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THE EMERGENCE OF DAY OF THE WEEK EFFECT IN THE INDIAN NIFTY ENERGY SECTOR: ANALYSIS AND INTERPRETATIONS

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ABSTRACT

This study delves into the presence and evolution of the day-of-the-week effect within the Indian NIFTY Energy Sectoral Index. Employing a comprehensive dataset of daily returns spanning the years 2005 to 2023, the analysis is segmented into two distinct time periods: 2005-2015 and 2016-2023. This segmentation allows for a granular examination of potential shifts in the nature or intensity of calendar anomalies within this market segment.

Findings from the initial period (2005-2015) reveal the absence of statistically significant day-of-the-week effects. This aligns with certain strands of existing research that suggest calendar anomalies might be less prevalent in specific market segments or may experience periods of dormancy. However, the second time period (2016-2023) presents a compelling departure from this pattern, highlighting the dynamic landscape of financial markets. A statistically significant (p-value < 0.05) and persistent anomaly arises, with Tuesdays consistently demonstrating the highest average daily returns within the NIFTY Energy Sector. This observation challenges traditional notions of day-of-the-week effects and necessitates a nuanced exploration of its potential drivers.

Keywords: Day of the Week Effect, Calendar Anomalies, NIFTY Energy, Tuesday Effect, Market Efficiency.

INTRODUCTION

The stock market, while generally considered a mechanism for efficient capital allocation, can exhibit inefficiencies known as market anomalies. These anomalies arise from a confluence of factors, including imperfect competition, limited information transparency, regulatory interventions, and investor behavioural biases. Consequently, actual stock returns may deviate from what would be expected under the assumption of a perfectly rational market. The study of market anomalies holds significant importance for investors. By understanding these persistent deviations from expected returns, investors can potentially develop strategic trading approaches to generate excess returns, or alpha, above what the market typically offers.

The stock market exhibits intriguing patterns related to specific days of the week, known as day-of-the-week effects. These effects suggest that average returns and price movements may vary systematically throughout the trading week. While the magnitude of these differences might be modest, research indicates a degree of consistency and recurrence in these patterns.

This study investigates the presence and development of day-of-the-week effects within a specific market segment, Nifty Energy Index. By analysing historical data, we aim to shed light on these patterns and their implications for market efficiency.

RESEARCH PURPOSE

The primary objective of this study is to check the existence of Day-of-the-week Effect in the Nifty energy index for two time periods, time period 1 (2005-2015) and time period 2 (2016-2023). The rationale behind this is twofold. First is to find if the Day of the week anomaly exists in the Nifty Energy Index. Second is to check the presence and significance of this anomaly in the two time periods.

There are compelling reasons for this sectoral focus:

- *Heterogeneity in Market Dynamics:* Different sectors exhibit unique characteristics, risk profiles, and investor behaviour patterns. A day-of-the-week anomaly observed in the broader market might not translate to individual sectors.
- *Potential for Amplification:* Certain sectors might be more susceptible to calendar effects due to their sensitivity to specific news cycles, regulatory pronouncements, or global events that occur on particular days.

By focusing on a specific sector, the study offers a more granular and nuanced understanding of day-of-the-week effects. This approach can potentially reveal the presence or absence of day-of-the-week effects within the chosen sector, potentially diverging from broader market patterns.

RESEARCH AIMS

This study focuses on identifying and analysing calendar anomaly, the Day of the Week Effect in the Nifty Energy Sector. The objective of this study is to find answer to the following questions:
RQ 1: Does the Nifty Energy Index exhibit any Day-of-the-Week Effect during time period 1 (2005-2015)?
RQ 2: Is there any change in the pattern of the observed anomaly from time period 1 to time period 2?

RESEARCH RELEVANCE

Within the financial sphere, a market anomaly may exist when price fluctuations in an asset or security defy clear attribution to presently available, pertinent market information or the introduction of new data. Persistent calendar anomalies contradict the fundamental idea of market efficiency. If investors can reliably generate excess returns by exploiting patterns linked to time (like calendar anomalies), it suggests that the market may not be fully efficient. (Karat & Sudhakar, 2023).

However, the efficient market hypothesis (EMH) possesses limitations, particularly in nascent markets like India, where perfect information efficiency may not always be achieved. India's burgeoning equity market, as evidenced by its growing appeal among global investors, necessitates a thorough examination of calendar anomalies (Raghavan et al., 2014). Understanding these anomalies can empower investors by equipping them with knowledge of potential recurring patterns within the Indian market. By recognizing such anomalies, investors may formulate short-term trading strategies aimed at capturing excess returns (Jaisinghani, 2016).

Market anomalies can be broadly categorized into two main types. Time-Series Anomalies: These anomalies are linked to specific timeframes, such as Calendar Effects: These include well-documented phenomena like the weekend effect (lower returns on Fridays) and the January effect (above-average returns in January) (S. et al., 2014). Momentum and Overreaction Anomalies: These anomalies focus on short-term price trends Another important type is Cross-Sectional

Anomalies. These anomalies are based on company characteristics, such as Size Effect. This anomaly suggests that smaller companies (small-cap) tend to outperform larger companies (large-cap) on a risk-adjusted basis. However, the consistency of this effect is debated. Value Effect: It suggests that value stocks, characterized by low P/E and M/B ratios and high dividend yields, have historically outperformed growth stocks over extended periods. This anomaly, if persistent, challenges the semi-strong form of EMH, as the value classification is based on publicly available information (Chatterjee & Maniam, 2011)

REVIEW OF LITERATURE

EFFICIENT MARKET HYPOTHESIS

The 1960s marked the emergence of EMH as a dominant paradigm in finance. Pioneering works by Fama (1965) and Samuelson (1965) laid the groundwork, assuming a high degree of market efficiency. However, subsequent decades witnessed growing evidence challenging the hypothesis in all its forms: weak, semi-strong, and strong.

