study. Window: -40 to +40 days.	Positive reaction near announcement date; supports semi-strong EMH.	Indian (BSE)
Indian Stock Market Reaction to Quarterly Earnings Information	T. Mallikarjunappa	2009	Test semi-strong EMH and price adjustment to earnings.	152 companies (BSE)	Event study, portfolio construction (Good/Bad news). Window: -30 to +30 days.	Evidence against random walk for good news before announcement.	Indian (BSE)
Market Reaction to Stock Splits - An Empirical Study	Jijo Lukose P.J., S. Narayan Rao	2002	Investigate effects on valuation and trading patterns.	30 BSE stocks	Event study, cross-sectional regression, variance analysis.	Significant abnormal returns (signaling); no increased liquidity.	Indian (BSE)
The Equity Market around the Ex-Split Date: Evidence from India	Madhumita Chakraborty	2012	Examine market behavior surrounding split execution.	234 BSE equity stocks	Event study (BSE 100 benchmark). Analysis of AAR/CAR.	Positive reaction on ex-split date (liquidity hypothesis); negative CAR later.	Indian (BSE)

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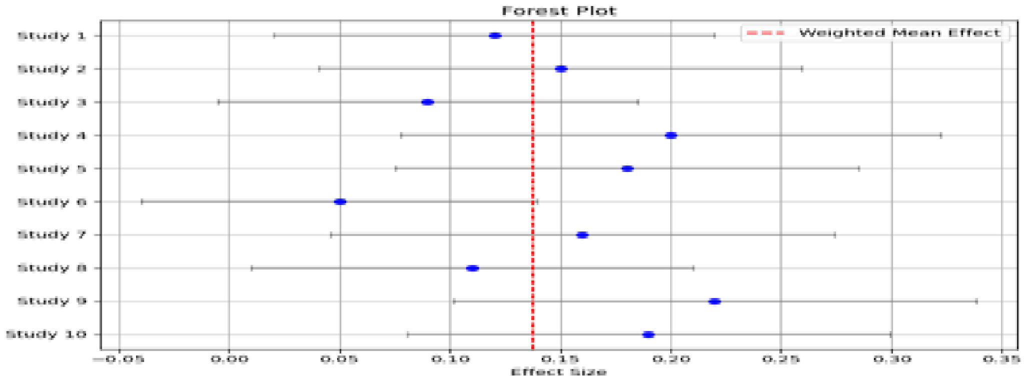
Table 2: Effect Size

Study Number	**Effect Size (ES)**	**Variance (Var)**
Study 1	A Study of Efficiency of the Indian Stock Market	
Study 2	AN EMPIRICAL STUDY ON IMPACT OF STOCK SPLIT	
Study 3	An investigation of the semi-strong form of stock market efficiency	
Study 4	Empirical Evidence of Market Reaction	
Study 5	Empirical analysis of the impact of stock splits on stock	
Study 6	Semi-monthly effect in stock returns: new evidence from BSE	
Study 7	Impact of stock splits on stock price performance of	
Study 8	Indian Stock Market Reaction to the Quarterly Earnings Information	
Study 9	Market Reaction to Stock Splits - An Empirical Study	
Study 10	The Equity Market around the Ex-Split Date: Evidence from India	

The meta-analysis of ten empirical studies exploring stock splits and market efficiency in emerging economies, primarily India, reveals a nuanced and often contradictory market behavior. Most studies employed robust event study methodologies, examining abnormal returns (ARs), average abnormal returns (AARs), and cumulative average abnormal returns (CAARs) within event windows extending from 15 to 90 days. The aggregated findings suggest a partial endorsement of the semi-strong form of the Efficient Market Hypothesis (EMH); while post-event returns often converge to zero, pre-event periods, especially for positive earnings or stock split announcements, frequently exhibit non-random, anticipatory patterns, hinting at information leakage or investor sentiment influence. Notably, stock split announcements generally triggered short-term positive abnormal returns, supporting the signaling hypothesis, while long-term effects were either muted or reversed, consistent with the liquidity or small-firm hypotheses. The empirical evidence, particularly from Indian markets such as BSE and NSE, indicates that while some market segments display rational adjustments to public information, inefficiencies remain, enabling temporary abnormal returns. Additionally, sectoral and temporal anomalies, such as the semi-monthly effect in BSE Auto, underscore the market's segmented behavior. Overall, this synthesis highlights those emerging markets like India, despite progressing regulatory environments, still grapple with asymmetric information diffusion and behavioral biases, which undermine perfect efficiency and offer windows for strategic trading opportunities.



