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Measuring the Volatility in Returns of Nifty 50 Based on Day-Of-The-Week Effect

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Abstract

Investors tend to desire abnormal returns from investments which is only possible if market inefficiencies exist. This study attempts to test for the existence of a calendar anomaly i.e. day-of-the-week effect in Nifty 50 which is a benchmark index of the Indian stock Market. Day-of-the-week effect depicts that average returns on various days of the week are different and hence investors may be able to earn abnormal returns of this calendar anomaly exists in the market. Data for the last five years from 2021 to 2025 has been collected and analyzed using dummy variable regression and ARCH family models.

Keywords: Volatility, Day-of-the-Week effect, Nifty 50, Abnormal returns

1. Introduction

Investors usually expect higher returns from their investments. A trending yet risky investment avenue has always been equity shares. Investors who are willing to take moderate risk and take the chance of earning capital gains prefer investment in the equity markets. The secondary market comprises of the stock exchanges of India, National Stock Exchange and Bombay Stock Exchange. The Bombay Stock Exchange is famously known as one of the oldest stock exchange of Asia, however National Stock Exchange rapidly started gaining more attention of investors and currently leads in market volume as compared to BSE.

Irrespective of the investment avenue and the risk taken, the hope for abnormal returns brings in the concept of market inefficiencies. Markets are said to be inefficient when prices do not reflect past information.

The tendency to find patterns in market returns brings in a concept called calendar anomaly. A calendar anomaly tracks a pattern in the return based on the time of the year. There are various calendar anomalies such as day-of-the-week effect, month-of-the-year effect, semi-month effect, turn-of-the-month effect, etc. One anomaly of interest is day-of-the-week effect which depicts that returns on various days of the week differ from each other. If this is true at all, investors who find these patterns can use this information to gain abnormal returns.

This study aims to test for day-of-the-week effect in the returns of one index Nifty 50 over the past five years.

2. Literature Review

One of the earliest researches was carries out to (Balaban, 1995) study the day-of-the-week effect in one market i.e. Turkey. The objective of the paper was to investigate day-of-the-week effects in an emerging stock market of Turkey. The statistical tool used was regression analysis and based on the findings it was reported that there was presence of day-of-the-week effect from 1988 to 1994.

Another study (Brooks & Persand, 2001) tested for the presence of day-of-the-week effect in South East Asian emerging markets and collected data for the time period from 1989 to 1996. Using dummy variable regression, it was found that day-of-the-week effect was present in Thailand, Malaysia and Taiwan.

An similar study on Indian market was conducted to check for calendar effects in the Indian stock market from 1999 to 2007. In the researcher's study it was found that there was an existence of November/ December effect in the Indian stock market during the period of study (Patel, 2008).

Another researcher (Compton, Kunkel, & Kuhlemeyer, 2013) also undertook a study with the aim to examine the Russian stock and bond markets for monthly seasonality, weekday seasonality, and a turn-of-the-month seasonality. Using OLS regression it was found that there was presence of day-of-the-week effect, month-of-the-year effect and turn-of-the-month effect in Russia.

For a considerable number of years, the research on calendar anomalies was carried out using dummy variable regression, however as stock market data would fall under time-series, recent studies started switching to ARCH family models to check for volatility in the returns. A few studies are summarized below:

A study on the Indian Stock Market to test for various calendar anomalies was conducted by and Indian researcher (Jaisinghani, 2016). The time period under study was from 1994 to 2014 and GARCH technique was applied. In this study, it was found that there was day-of-the-week effect, month-of-the-year effect, and mid-year effect in the time period under study.

Other researchers such as (Derbali & Hallara, 2016) have also tested for calendar anomalies using ARCH family models and found day-of-the-week effect to be present in Tunisia from 1997 to 2014. (Caporale & Zakirova, 2017) also used GARCH, EGARCH and TGARCH to check for existence of the calendar anomalies in the Russian stock market.

Recently (Elangovan et. al, 2022) conducted a study to test for month-of-the-year effect using econometrics to analyse Indian stock market returns from 2011 to 2021. They found month-of-the-year effect to be present in the Indian stock market.

3. Research Methodology

Problem statement: Investors desire to earn abnormal returns from stock markets. Abnormal returns can be earned if there are market inefficiencies. Presence of calendar anomalies challenge the weak form of market efficiency. The study attempts to test for the presence of day-of-the-week effect in the Indian stock market in the past five years.

3.1 Research Objectives:

1. To study for the presence of day-of-the-week effect in Nifty 50 returns
2. To measure the volatility in returns of Nifty 50 based on day-of-the-week effect

3.2 Source of Data:

Daily closing prices of Nifty 50 have been collected from 1.01.2021 to 31.12.2025 from the official website of Nifty 50.

3.3 Methodology:

Daily closing prices have been converted into log returns. After checking for stationarity of the data, appropriate econometric test has been utilized.

4. Data Analysis and Interpretation:

The stationarity of the log returns was checked using Augmented Dickey Fuller Test which is shown in

the table below:

Table 1: Stationarity of Data

	t-statistic	P-value
Augmented Dickey-Fuller test statistic	-34.68563	0.0000

Based on the result in table 1, it can be seen that the data is stationary as the p-value is 0.0000 for the Nifty 50 log returns data from 2021 to 2025.