Despite these challenges, EMH remains a valuable starting point in modern finance. It posits that information efficiency prevents investors from systematically earning excess returns compared to other market participants. In simpler terms, investors cannot consistently "beat the market."

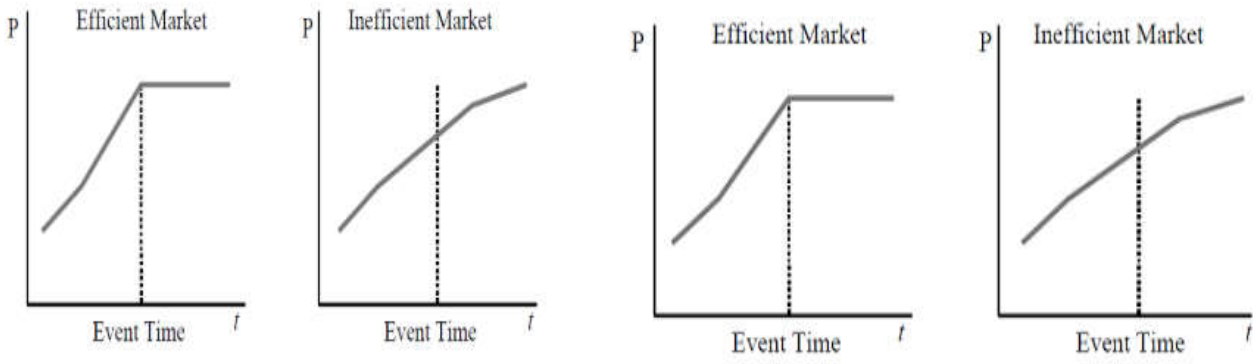

Figure 1 Market Reaction to Favourable Predictable and Unpredictable Events.

In an efficient market, stock prices swiftly adapt to new information, whether the information is related to predictable or unpredictable events. In contrast, a less efficient market exhibits a delayed response to new information. With predictable events, some price adjustment might occur in anticipation, but full adjustment still happens quickly at the event date in an efficient market (Chuvakhin, 2009).

The Efficient Market Hypothesis (EMH) proposes different levels of information reflected in asset prices, categorized into three main forms, Weak form, Semi-strong form and Strong form.

MEANING OF DAY OF THE WEEK EFFECT

The day-of-the-week effect, a market anomaly suggesting that stock prices may consistently demonstrate higher or lower returns on specific days, has fascinated researchers for decades. This phenomenon seems to suggest a bias toward positive performance later in the week. Day of the week effect refers to the phenomenon when returns of the trading assets are significantly varied on different days of the week (Chhabra & Gupta, 2022). The academic literature presents varied interpretations of the day-of-the-week effect across different markets. While some studies document a negative Tuesday effect, others emphasize Monday or Friday effects. This observed inconsistency in findings highlights the potential for market-specific dynamics to influence the presence and nature of calendar anomalies. The lack of a universal pattern underscores the importance of examining the presence of day-of-the-week effects within specific contexts.

EXISTING RESEARCH

The quest to understand calendar anomalies has a long history in financial research. Pioneering studies like Osborne (1962) uncovered the day-of-the-week effect in the U.S. equity market. Subsequent analyses by French (1980) and Gibbons and Hess (1981) confirmed this pattern, with significantly negative Monday returns and positive Friday returns. Expanding the scope internationally, Jaffe and Westerfield (1985) demonstrated similar effects in the USA, UK, Canada, Australia, and Japan. Intriguingly, they also observed a specific negative Tuesday effect within the Japanese and Australian markets. Seasonal trends from the U.S. market offered one possible cause for the Australian effect, highlighting the potential for "spillover" due to time zone differences.

French's seminal 1980 work explored the "Calendar-time hypothesis" (that the market operates continuously, implying a three-day return on Mondays) as well as the "Trading-day hypothesis" (that returns are generated only during active trading). French found compelling evidence from 1953 to 1977 data that the S&P 500's daily returns contradicted both models. Most notably, Mondays consistently showed negative returns in stark contrast to the other four trading days. This surprising discovery spurred further investigations into this market anomaly.

Gibbons & Hess (1981) expanded on French's work, finding low mean returns not only on Mondays but also Tuesdays, with higher returns later in the week. Theoretical models like those by Admati & Pfleiderer (1988) and Foster & Viswanathan (1990) provide additional context. These models explore the dynamics of private information's arrival, its incorporation into prices, and the influence various investor groups have on this process.

Investor psychology may also play a significant role. Rystrom & Benson (1989) highlight the potential for emotion-influenced behaviour to skew otherwise-rational decision-making. Variations in optimism and pessimism across weekdays might lead to corresponding price movements. This aligns with Pettengill's (2003) explanation, where investor concerns about insider information received over the weekend might suppress Monday purchases.

