

Calendar Anomalies in the Indian Stock Market: Evidence from Nifty 50 Monthly Returns (2020–2025)

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Abstract

The study investigates the monthly seasonal patterns which exist in the Indian Stock market from the returns of Nifty 50 index for the period 2020 to 2025. The Previous research on the calendar anomalies suggest that the stock returns may systematically vary across the different months of the year. To study this possibility in the Indian context, monthly return of the Nifty 50 index was analysed using the descriptive statistics and a one way analysis of variance (ANOVA). The results showed variations across months. In particular April, July and November recorded comparatively higher returns whereas January, February and March showed relatively weaker performance during the period of 2020-2025. However the ANOVA results indicate that these variations are not statistically significant at 5% Level. This suggests that strong month of the year effects are not evident in Nifty 50 Index for the period 2020-2025. The findings may reflect the increasing efficiency in the Indian Market, where improved information availability and the greater institutional participation reduce the predictable return patterns in the market. This study adds to the current research on unusual market patterns by showing new evidence from a developing market's point of view.

Keywords: Seasonality; Nifty 50; Calendar Anomalies; Stock Market Returns; Indian Equity Market

1. Introduction

Recent studies focusing on the Indian market reveal nuanced insights into calendar anomalies and their implications for market efficiency, advancing the understanding of how these seasonal effects interact with the evolving characteristics of the Indian stock market (Rossi, 2015).

One key investigation thoroughly analyzed the turn-of-the-month anomaly across broad-market and sectoral indices from the National Stock Exchange (NSE) and Bombay Stock Exchange (BSE) using advanced ARIMAX models. This study found that the turn-of-the-month effect, a calendar anomaly where returns are abnormally higher around month ends and beginnings, persists in Indian equities. Significantly, it examined how market reforms over time influenced the strength and persistence of this anomaly, illustrating that regulatory and structural changes can alter anomaly expressions and thus market efficiency (Raj & Kumari, 2006).

Another empirical study specifically tested the financial year effect in India—the impact due to the Indian fiscal year cycle—and found no strong evidence for exploitable anomalies that would allow abnormal returns. Although the volatility in returns showed some weak but statistically significant sensitivity to the financial year cycle, the study suggests that the Indian stock market is moving toward

greater efficiency, leaving limited opportunity for investors to profit from such calendar irregularities (Aggarwal & Jha, 2023).

In contrast, earlier studies examining the week-day effects, including Monday and Friday anomalies, found little evidence of these calendar anomalies in Indian stock indices such as S&P CNX 500, CNX 100, and BSE 200. Tests supporting random walk behavior and serial correlation analysis reinforced the weak-form efficiency of the Indian market regarding these particular anomalies during the studied period (2007–2008) (Mittal and Jain, 2009).

Further, in Indian commodity futures markets, including agricultural and metals futures, research indicates the presence of calendar anomalies like the day-of-the-week and month-of-the-year effects. These anomalies suggest inefficiencies within these commodity markets, providing potential strategic advantages for traders who exploit calendar-based patterns, although many markets are weakly efficient according to standard regression analyses (Chhabra and Gupta, 2020).

Moreover, beyond traditional calendar effects, research unique to the Indian context identified a “Monsoon Effect” in the equity market, where seasonal rainfall impacting economic performance influences stock returns. The post-monsoon period consistently yielded significantly higher returns compared to the pre-monsoon period, indicating a strong seasonal pattern driven by macroeconomic factors unique to India. This anomaly highlights how local climatic and economic cycles can generate calendar irregularities tied to broader market fundamentals and investor sentiment (Vachhrajani et al., 2014).

Synthesizing these findings, it becomes clear that while Indian markets exhibit certain calendar anomalies that question strict weak-form efficiency, the impact of these anomalies has evolved over time, with reforms and market maturation gradually diminishing their strength. Some calendar anomalies, such as the turn-of-the-month and monsoon-related effects, remain statistically significant and potentially exploitable, whereas others like the day-of-the-week effects appear weaker or absent in recent analyses. This evolving landscape supports adaptive views of market efficiency in India, where anomalies may wax and wane with changing market conditions, regulation, and investor behavior (Tadepalli et al., 2021; Bhatia, 2020; Vachhrajani et al., 2014).