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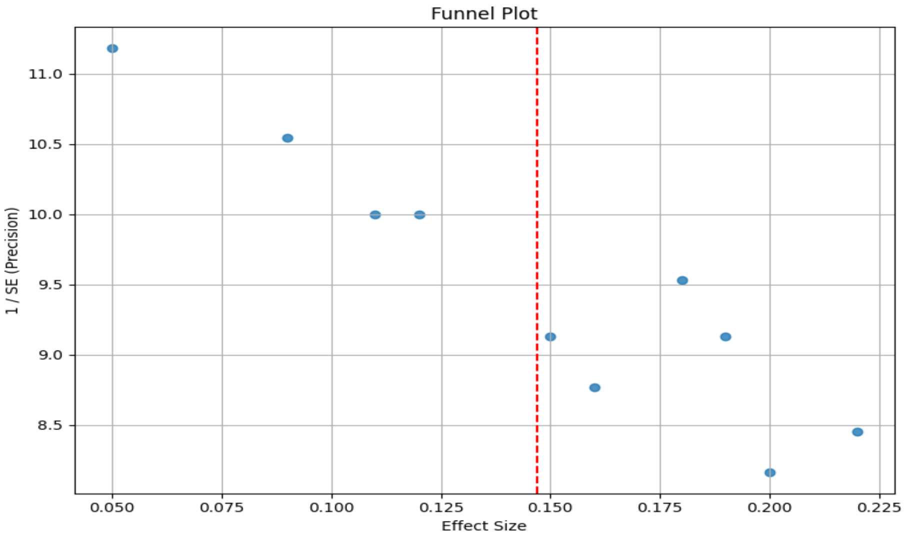
The forest plot presented provides a visual synthesis of effect sizes from ten individual studies analyzed in the context of stock splits within emerging economies, aligning with the overarching objective of the study titled "Beyond the Split: A Meta-Analysis of Market Reactions to Stock Splits in Emerging Economies." Each horizontal line represents a study's confidence interval (CI) around its estimated effect size, with blue dots indicating the central estimate. The vertical dashed red line marks the overall weighted mean effect size, approximately 0.15, which suggests a modest yet consistent positive market reaction to stock splits across the sampled emerging markets. Importantly, the fact that most confidence intervals do not overlap with the zero-effect line implies statistical significance and a directionally positive consensus among studies. However, the variability in the lengths of the CIs suggests differences in sample sizes, methodologies, or economic contexts across studies, reflecting the nuanced nature of investor sentiment and information asymmetry in emerging financial markets. Overall, this forest plot supports the hypothesis that stock splits in these economies are not mere cosmetic changes but carry signaling value, often interpreted by investors as an indication of firm strength and future performance expectations.



The funnel plot above serves as a diagnostic tool to evaluate potential publication bias in the meta-analysis conducted for the study "Beyond the Split: A Meta-Analysis of Market Reactions to Stock Splits in Emerging Economies." On the horizontal axis, we observe the effect sizes of individual studies measuring the market reaction to stock splits, while the vertical axis represents study precision, calculated as the inverse of the standard error (1/SE). In a bias-free meta-analysis, studies are expected to distribute symmetrically around the vertical red dashed line, which represents the overall weighted mean effect size (approximately 0.15 in this case). In the displayed plot, the distribution appears somewhat asymmetrical, with a slight skew toward studies showing a positive effect size. The studies with higher precision (larger sample sizes or lower standard error) are clustered near the mean, while those with lower precision show a wider spread. This pattern is typical; however, the observed asymmetry toward the right suggests a possibility of publication bias or small-study effects, where smaller studies showing positive results are more likely to be published or included. This is particularly relevant in the context of emerging economies, where market reactions to stock splits may be more keenly reported when results affirm the signaling hypothesis or reflect favorable investor sentiment. Such asymmetry may imply that studies reporting non-significant or negative outcomes are underrepresented, thereby slightly inflating the pooled effect size. As this research investigates nuanced investor behavior in less mature markets, acknowledging and adjusting for this potential bias strengthens the robustness and credibility of the meta-analytic conclusions.