CALENDAR ANOMALIES AND THE INDIAN MARKETS

Existing research within the context of Indian markets indicates the presence of predictable patterns that can potentially be exploited for above-average returns. These findings challenge the Efficient Market Hypothesis (EMH), which posits that such patterns should not persist in a truly efficient market. This study further suggests that, by strategically timing investments in accordance with observed anomalies, investors may have the opportunity to enhance their returns within the Indian market. (Wats, 2019).

Analysis of the National Stock Exchange over the past five years (2014-2019) reveals an intriguing deviation from the classic weekend effect. Unlike established patterns, negative returns in the Indian market appear concentrated on Tuesdays rather than Mondays, indicating a distinct "Tuesday effect" across most sectors. (Karat & Sudhakar, 2023).

Calendar anomalies within the Indian stock market have captivated the attention of both academics and investors. Research presents a complex picture, with studies demonstrating varying results regarding day-of-the-week and month-of-the-year effects across different indices and time periods. Pandey (2002) observed that India's April-March financial cycle aligns with an "April effect" rather than the January effect seen elsewhere; this was attributed to fund managers and investors revisiting positions sold off in March, supporting the tax-loss harvesting hypothesis. Gopala (2017), examining the BSE Sensex, BSE Midcap, BSE 500, and BSE Small cap from 1990-2015, observed month-of-the-year effects across the time frame. Interestingly, smaller capitalization companies exhibited a relatively stronger anomaly than their larger counterparts. Gopala's study also presents evidence of a positive weekend effect and a negative Tuesday effect across all three indices.

Calendar anomalies intrigue researchers because their profitability often declines upon widespread documentation. This phenomenon aligns with the principle of asymmetric information—where a subset of investors possesses knowledge others lack, enabling them to capitalize on patterns. As this knowledge is disseminated, it becomes symmetric, levelling the playing field and diminishing the anomaly's effectiveness. Studies employing dynamic analysis have strongly supported this theory, demonstrating that anomalies like the weekend effect, holiday effect, turn-of-the-month effect, and the January effect all lost their predictive power post-publication (Marquering et al., 2006).

LITERATURE GAP

Research on calendar anomalies has its origins in studies focused predominantly on US markets, where evidence of such inefficiencies was first documented. Subsequently, extensive investigations have explored the presence of anomalies within the Indian financial markets as well. These studies provide evidence that Indian markets exhibit susceptibility to calendar-based anomalies, although the specific manifestations and intensity may differ from those observed in other developed economies.

While calendar anomalies have been studied within the broader context of the Indian market, a significant research gap exists with regard to sector-specific investigations across NSE and BSE sectoral indices. Understanding how such anomalies might manifest differently across various economic sectors is crucial for developing a comprehensive understanding of Indian market dynamics. The NIFTY Energy Sector, as an emerging and dynamic component of the Indian economy, presents a compelling opportunity to address this gap.

The NIFTY Energy Index: A Vital Sectoral Benchmark

The NIFTY Energy Index, a specialized index on the National Stock Exchange (NSE) of India, plays a pivotal role in representing the performance of the Indian energy sector. Designed to track a meticulously chosen set of companies, this index offers investors and analysts a reliable indicator of the sector's overall trajectory. The NIFTY Energy Index's composition reflects the diversity within this crucial sector. Its 10 constituents span essential segments. By providing exposure to this diverse range of energy-related companies, the NIFTY Energy Index serves as a valuable tool for investors seeking to participate in the growth potential of the Indian energy sector. The Oil, Gas and Consumable fuels accounts for 61.06% while the power sector accounts for 38.94% in the NIFTY Energy Index. The detailed breakdown of company wise share is in the figure below.

Figure 2: Companies in NIFTY Energy Index
Retrieved from: https://www.niftyindices.com/indices/equity/thematic-indices/nifty-energy

METHODOLOGY

DESIGN OF STUDY

This study investigates the presence and potential evolution of the day-of-the-week effect within the Indian NIFTY Energy Sectoral Index. To achieve this, a comprehensive dataset of daily closing prices is obtained from NSE Indices spanning the period from January 2005 to December 2023. The analysis is divided into two distinct time periods: Period 1 (2005-2015) and Period 2 (2016-2023). This segmentation allows for the examination of potential shifts in the day-of-the-week effect's strength or manifestation over time.

VARIABLE CONSTRUCTION:

The dependent variable is the daily percentage return of the NIFTY Energy Index. Returns are calculated using the below formulae:

$$Return_t = \left(Pt/P_{(t-1)} - 1\right) * 100$$

Where:

- Pt is the closing price of the NIFTY Energy Index on day t.
- Pt-1 is the closing price of the NIFTY Energy Index on the previous trading day.

CONSTRUCTION OF DAY-OF-THE-WEEK INDICATOR VARIABLES: DUMMY VARIABLES

Dummy variables, also known as indicator variables or binary variables, are a way to represent categorical information in regression models. They take on only two values: 1 to signify the presence of a certain category and 0 to indicate its absence.