Overall, studies focused on the Indian market affirm that calendar anomalies play a complex role in shaping the efficiency profile of Indian stock and commodity markets, urging investors, policymakers, and researchers to consider both global anomaly patterns and unique local economic cycles in evaluating market behavior and informational efficiency (Raj & Kumari, 2006)

The Nifty 50 index, which monitors the performance of 50 prominent companies on India's National Stock Exchange, acts as an essential benchmark for assessing stock market trends. Recognizing seasonal patterns within the Nifty 50 index is advantageous for investors, policymakers, and researchers, as it provides insights into market efficiency and the predictability of returns. (Samarakoon & Pradhan, 2024)

Therefore, the present study aims to examine the presence of seasonal anomalies in the Nifty 50 index by analysing monthly stock returns during the period 2020–2025. The study applies descriptive statistical analysis and a one-way Analysis of Variance (ANOVA) to determine whether significant differences exist across monthly returns. The findings of the study contribute to the existing literature on market anomalies and provide evidence regarding the presence or absence of seasonal patterns in the Indian stock market.

2. Literature Review

Calendar anomalies have been widely studied in financial markets as they challenge the assumptions of the Efficient Market Hypothesis (EMH). Early research by Eugene F. Fama (1970) introduced the concept of market efficiency, suggesting that stock prices fully reflect all available information. However, several empirical studies have reported patterns in stock returns that appear inconsistent with this theory. These patterns, commonly known as market anomalies, include day-of-the-week effects, January effects, and month-of-the-year effects.

One of the earliest studies on calendar anomalies was conducted by Michael S. Rozeff and William R. Kinney (1976), who identified the **January effect** in the United States stock market. Their findings indicated that stock returns during January were significantly higher compared to other months of the year. The authors suggested that tax-loss selling and portfolio rebalancing by investors could be responsible for this seasonal pattern.

Similarly, Robert A. Ariel (1987) examined monthly patterns in stock returns and reported that certain months exhibit higher average returns compared to others. Ariel argued that behavioural factors and institutional trading patterns may contribute to the existence of such anomalies in financial markets. These findings encouraged further investigation into calendar effects across different global markets.

Subsequent studies extended the analysis of seasonal anomalies to international markets. Research conducted by various scholars indicated that calendar anomalies may exist not only in developed markets but also in emerging markets. However, the strength and persistence of these anomalies appear to vary across countries and time periods. Some studies have found strong seasonal patterns, while others have reported weakening effects as financial markets become more efficient.

In the context of emerging markets, the presence of calendar anomalies may be influenced by factors such as market structure, investor behaviour, and regulatory frameworks. Several studies focusing on Asian and emerging stock markets have reported mixed evidence regarding the existence of monthly seasonality. Some researchers found that certain months generate higher returns due to institutional trading cycles or investor sentiment, while others concluded that such patterns are diminishing with increasing market efficiency.

In the Indian context, the stock market has evolved significantly over the past two decades, with improvements in technology, regulatory oversight, and market participation. The National Stock Exchange (NSE) and its benchmark index, the Nifty 50, represent an important platform for examining stock market behaviour in India. Previous studies on the Indian stock market have explored various calendar anomalies, including day-of-the-week effects and month-of-the-year effects. However, the results have been inconsistent, with some studies identifying seasonal patterns while others reporting no statistically significant anomalies.

Given the mixed findings in previous research, it is important to re-examine the presence of seasonal anomalies using recent data. Financial markets have undergone substantial transformation in recent years due to technological advancements, algorithmic trading, and increased institutional participation. These developments may have reduced predictable patterns in stock returns and improved overall market efficiency.

Therefore, the present study aims to contribute to the existing literature by examining the presence of monthly seasonality in the Nifty 50 index during the period 2020–2025. By applying descriptive statistical analysis and ANOVA, the study seeks to determine whether significant differences exist across monthly returns in the Indian stock market.

3. Objectives of Study

The present study aims to examine the presence of seasonal anomalies in the Indian stock market by analysing the monthly returns of the Nifty 50 index. The specific objectives of the study are:

1. To analyze the monthly return patterns of the Nifty 50 index.
2. To examine whether seasonal effects exist in the Indian equity market.
3. To identify months that exhibit relatively higher or lower average returns.
4. To assess the implications of seasonal patterns for investment decisions and portfolio management strategies.