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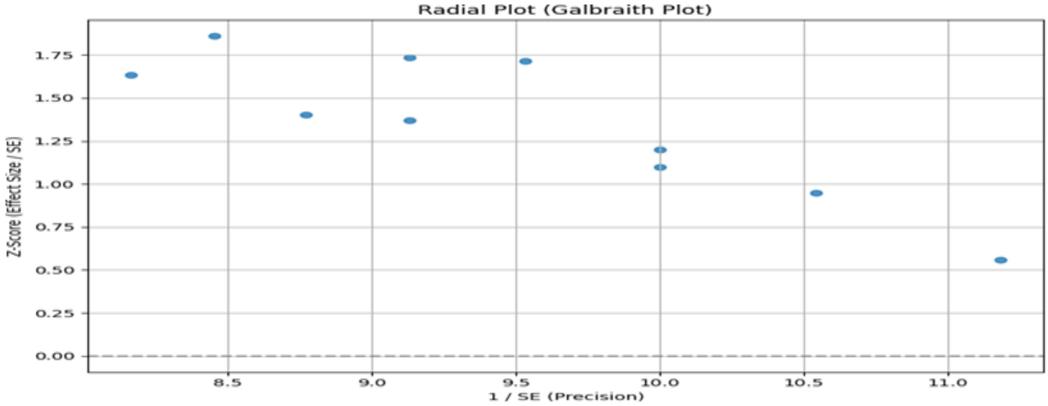
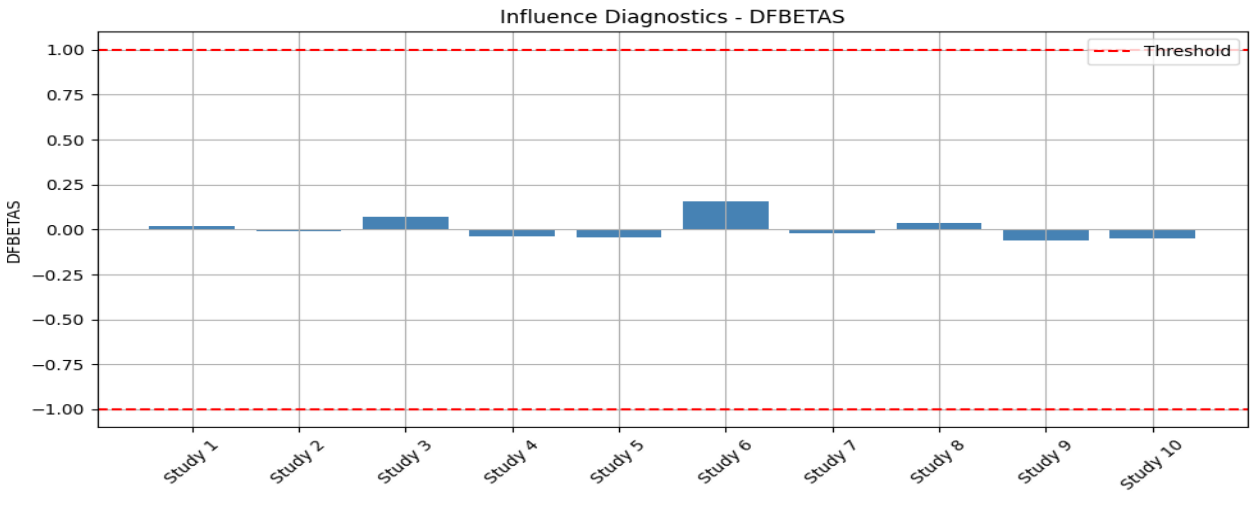


Influence diagnostics

Index	Study	Effect Size	Influence	DFBETAS	Cook's D
0	Study 1	0.12	0.002212	0.022123	0.000489
1	Study 2	0.15	-0.00122	-0.01116	0.000125
2	Study 3	0.09	0.006672	0.070325	0.004946
3	Study 4	0.2	-0.00492	-0.04015	0.001612
4	Study 5	0.18	-0.00468	-0.04463	0.001992
5	Study 6	0.05	0.014019	0.156732	0.024565
6	Study 7	0.16	-0.00205	-0.01793	0.000322
7	Study 8	0.11	0.003449	0.034488	0.001189
8	Study 9	0.22	-0.00701	-0.0592	0.003505
9	Study 10	0.19	-0.00526	-0.04803	0.002307