To isolate the potential impact of specific weekdays on NIFTY Energy Index returns, four binary indicator variables (commonly known as "dummy variables") are constructed. These variables represent Tuesday, Wednesday, Thursday, and Friday within the dataset. Monday serves as the reference or baseline category, facilitating comparisons with other days of the week. The coding scheme for these dummy variables is as follows:

- Tuesday Variable: Tuesday variable is assigned a 1 only on its corresponding day and a 0 for all other days.
- Wednesday Variable: Wednesday variable is assigned a 1 only on its corresponding day and a 0 for all other days.
- Thursday Variable: Thursday variable is assigned a 1 only on its corresponding day and a 0 for all other days.
- Friday Variable: Friday variable is assigned a 1 only on its corresponding day and a 0 for all other days.

RATIONALE FOR DUMMY VARIABLE APPROACH:

The use of dummy variables enables the regression model to directly estimate the average difference in NIFTY Energy Index returns between each specific weekday and the baseline (Monday). This methodological approach allows for the identification of potential calendar anomalies and provides insights into whether returns on certain days exhibit statistically significant deviations from the benchmark day.

ECONOMETRIC MODELLING AND TESTING

STATIONARITY TESTING: Prior to utilizing regression models, the Augmented Dickey-Fuller (ADF) test is utilized to evaluate stationarity of daily return series for both time periods. Ensuring stationarity is crucial to prevent erroneous regression outcomes.

Equation:

$$\Delta Return_t = \gamma * Return_{(t-1)} + \Sigma\delta i * \Delta Return_{(t-i)} + \varepsilon_t$$

Where:

$\Delta Return_t$ is the first difference of the NIFTY Energy return series $Return_t - Return_{(t-1)}$.

$Return_{(t-1)}$ is the lagged value of the return series.

γ is the coefficient of interest.

$\Sigma\delta i * \Delta Return_{(t-i)}$ represents the lagged first differences included to account for potential autocorrelation.

ε_t is the error term.

Hypothesis:

Null Hypothesis (H_0): There is a unit root in the NIFTY Energy return series (i.e., the series is non-stationary). This implies $\gamma = 0$.

Alternative Hypothesis (H_1): There is no unit root in the NIFTY Energy return series (i.e., the series is stationary). This implies $\gamma < 0$.

TIME SERIES REGRESSION:

The following regression models are specified for each time period:
Period 1 (2005-2014):

$$\boldsymbol{Return_t = \beta 0 + \beta 1 * Tuesday_t + \beta 2 * Wednesday_t + \beta 3 * Thursday_t + \beta 4 * Friday_t + \varepsilon_t}$$

Period 2 (2016-2023):

$$\boldsymbol{Return_t = \alpha 0 + \alpha 1 * Tuesday_t + \alpha 2 * Wednesday_t + \alpha 3 * Thursday_t + \alpha 4 * Friday_t + \varepsilon_t}$$

Where:

β0 and α0 are intercepts for Period 1 and Period 2, respectively.

β1, β2, β3, β4 and α1, α2, α3, α4 are coefficients representing the average difference in returns between the specified day and Monday.

ε_t is the error term.

HYPOTHESIS TESTING:

Individual t-tests are used to determine whether the coefficients of the day-of-the-week dummy variables are statistically significant, revealing if specific days exhibit returns that differ significantly from Monday. Additionally, an F-test examines the overall significance of each regression model, evaluating whether the inclusion of the day-of-the-week variables collectively improves the explanatory power of the model.

Hypothesis:

H_0 (for each day-of-the-week dummy): There is no statistically significant difference in average returns between the specified day and Monday.

H_1: There is a statistically significant difference in average returns between the specified day and Monday.

TREATMENT OF DATA

The day wise return collected from NSE Indices for NIFTY Energy is subjected to regression analysis to quantifiably differentiate the day wise returns. The software used for this purpose is E-Views.

RESULTS AND FINDINGS

KEY STRUCTURE

This study investigates the presence and evolution of the day-of-the-week effect within the Indian NIFTY Energy Sectoral Index. Daily closing prices from January 2005 to December 2023 were analysed, with the dataset divided into two time periods: 2005-2015 and 2016-2023. To isolate the impact of weekdays, non-trading days were excluded. Before employing time series regression, the Augmented Dickey-Fuller (ADF) test had been performed to assess the stationarity of daily return for both the time periods. Two regression models were specified (one for each period), employing dummy variables to represent Tuesday, Wednesday, Thursday, and Friday, with Monday serving as the baseline. Individual t-tests and an overall F-test were used to determine the statistical significance of the day-of-the-week variables.

ANALYSIS OF FINDINGS

AUGMENTED DICKEY FULLER TEST:

The Augmented Dickey-Fuller (ADF) Test was performed on the daily returns for both Period 1 and Period 2. This test is crucial to determine if the dependent variable (Return) exhibits a unit root, which would indicate non-stationarity. The ADF test generates a p-value. If this p-value exceeds the chosen significance level (e.g., 0.05), we fail to reject the null hypothesis. This implies that the time series is likely non-stationary.

Hypothesis:
Null Hypothesis (H0): Return in the given period has a unit root.
*Alternative Hypothesis (H*1): Return in the given period does not have a unit root.

The following table shows the ADF Stat for both the time periods.