Table 2: Descriptive Statistics for Day-of-the-Week Effect for Nifty 50

Days of the week	Mondays	Tuesday	Wednesday	Thursday	Friday
Observations	249	250	244	247	245
Mean	0.067046	0.119746	0.069183	0.014370	0.001909
Standard Deviation	1.033502	0.850979	0.752427	0.827584	0.913851
Skewness	-0.109695	-0.874781	0.169536	-0.933916	-0.115309
Kurtosis	5.955192	13.27167	4.581690	7.233924	4.183271

From table 2, it can be seen that the average returns on Fridays are lowest and highest returns are observed on Tuesdays. Skewness for all days of the week except Wednesday is negative indicating longer left tails, and positive on Wednesdays indicating longer right tails on Wednesdays. Standard deviation depicts volatility in the returns which is highest on Mondays with a value of 1.033502. Kurtosis is above 3 for all the days of the week indicating higher peak and leptokurtic distribution.

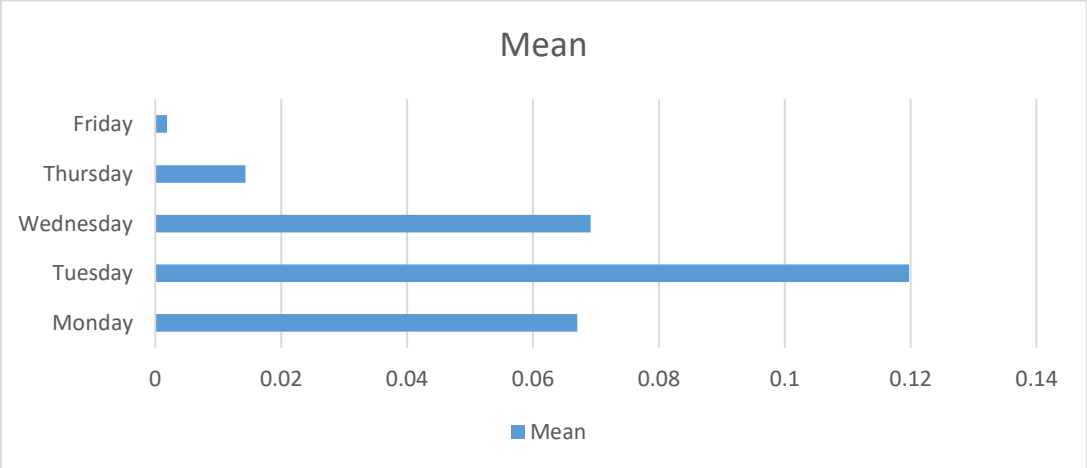

Figure 1: Average returns on different days of the week for Nifty 50

Table 3: Dummy Variable Regression for Day-of-the-Week Effect for Nifty 50

	Estimate	Std. Error	t value	P-value
Monday	0.067046	0.055799	1.202	0.230
Tuesday	0.052700	0.078832	0.669	0.504
Wednesday	0.002137	0.079315	0.027	0.979
Thursday	-0.052676	0.079071	-0.666	0.505
Friday	-0.065137	0.079233	-0.822	0.411

P-value 0.7106

As the P-Value is 0.7106, which is more than 5% level of significance, the model is statistically insignificant. Also the individual p-values of the days of the week is above 0.05. This shows that there is absence of Day-of-the-Week effect during the period from 2021-2025 in Nifty 50 returns.

After confirming ARCH effect in the Nifty 50 returns, GARCH (1,1) and TGARCH (1,1) are shown below:

Table 4: ARCH Family Models for Day-of-the-Week effect for Nifty 50

	GARCH		**TGARCH**	
Mean Equation				
Day of Week Dummy	Coefficients	P-Value	Coefficients	P-Value
Monday	0.121727	0.0030	0.117261	0.0052
Tuesday	0.077662	0.1792	0.052155	0.3585
Wednesday	0.068604	0.1851	0.047519	0.3336
Thursday	0.040878	0.3859	0.058972	0.2058
Friday	0.054997	0.1758	0.027927	0.4847
Variance Equation				
Constant	0.026311	0.0001	0.071963	0.0000
Arch term	0.116482	0.0000	0.073212	0.0000
Garch Term	0.854619	0.0000	0.247368	0.0000
Leverage Term	-	-	0.720555	0.0000
Durbin-Watson stat	1.972819		1.973822	
Akaike info criterion	2.449626		2.431466	
Schwarz criterion	2.482720		2.468696	

The results show that the Monday returns have higher volatility and are statistically significant at 5% significance level.

ARCH term is significant so size of the shock has effect on the volatility of returns and also GARCH term is significant so past volatility helps predict future volatility. In the TGARCH, the leverage term (gama) is positive which shows that bad news have larger effects than good news.

The Durbin Watson Test is to test for autocorrelation in the residuals and a value near 2 means that there is no auto correlation.

The Akaike Information Criterion is used to check which model is better and the lower the value the better the model. Hence, from the AIC values it can be seen that TGARCH model is better. Schwarz Criterion shows how well a model fits data, and the lower the value the better the fit. Hence, based on Schwarz Criterion also shows that the TGARCH model fits the data better.

5. Conclusion:

The study aimed to test for the existence of Day-of-the-week effect in Nifty 50 returns from 2021 to 2025. The descriptive statistics show that there are uneven returns during different days of the week and Tuesday returns show the highest returns. However, dummy variable regression shows that there is absence of the

day-of-the-week effect in Nifty 50 returns. Also, to measure the volatility in returns on different days of the week, the ARCH, GARCH and TGARCH tests were applied and it was seen that Monday returns show highest volatility as compared to other days of the week.

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