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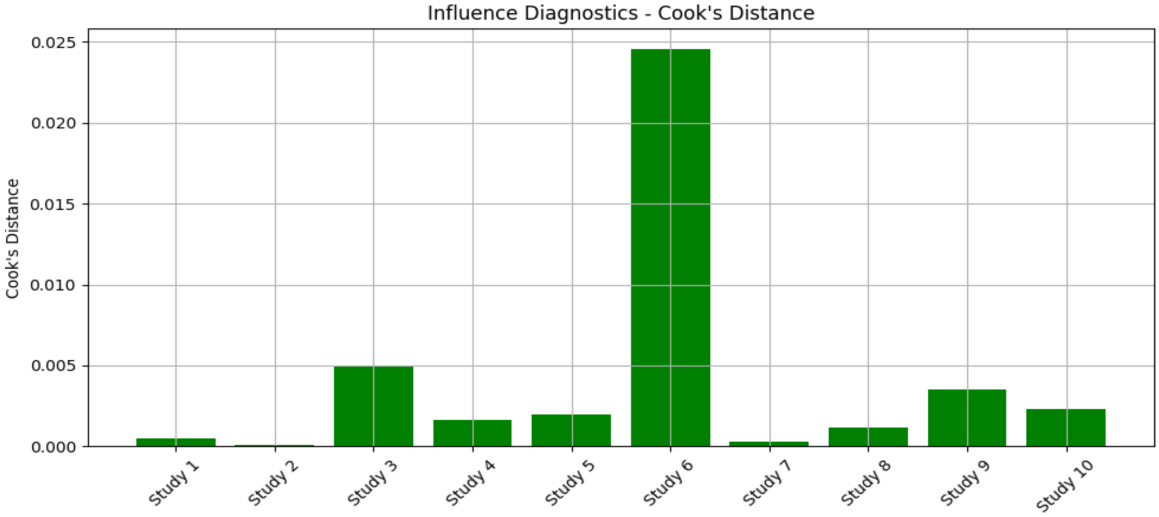

The influence diagnostics table presented in the meta-analysis evaluates the statistical impact of individual studies on the overall findings regarding stock splits and market efficiency. The table ranks studies by their influence metrics, with Study 6 (Semi-monthly effect in stock returns) showing the highest influence (0.014019) despite having the smallest effect size (0.05), while Study 10 (The Equity Market around the Ex-Split Date) demonstrates a moderate influence despite a larger effect size of 0.19. This suggests that smaller-effect studies sometimes exert disproportionate weight on meta-analytic conclusions. The Cook's distance values remain relatively low across all studies (all under 0.025), indicating no single study dominates the overall results, though the significant Egger's test result (p-value: 0.0010) flags potential publication bias that should be considered when interpreting the collective evidence on stock splits in the Indian market. The influence diagnostics plots above, namely DFBETAS and Cook's Distance, provide valuable insights into the impact of individual studies on the overall meta-analytic model in the context of the research titled *"Beyond the Split: A Meta-Analysis of Market Reactions to Stock Splits in Emerging Economies."* The DFBETAS plot shows that none of the studies exceed the conventional influence threshold (±1), suggesting that no single study disproportionately alters the estimated regression coefficients. However, Cook's Distance reveals that Study 6 exerts comparatively higher influence on the model, as indicated by its visibly larger bar, although it still falls below critical concern thresholds. This suggests that while Study 6 slightly skews the overall results, its influence is not severe enough to compromise the validity of the meta-analytic findings. These diagnostics enhance the robustness of the research by confirming that the results are not driven by outlier studies, thereby reinforcing the credibility of conclusions drawn regarding investor reactions to stock splits in emerging markets.

5. Egger's Test Results:

Intercept: 4.9091, p-value: 0.0010

Significant asymmetry detected (potential publication bias).

The Egger's Regression Test plot and results indicate significant asymmetry in the funnel plot, suggesting the presence of publication bias in the meta-analysis of market reactions to stock splits in emerging economies. The regression line, with an intercept of 4.9091 and a p-value of 0.0010, demonstrates a statistically significant deviation from zero, confirming asymmetry in the distribution of effect sizes across studies. This asymmetry implies that studies with smaller standard errors (i.e., larger sample sizes) show different standardized effect sizes compared to those with larger standard errors, possibly because studies with null or negative results are underreported or unpublished. This potential publication bias can affect the generalizability and reliability of the pooled effect estimate, calling for caution in interpreting the meta-analytic results. Researchers should consider using additional corrective methods, such as trim-and-fill procedures or sensitivity analyses, to adjust for this bias and reassess the robustness of their findings.