Time Period	ADF Stat (return)
Period 1 (2005-2015)	0.00
Period 2 (2016-2023	0.00

Table 1 ADF Stat for Period 1 & 2

Since the p-value is less than the significance level, we reject the null hypothesis and hence return in both time periods does not have a unit root meaning that the data is Stationary.

AVERAGE DAILY RETURNS:

The motive of this study is to check the relevance of Day of the week effect on NIFTY Energy in 2 time periods ranging from 2005 to 2023. In order to check if any particular day exhibited abnormal returns with respect to the other days, the average daily return for both the time-periods were considered.

Day of the week	Period 1 (2005-2015)	Period 2 (2016-2023)
Monday	0.00%	-0.018%
Tuesday	0.05%	0.265%
Wednesday	0.08%	0.040%
Thursday	-0.02%	0.002%
Friday	0.13%	0.102%

Table 2 Average Daily Return for Period 1 & 2

The table presents the daily average return for each day segmented into two time periods. It is observed that Friday in period 1 is giving the highest return while in period 2, Tuesday is outperforming all the days of the week.

STATISTICAL SIGNIFICANCE:

The equation for both the periods is regressed with Return as the dependent variable and Days of the week as independent variable.

$$Return_t = \beta 0 + \beta 1 * Tuesday_t + \beta 2 * Wednesday_t + \beta 3 * Thursday_t + \beta 4 * Friday_t + \varepsilon_t$$

Hypothesis:

H_0: There is no statistically significant difference in average returns between the specified day and Monday.

H_1: There is a statistically significant difference in average returns between the specified day and Monday.

Regression Summary: Period 1 (2005-2015)

Variable	Coefficient	t-statistic	Prob.
Tuesday	-0.000568	-0.571999	0.56
Wednesday	0.000496	0.498884	0.61
Thursday	-0.000712	-0.713708	0.47
Friday	0.000527	0.527283	0.59
c	0.000484	0.689278	0.49

Table 3 Regression Summary Output for Period 1

The table presents the results of regression analysis on Period 1. The rule of thumb for the significance of a variable are twofold. First, the variable's calculated t-value should be greater than its critical t value (in this case, 2.241). Second, the variable's p-value must be lower than its alpha value; in this case, p-value must be lower than 0.05.
It must be noted that none of the above days of the week are satisfying any conditions for t-test and all the p-values are higher than 0.05 therefore there is no statistically significant difference in returns among the days of the week in period 1 hence we fail to reject the null hypothesis.

f-test:

The f test checks the overall significance of the model. The rule of thumb for f-test is that if prob(f-test) is less than 0.05, we conclude that the model is statistically insignificant.

f-statistic	Prob (f-statistic)
0.67	0.61

Table 4 f-test for Period 1

From the table, it can be concluded that the model in period 1 is statistically insignificant since the p-value is 0.61 which is greater than 0,05. Moreover, for period 1, f-stat value is 0.67. The corresponding f-critical value is 1.94. Since the f stat is lower than the f-critical, we fail to reject the null hypothesis and conclude that the model is insignificant.

Durbin-Watson Stat:

Durbin-Watson Stat	1.88

Table 5 DW Test for Period 1

The Durbin-Watson (DW) statistic spans from zero to four, where a value of 2.0 signifies no autocorrelation. The DW Stat for period 1 is 1.88 which is close to 2 and therefore it can be concluded that there is no autocorrelation.

Regression Summary: Period 2 (2016-2023)

Variable	Coefficient	t-statistic	Prob.
Tuesday	0.002830	3.049765	0.00
Wednesday	0.000580	0.628747	0.52
Thursday	0.000194	0.209977	0.83
Friday	0.001195	1.290040	0.19
c	-0.000176	-0.268105	0.78

Table 6 Regression Summary Output for Period 2

The table presents the results of regression analysis on Period 2. The rule of thumb for the significance of a variable are twofold. First, the variable's calculated t-value should be greater than its critical t value (in this case, 2.241). Second, the variable's p-value must be lower than its alpha value; in this case, p-value must be lower than 0.05.

It is noted that for Tuesday the t(cal) values more than surpass the t(crit) value of 2.241 and that the p value is lower than 0.05 for the explanatory variables. Therefore, we successfully reject the null hypothesis and conclude that there is a statistically significant difference in average returns between Tuesday and Monday. While none of the other days of the week satisfy any conditions for t-test and all the p-values are higher than 0.05 therefore there is no statistically significant difference in the average returns between the specified day(except Tuesday) and Monday.

f-test:
The f test checks the overall significance of the model. The rule of thumb for f-test is that if prob(f-test) is less than 0.05, we conclude that the model is statistically insignificant.

f-statistic	f-critical
3.03	1.94

Table 7 f-test for Period 2

From the table, it can be concluded that the model in period 2 is statistically significant since the p-value is 0.01 which is less than 0.05. Moreover, for period 2, f-stat value is 3.036. The corresponding f-critical value is 1.9499. Since the f stat is greater than the f-critical, we reject the null hypothesis and conclude that the model is significant.

Durbin-Watson Stat:

Durbin-Watson Stat	1.99

Table 8 DW Test for Period 2

The Durbin Watson Stat for period 2 is 1.99 which is close to 2 and therefore it can be concluded that there is no autocorrelation.