4. Research Methodology

This study adopts a quantitative research design to examine the presence of seasonal anomalies in the Indian stock market. The analysis focuses on the Nifty 50 index, which represents the performance of fifty major companies listed on the National Stock Exchange of India. The Nifty 50 index is widely used as a benchmark indicator of overall market performance in India.

The study uses secondary data obtained from publicly available financial databases. Monthly historical data of the Nifty 50 index were collected for the period January 2020 to December 2025. Monthly returns were calculated using the percentage change in index values between consecutive months.

To analyse the presence of seasonal patterns, descriptive statistical techniques were first applied to calculate the average monthly returns of the Nifty 50 index. These descriptive statistics help in identifying variations in returns across different months of the year.

In addition to descriptive analysis, a one-way Analysis of Variance (ANOVA) was employed to test whether significant differences exist in average monthly returns across the twelve months. ANOVA is a widely used statistical technique that allows researchers to examine whether variations between multiple groups are statistically significant. In this study, each month of the year represents a group, and the ANOVA test evaluates whether the average returns differ significantly across these groups.

The statistical analysis was conducted using Microsoft Excel's Data Analysis ToolPak. The level of significance for hypothesis testing was set at 5 percent ($\alpha = 0.05$). The null hypothesis assumes that there is no significant difference in monthly returns, while the alternative hypothesis suggests that significant differences exist among months.

5. Hypothesis of Study

Null Hypothesis (H_0):

There is **no significant difference in the average monthly returns** of the Nifty 50 index.

Alternative Hypothesis (H_1):

There is a **significant difference in the average monthly returns** of the Nifty 50 index.

6. Results and Analysis

The empirical analysis of the monthly returns of the Nifty 50 index during the period 2020–2025. Descriptive statistics were first used to examine the pattern of average monthly returns. Subsequently, a one-way Analysis of Variance (ANOVA) test was conducted to determine whether the differences in monthly returns were statistically significant.

Table 1 – Average Monthly Returns

Table 1: Average Monthly Returns of Nifty 50 (2020–2025)

Month	Average Return (%)
January	-1.49
February	-1.46
March	-1.94
April	3.49
May	0.77
June	2.80
July	3.40
August	2.04
September	0.48
October	0.77
November	3.12
December	2.03

Table 1 presents the average monthly returns of the Nifty 50 index for the study period. The results indicate that April (3.49%), July (3.40%), and November (3.12%) recorded relatively higher average returns. In contrast, January (-1.49%), February (-1.46%), and March (-1.94%) exhibited lower average returns. Although some variation in monthly returns can be observed, it is necessary to test whether these differences are statistically significant.

Figure 1 – Monthly Return Pattern

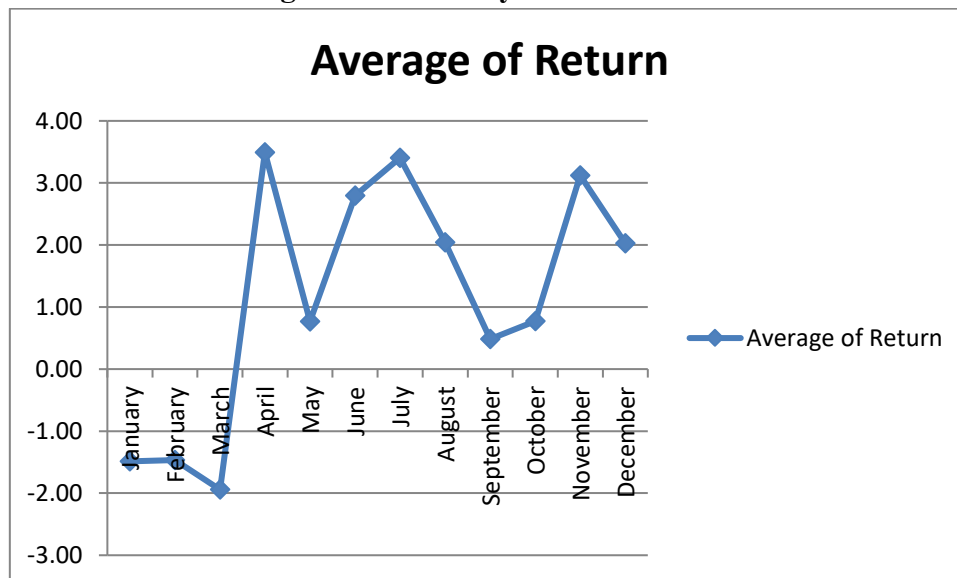


Figure 1: Monthly Return Pattern of Nifty 50 (2020–2025)

Figure 1 illustrates the variation in average monthly returns of the Nifty 50 index. The graphical representation indicates that certain months such as April, July, and November exhibit relatively higher returns compared to other months. However, visual patterns alone cannot confirm the presence of seasonal anomalies; therefore, a statistical test is required.