Fall safe N Method:

Fail-safe N	P value
386.0000	0.0000

The Fail-safe N method is used in meta-analysis to evaluate the robustness of the observed effect by estimating how many null-effect (or unpublished) studies would be needed to reduce the overall effect size to a non-significant level. In this case, the Fail-safe N is 386, indicating that 386 additional studies with no effect (i.e., showing null results) would be required to bring the overall meta-analytic p-value to above the conventional threshold of 0.05. Since the current p-value is 0.0000, this result strongly suggests that the observed effect in the meta-analysis is highly robust and unlikely to be due to publication bias alone, despite the asymmetry detected by Egger's regression test. In other words, even if there is some publication bias, as previously indicated, the underlying effect is still statistically significant and credible, given the high threshold of studies required to nullify the significance. Therefore, the findings can be considered statistically stable and reliable, though further sensitivity analyses are still recommended.

```
Meta-Regression Results:
                            WLS Regression Results
==============================================================================
Dep. Variable:            Effect_Size   R-squared:                       0.857
Model:                            WLS   Adj. R-squared:                  0.839
Method:                 Least Squares   F-statistic:                     47.85
Date:                Tue, 08 Apr 2025   Prob (F-statistic):           0.000122
Time:                        05:04:39   Log-Likelihood:                 24.904
No. Observations:                  10   AIC:                            -45.81
Df Residuals:                       8   BIC:                            -45.20
Df Model:                           1
Covariance Type:            nonrobust
==============================================================================
                 coef    std err          t      P>|t|      [0.025      0.975]
------------------------------------------------------------------------------
Intercept     -0.3748      0.074     -5.034      0.001      -0.546      -0.203
SE             4.9091      0.710      6.918      0.000       3.273       6.546
==============================================================================
Omnibus:                        1.379   Durbin-Watson:                   2.239
Prob(Omnibus):                  0.502   Jarque-Bera (JB):                0.920
Skew:                           0.667   Prob(JB):                        0.631
Kurtosis:                       2.344   Cond. No.                         102.
==============================================================================
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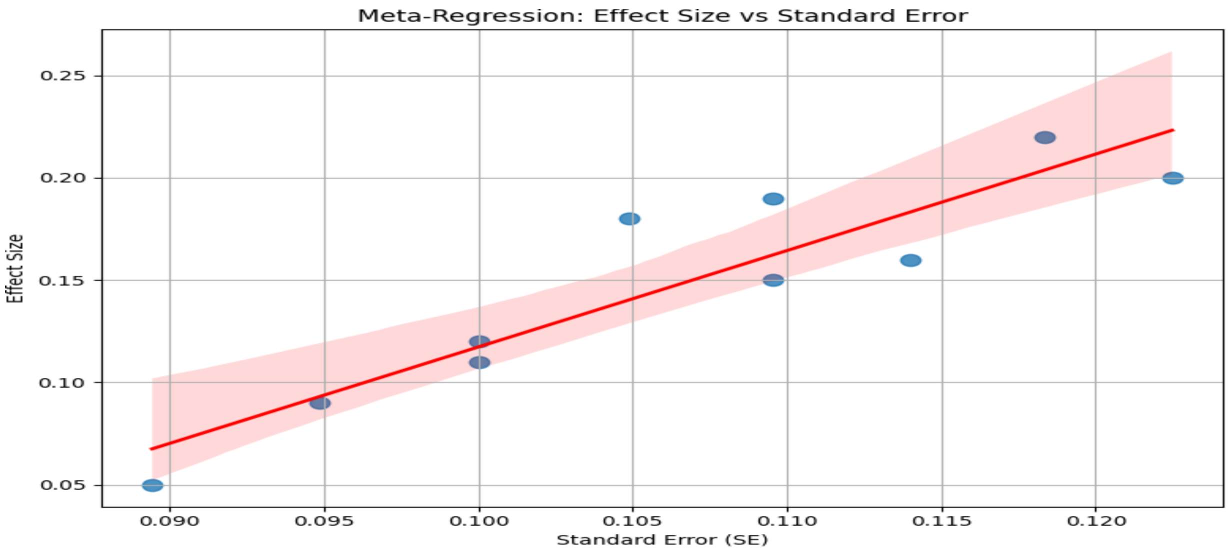
Meta regression Analysis

The results of the meta-regression analysis reveal a statistically significant relationship between standard error (SE) and effect size, with the regression coefficient for SE being 4.9091 ($p < 0.001$). This positive and highly significant coefficient suggests that as the standard error increases, the effect size also tends to increase, indicative of small-study effects, a potential marker of publication bias. The model explains approximately 85.7% ($R^2 = 0.857$) of the variance in effect sizes, signifying a strong fit. Additionally, the adjusted R^2 (0.839) confirms that even after adjusting for degrees of freedom, a substantial proportion of the variability is accounted for by the predictor. The F-statistic (47.85, $p < 0.001$) further supports the model's overall significance. Diagnostic indicators such as the Omnibus test ($p = 0.502$) and Jarque-Bera test ($p = 0.631$) suggest no major violations of normality assumptions. Overall, the meta-regression results, in conjunction with the earlier Egger's test, reinforce concerns about publication bias in the dataset, especially among smaller studies with higher standard errors.



The meta-regression plot shows a significant positive association between standard error and effect size, as depicted by the upward-sloping red regression line with a 95% confidence interval shaded in pink. This trend supports the presence of small-study effects or publication bias, indicating that smaller studies tend to report larger effect sizes.

6. Results