INTERPRETATIONS OF THE FINDINGS

Statistical analysis indicates a distinct shift in the presence of day-of-the-week effects within the NIFTY Energy Sector. During the initial period (2005-2015), no statistically significant day-of-the-week effect was evident. However, a compelling new phenomenon emerged in the subsequent period (2016-2023): the "Tuesday Effect." This effect is characterized by Tuesday demonstrating the highest average daily returns within the NIFTY Energy Index, a difference that exhibits statistical significance.

CONCLUSION

SUMMARY OF THE STUDY

Findings from the first time-period (2005-2014) reveal an absence of statistically significant day-of-the-week effects. This aligns with certain strands of existing research that suggest calendar anomalies might be less prevalent in specific market

segments or may experience periods of dormancy. However, the second time-period (2016-2023) presents a compelling departure from this pattern, highlighting the dynamic landscape of financial markets.

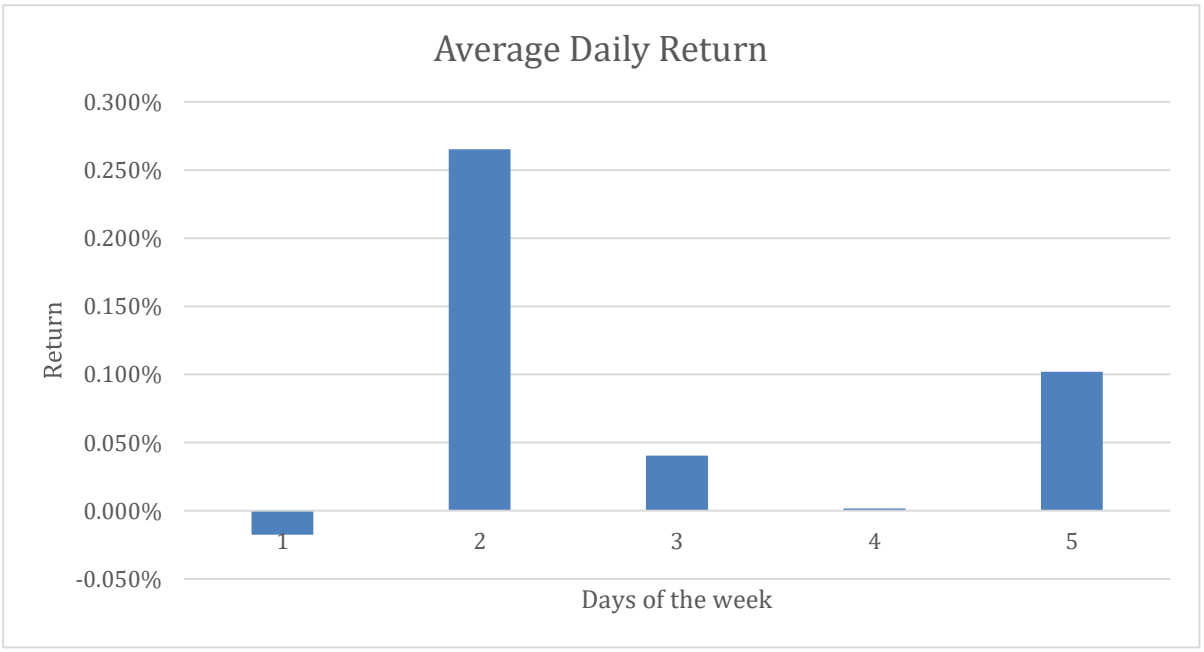

Figure 3: Average Daily Return of Period 2

The above histogram demonstrates a graphical representation of day wise average return for 5 days of the week and it must be noted that Tuesday is depicting higher returns from other days.

POTENTIAL EXPLANATIONS AND AVENUES FOR FURTHER RESEARCH

Several factors could contribute to the emergence and persistence of the observed Tuesday anomaly. These potential explanations warrant further in-depth investigation:

- *Sector-Specific Policy Shifts:* Changes in Indian energy policy, including subsidies, tax regulations, import/export policies, or announcements related to exploration rights, may have altered investor sentiment and risk-reward perceptions within the NIFTY Energy Sector.

- *News Events and Sentiment:* The release of economic data, energy sector reports, or geopolitical events with implications for oil prices or renewable energy could trigger shifts in investor behaviour. A systematic study of news cycles, particularly those occurring on Mondays or those heavily reported on Tuesdays, might shed light on the relationship between information flow and the Tuesday anomaly.

- *Evolving Behavioural Patterns*: Psychological biases, herding behaviour could lead to recurring patterns within the NIFTY Energy market. Research incorporating insights from behavioural finance could investigate whether overconfidence or other psychological factors play a role in amplifying returns on Tuesdays.

IMPLICATIONS FOR MARKET EFFICIENCY

The presence of a persistent Tuesday anomaly raises intriguing questions about the Efficient Market Hypothesis (EMH) within the context of the NIFTY Energy Sector. Further research is warranted to determine the following:

- *Profitability:* Can investors design trading strategies that consistently exploit the Tuesday anomaly, even after accounting for transaction costs and risk? Studies incorporating back testing and simulations could offer practical insights into the potential to generate excess returns.
- *Persistence:* Will the Tuesday effect diminish over time as market participants become aware of it? Tracking the anomaly's evolution within subsequent time periods could reveal whether self-correcting mechanisms within the market lead to its eventual dissipation.
- *Sector Specificity:* Does this anomaly extend to other sectors of the Indian stock market, or is it unique to the NIFTY Energy index? Comparative analyses across different sectors could elucidate whether certain market segments are more prone to calendar-based inefficiencies.