Table 2: ANOVA Results for Monthly Returns

ANOVA						
Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	243.3973	11	22.12703	0.819218	0.621212	1.952212
Within Groups	1620.596	60	27.00993			
Total	1863.993	71				

A one-way ANOVA test was conducted to examine whether significant differences exist in average monthly returns of the Nifty 50 index during the study period. The results indicate that the variation in returns across months is not statistically significant ($F = 0.819$, $p = 0.621$). Since the p-value exceeds the 0.05 significance level, the null hypothesis of equal monthly returns cannot be rejected. This suggests that the Nifty 50 index does not exhibit strong seasonal patterns during the period under study.

7. Discussion

The objective of this study was to examine the presence of seasonal anomalies in the Indian stock market by analysing the monthly returns of the Nifty 50 index during the period 2020–2025. The descriptive analysis indicated that certain months, particularly April, July, and November, recorded relatively higher average returns compared to other months. Conversely, January, February, and March exhibited comparatively lower returns. These patterns suggest some variation in monthly returns; however, statistical testing was necessary to determine whether these differences were significant.

The results of the one-way ANOVA test indicated that the variation in average monthly returns across the twelve months was not statistically significant. The p-value obtained from the analysis exceeded the significance level of 0.05, indicating that the null hypothesis of equal monthly returns cannot be rejected. This finding suggests that the Nifty 50 index does not exhibit strong or consistent seasonal anomalies during the study period.

The absence of significant seasonal patterns may reflect increasing efficiency in the Indian stock market. Over the past decade, technological advancements, greater institutional participation, and improved dissemination of market information have contributed to a more efficient trading environment. As a result, predictable patterns in stock returns may have weakened over time.

The findings of this study are broadly consistent with several recent studies that report diminishing calendar anomalies in modern financial markets. As markets become more integrated and technologically advanced, investors are able to respond more quickly to new information, reducing opportunities for abnormal returns based on predictable calendar effects.

From an investment perspective, the results imply that investors may not be able to systematically exploit monthly seasonal patterns in the Nifty 50 index to generate abnormal returns. Portfolio managers and traders should therefore rely on broader market analysis and diversified investment strategies rather than depending solely on calendar-based trading strategies.

8. Limitations of the Study

This study has certain limitations that should be acknowledged. First, the analysis focuses only on the Nifty 50 index and does not consider individual stocks or sectoral indices. Second, the study period covers six years (2020–2025), which may limit the ability to capture long-term seasonal patterns. Future research may extend the analysis to a longer time horizon and include additional indices or sectors to provide a more comprehensive understanding of seasonal anomalies in the Indian stock market.

9. Conclusion

This study examined the presence of seasonal anomalies in the Indian stock market by analysing the monthly returns of the Nifty 50 index during the period 2020–2025. The analysis was conducted using descriptive statistics and a one-way ANOVA test to determine whether significant differences exist across monthly returns. The descriptive results indicated that certain months such as April, July, and November exhibited relatively higher average returns, while January, February, and March showed comparatively weaker performance.

However, the results of the ANOVA test revealed that the differences in average monthly returns were not statistically significant. The p-value obtained from the ANOVA analysis exceeded the significance level of 0.05, indicating that the null hypothesis of equal monthly returns cannot be rejected. This suggests that strong seasonal patterns are not evident in the Nifty 50 index during the study period.

The findings of this study provide insights into the efficiency of the Indian stock market. The absence of significant seasonal anomalies may indicate improved market efficiency, greater institutional participation, and faster information dissemination in recent years. Future research may extend this study by analysing longer time periods, additional stock indices, or sectoral data to further explore seasonal patterns in financial markets.

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