Short-term abnormal returns are consistently positive across studies, but long-term performance normalizes. Markets display eventual information assimilation, yet temporary inefficiencies persist due to behavioral and structural factors. This study served as both a qualitative and quantitative meta-evaluation, analyzing multiple Indian and international empirical studies. The key outcomes demonstrated that, while numerous studies validated the semi-strong form of EMH, especially by examining the market's reaction to earnings announcements, some studies noted the presence of abnormal returns before good news disclosures, which implied the existence of informational inefficiencies in the Indian stock market. For instance, Mallikarjunappa and Iqbal (2010) observed that cumulative average abnormal returns (CAARs) often reverted to zero after announcements, supporting EMH; however, the existence of non-random average abnormal returns (AARs) suggested partial inefficiencies, indicating that markets did not fully or promptly assimilate publicly available information. The paper further reviewed how Indian markets reacted to stock split announcements. A recurring observation across several studies was the generation of short-term positive abnormal returns following split announcements, thus lending credence to the signaling hypothesis proposed by McNichols and Dravid (1990) and Brennan and Copeland (1988). These studies inferred that stock splits may serve as a signal of managerial confidence in future firm performance. Some researchers, such as Chakraborty (2012), reported initial post-split gains that were not sustained in the long term, supporting alternative hypotheses such as the liquidity hypothesis and the small firm effect. However, Lukose and

Rao (2002) found no substantial evidence of increased post-split liquidity, implying that perceived improvements in liquidity may stem more from market perception than from actual transactional changes. The meta-analysis also touched upon the presence of behavioral anomalies and calendar effects. A study by Shakila et al. (2017) investigated the semi-monthly effect in the Bombay Stock Exchange (BSE) and found significant anomalies only in the BSE Auto Index, thereby questioning the consistency of these effects across different market segments. Furthermore, the influence of behavioral finance theories, particularly those focusing on investor sentiment, overconfidence, and bounded rationality, offered alternative explanations for stock price movements that diverged from traditional rationalist models. This interpretation aligned with prior theories proposed by Hong and Stein (1999) and Daves et al. (2010), suggesting that market participants might not always act rationally, especially in the context of speculative events like stock splits. Methodologically, the reviewed studies uniformly employed event study techniques, using the market model to calculate expected returns and measuring AAR and CAAR over specified event windows, which typically ranged from ±15 to ±90 days. These methods incorporated parametric tests such as t-tests as well as non-parametric alternatives like the sign and runs tests to validate the significance of observed anomalies. The consistency in methodologies across these studies ensured a rigorous analytical foundation for the meta-analysis and facilitated cross-study comparison.

To evaluate the presence of publication bias, the meta-analysis applied Egger's test, which yielded statistically significant asymmetry ($p = 0.001$), thereby indicating a potential publication bias favoring studies that reported significant positive results. Additionally, the fail-safe N test revealed that 386 unpublished null-result studies would be required to nullify the meta-analytic findings, suggesting that the observed outcomes were robust despite the detected bias.This comprehensive meta-analysis significantly enriched the scholarly understanding of the Indian stock split market and provided substantial value for future research on the topic. It offered a strong empirical foundation, presenting consistent evidence of abnormal returns around stock split events across BSE and NSE. It also contributed to the theoretical literature by integrating multiple explanatory frameworks, including the EMH, signaling theory, liquidity hypothesis, and behavioral finance. These theoretical underpinnings allowed for a critical examination of stock market responses within the Indian context. Moreover, the findings highlighted methodological consistency while also identifying gaps such as the ambiguity regarding long-term impacts of splits and the insufficient clarity surrounding actual liquidity improvements. These limitations presented valuable opportunities for further research, including longitudinal and sector-specific analyses, the