POLITICAL CHANGES AND ANOMALY

The findings of this study reveal a compelling shift in the presence of day-of-the-week effects within the NIFTY Energy Sector, potentially linked to changes in India's central government. A deliberate segmentation of the analysis into two periods, 2005-2015 and 2016-2023, facilitates the examination of this potential relationship. The starting year of the first period (2005) aligns with the UPA (United Progressive Alliance) assuming leadership in 2004, while a buffer year is included to account for the potential lag in the implementation and market impact of energy sector policies. Similarly, the starting year of the second period (2016) aligns with NDA assuming leadership in 2014 while a buffer year is included to account for potential lags.

During the 2005-2015 period, when the UPA (United Progressive Alliance) held power, no statistically significant day-of-the-week effect was observed. This aligns with the notion that calendar anomalies can be market-specific or experience periods of inactivity. However, a striking development emerged with the NDA (National Democratic Alliance) assuming leadership in 2014. The analysis identifies a distinct "Tuesday Effect" from 2016 onwards, characterized by significantly higher average daily returns on Tuesdays within the NIFTY Energy Index.

The timing of this anomaly's emergence, following a transition in central government, raises intriguing questions about the potential influence of policy shifts on market dynamics. The deliberate segmentation of the study's timeframe, with a buffer year incorporated to account for policy implementation lag, strengthens this line of inquiry. These findings suggest that the change in India's central government could have played a role in the manifestation of this new calendar anomaly within the NIFTY Energy Sector.

LIMITATIONS OF THE STUDY

This study, while providing valuable insights into the Tuesday anomaly within the NIFTY Energy Sector, is bound by certain limitations that warrant consideration. Firstly, the focus on a single sector, while allowing for in-depth analysis, potentially limits the generalizability of the findings to the broader Indian stock market. Calendar anomalies may manifest differently across sectors due to varying news cycles, investor behaviours, or regulatory environments.

Secondly, the time period selected for this study could influence the observed results. Calendar anomalies are dynamic and can fluctuate in intensity or even disappear over time. It is crucial to acknowledge that the persistence of the Tuesday anomaly might be subject to change.

Furthermore, this study's singular emphasis on the Tuesday anomaly leaves room for exploration of other potential calendar-based inefficiencies within the sector. Effects related to the month of the year, holidays, or less immediately evident recurring patterns might also contribute to market dynamics within the NIFTY Energy Sector. A multifaceted investigation encompassing a broader spectrum of calendar anomalies would provide a more nuanced understanding of potential market inefficiencies.

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APPENDICES

Appendix 1: Average Daily Return (period 1)

Years	Monday	Tuesday	Wednesday	Thursday	Friday
2005	0.348%	0.077%	0.020%	0.045%	0.054%
2006	-0.144%	-0.067%	0.207%	0.020%	0.383%
2007	0.497%	0.516%	0.146%	0.177%	0.098%
2008	-0.419%	0.013%	-0.054%	-0.468%	-0.230%
2009	0.227%	-0.167%	0.414%	0.092%	0.529%
2010	0.306%	-0.255%	0.000%	-0.020%	0.046%
2011	-0.176%	0.008%	0.148%	-0.238%	-0.375%
2012	-0.252%	0.500%	0.032%	-0.152%	0.161%
2013	0.015%	-0.311%	0.069%	0.089%	0.214%
2014	0.320%	-0.126%	-0.064%	-0.067%	0.149%
2015	-0.189%	-0.228%	0.158%	0.182%	0.110%

Table 9 Year Wise Average Daily Return (period 1)