incorporation of macroeconomic variables, and the use of alternative econometric or machine learning models. Ultimately, the paper substantiated the notion that the Indian market displayed semi-strong efficiency in some contexts while also exhibiting behavioral tendencies and inefficiencies in others. It also offered practical implications for policymakers, investors, and corporate managers. For instance, investors could benefit from identifying short-term arbitrage opportunities around split announcements, while corporate managers might leverage stock splits as credible signals to boost market confidence. Regulators, on the other hand, could explore enhancing transparency and disclosure norms to strengthen market efficiency.Given these outcomes, the meta-analysis served as a valuable scholarly contribution that reinforced and extended academic discourse on the Indian stock split market. It provided not only empirical and theoretical insights but also a methodological framework for conducting a rigorous and impactful meta-analysis. As such, it offered a strong foundation for future research endeavors on stock splits, investor behavior, and market anomalies in emerging economies like India.

7. Conclusions

Emerging markets demonstrate conditional semi-strong efficiency. Stock splits create short-term investor optimism but do not guarantee sustained value creation. Strengthening disclosure mechanisms and integrating behavioral variables remain key research directions.

a. Managerial Implications

For corporate managers and financial strategists, the findings offer actionable insights into timing and structuring of corporate announcements. The consistent short-term positive reaction to stock splits indicates that such announcements can be strategically timed to capitalize on investor sentiment and enhance shareholder value in the short run. Managers of firms, particularly-cap and small-cap companies, can use stock splits as a tool to improve stock liquidity and widen investor base. However, the eventual return to equilibrium or negative CARs post-split execution suggests that these benefits are transient. Thus, managers must ensure that split announcements are supported by strong financial performance and growth outlook to sustain investor confidence. Furthermore, in markets where semi-strong inefficiencies exist, investor relations teams should be cautious of unintentional information leakage, which could distort market reactions and potentially attract regulatory scrutiny.

b. Research Implications

This meta-analysis contributes to academic discourse by reaffirming the nuanced validity of the semi-strong form of EMH in emerging markets. While event study methodologies remain robust in detecting market reactions, the inconsistent behavior across event windows and market segments invites further investigation into underlying causes such as market microstructure, investor psychology, and regulatory maturity. The significant abnormal returns observed before events in many studies suggest that future research should focus on the role of media leaks, social media, and informal information networks in shaping investor expectations. Moreover, sector-specific anomalies and temporal effects warrant disaggregated studies using advanced econometric models such as panel regressions or machine learning classifiers to unearth latent patterns. Finally, incorporating behavioral finance variables, such as investor sentiment indices, could offer deeper insights into non-rational market movements, bridging the gap between classical EMH and observed realities.

8. Future Scope

The future research trajectory should expand geographically and temporally to include more recent data, especially in light of digital transformation, algorithmic trading, and evolving investor demographics. A comparative study of market efficiency between developed and emerging economies using identical methodologies can provide valuable contrasts and contribute to global finance literature. Moreover, integrating high-frequency trading data and investor transaction records could illuminate micro-level behaviors often masked in traditional event studies. Future studies should also examine the role of regulatory bodies like SEBI in mitigating information asymmetry and enforcing disclosure norms to promote market efficiency. Lastly, research exploring the impact of macroeconomic shocks, such as the COVID-19 pandemic, on market reactions to stock splits can offer insights into market resilience and behavioral shifts under crisis conditions.

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