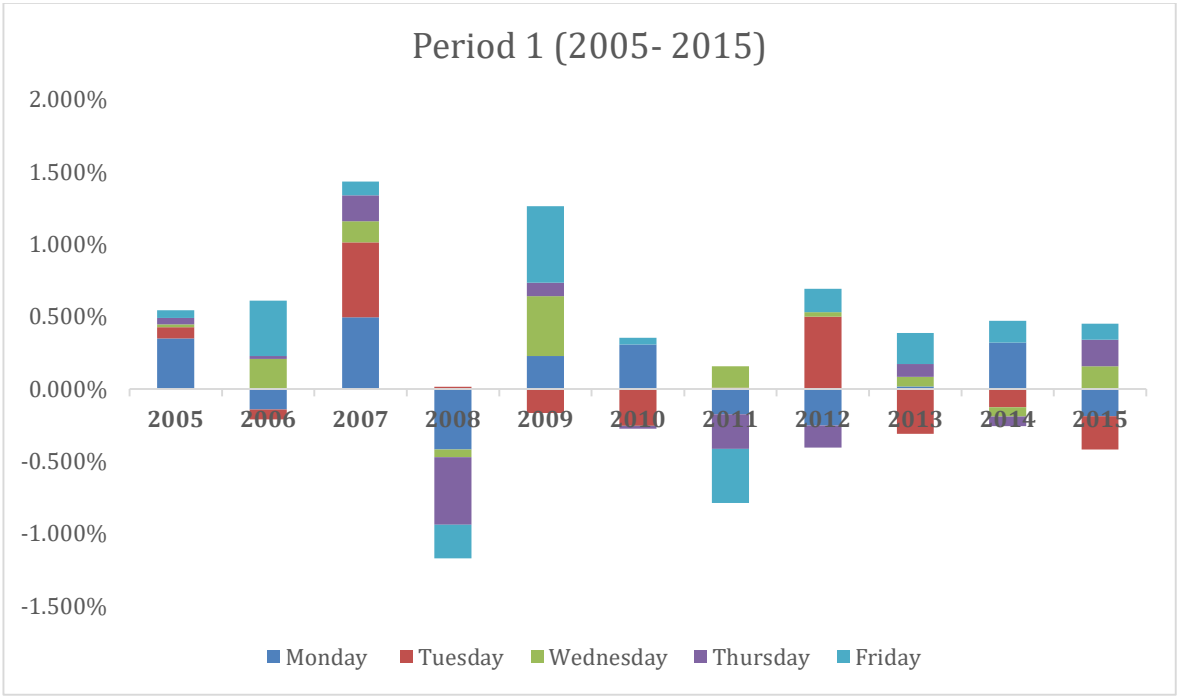

Figure 4: Year Wise Average Daily Return (period 1)

Appendix 2: Average Daily Return (period 2)

Below are the average daily return for each year of period 2:

Years	Monday	Tuesday	Wednesday	Thursday	Friday
2016	0.078%	0.129%	0.066%	-0.165%	0.287%
2017	0.263%	0.018%	0.246%	0.089%	0.066%
2018	0.103%	0.147%	-0.036%	-0.152%	-0.017%
2019	-0.073%	0.220%	-0.094%	0.024%	0.147%
2020	-0.855%	0.417%	0.067%	-0.021%	0.658%
2021	0.020%	0.493%	0.099%	0.245%	-0.251%
2022	0.059%	0.429%	-0.004%	-0.011%	-0.144%
2023	0.250%	0.261%	-0.035%	0.000%	0.077%

Table 10 Year Wise Average Daily Return (period 2)

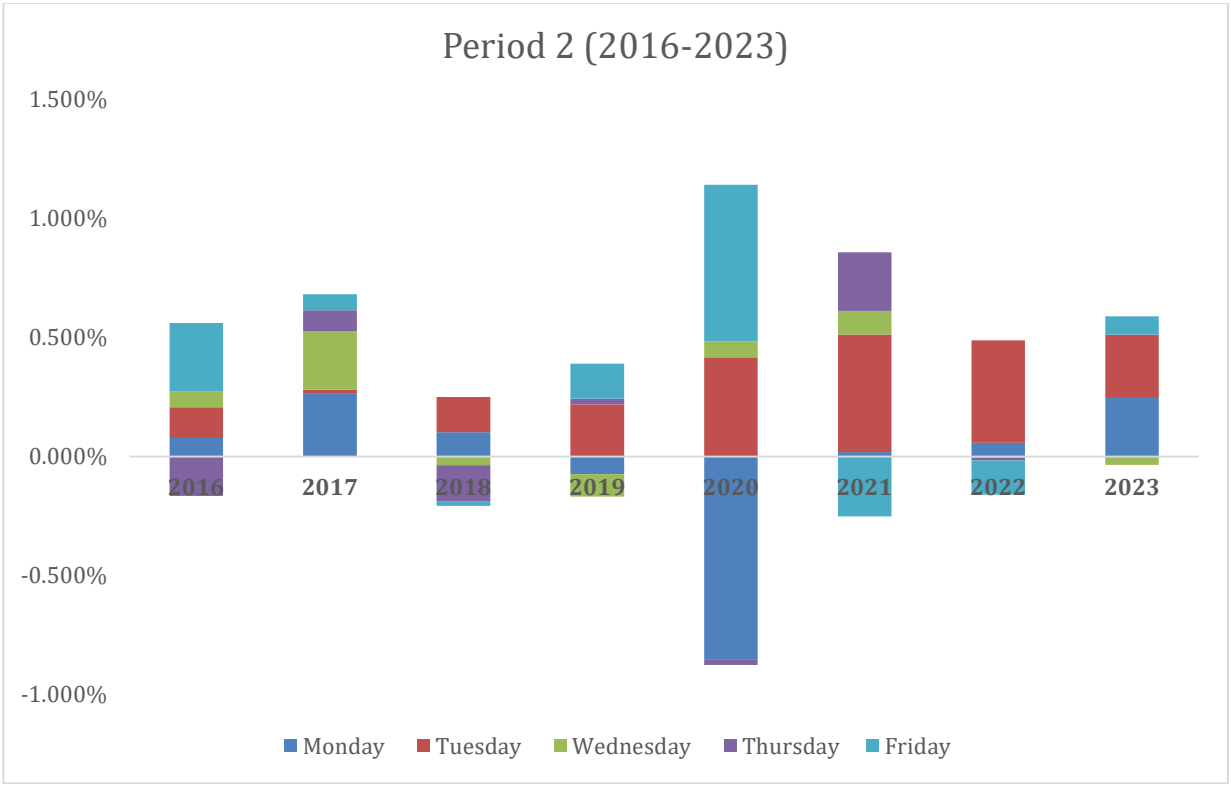

Figure 5: Year Wise Average Daily Return (period 2)