DAY OF THE WEEK EFFECT OF STOCK RETURNS: EMPIRICAL EVIDENCE FROM BOMBAY STOCK EXCHANGE

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	Abstract
Keywords: Seasonality; Day of the Week effects; Anamoly; OLS; ANOVA.	A number of studies have been carried out from time to time both in the developed and developing economies to test the presence of anomalies in stock returns. Day of the week effect is the most commonly tested method to check the presence of seasonal anomalies. Previous empirical studies have strongly supported that seasonal anomalies do exist in stock markets. These seasonal anomalies provide an opportunity to the investors to earn abnormal returns by trading on past information. This study attempts to test whether the day of the week effect is present in the stock returns of the Bombay Stock Exchange in India. For this purpose, stock returns for the period between 2010 to 2017 with 1716 observation are taken into account. The day of the week effect hypothesis is tested using OLS model. The research does not support the day of the week effect. None of the coefficients (days of the week) were statistically significant at conventional level of significance (5%) indicating that there was no Day-of-the-Week Effect in the Sensex Returns. Thus, investors cannot earn abnormal returns by trading on a strategy based on past information.

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1. Introduction

The efficient market hypothesis (EMH) postulates that investors cannot make abnormal profits through market timimgs.Market is efficient and stock prices reflect all available information about their intrinsic value. However the opponents of efficient market theory assert that past price movements can be used to predict future price movements. There are number of empirical studies that contradict the efficient market hypothesis due to presence of certain anomalies such as calendar anomalies, fundamental anomalies and technical anomalies. Calendar anomalies say that securities do behave differently on a particular day-of-the-week, or month-of-the-year. Calendar anomalies called seasonal effects, which can be defined as, "the tendency of financial assets returns to display systematic patterns at certain times of the day, week, month or year" (Brooks, 2008, p. 454).The day-of-the-week effect has been supported by many empirical studies. The day-of-the-week effect indicates that returns are abnormally higher on some days of the week than on other days. There are studies whose results have documented that the average return on Friday is abnormally high, and the average return on Monday is abnormally low. Both developed and emerging stock-markets have evidenced day-of-the-week effect. It has challenged the EMH and has attracted the concern of many economists, market regulators, market practitioners and investors. Examination of this effect would be of great help for investor in their decision making regarding the market timings. This paper aims to investigate empirically the day-of-the-week effect on stock returns and volatility of the Indian stock markets.

Organization of the study

Section I is introductory in nature and introduces the topic. Section-II provides review of literature related to the subject under study. Section-III describes the methodology and data used for empirical analysis. Section-IV present empirical results and discussion of the study. Concluding remarks are given in section-V.

1.2. **Review of Literature**

There is an extensive literature on day of the week effect for the stock returns

	year	Day of the week effect	Market Studied	Results

		Present	Absent		
French	1980	✓		U.S.	He studied the S & P 500 index for the period of 1953-1977 and he supported Friday effect.His findings indicate that the mean returns on Friday is higher than the mean return on Monday.
Jaffe and Westerfield, 1985	1985	✓		U.K. Germany, France, Austria and the Netherlands	A significant negative mean return on Tuesday is reported for the U.K. Germany, France, Austria and the Netherlands.
Choudhry	2000	✓		India, Indonesia, Malaysia, Philippine, South Korea, Taiwan, and Thailand	Studied for seven emerging Asian stock markets that include India, Indonesia, Malaysia, Philippine, South Korea, Taiwan, and Thailand. The empirical findings proved a presence of the day-of-the-week effect on both returns and volatility.
Balaban et al.,	2001	✓		Germany and Austria	A negative Friday effect is abnormally identified for Germany and Austria
Berument and Kiymaz,	2001	✓			A daily seasonal anomaly is found in the Canadian stock market with a negative Monday and positive Friday effect.
Bhattacharya et al	2003	✓		India	Examined the day of the week effect in returns and its volatility in the Indian capital market and found significant positive returns on Monday.

Kiymaz and Berument, 2003	2003	✓		U.K., Germany, France, and Switzerland	A significant negative Monday effect is reported for the U.K., Germany, France, and Switzerland, and a significant positive Friday effect is observed in France.
Ajayi et al	2004	✓		Estonia, Lithuania, Russia and Slovenia	Found evidence of the day-of-the-week effect in four out of eleven stock markets that includes Estonia, Lithuania, Russia and Slovenia. They observed the significant negative Monday effect in Estonia and Lithuania while positive Monday and Friday effects in Russia and Slovenia, respectively.
Aly et al.	2004		✓	Egypt	Found no evidence of daily seasonality in the Egyptian stock market.
Gregoriou et al.	2004		✓	UK	Examined the stock returns of the UK stock market utilizing the FTSE 100 index. The empirical results provide evidence of the no day-of-the-week effect, suggesting that the UK stock market appears to be weak-form efficient.
Nath and Dalvi	2004	✓		India	Examined empirically the day of the week effect anomaly in the Indian equity market for the period from 1999 to 2003 using both high frequency and end of day data for

					the benchmark Indian equity market index S&P CNX NIFTY. The study found that before the introduction of rolling settlement, Monday and Friday were significant days. However, after the introduction of the rolling settlement, Friday has become significant.

3. Research Method

3.1. Purpose of the study

The main goal of this study was to analyze the BSE to determine whether Day of the week anomalies exist. In other words, the study has tested Efficient Market Hypothesis to ascertain whether the Indian market was weak form efficient.

3.2. Daily Returns

The data used in this research consist of daily index returns using values for the BSE Index, from April, 2007 to March, 2017.Trading period between Monday to Friday is considered. The daily returns Rt computed from BSE 30 Index as follows.

$$R_t = In\left(\frac{P_t}{P_{t-1}}\right)$$

Where:

Rt = return on day't'

Pt = Closing Price on day't'

P t-1 = Closing Price on day't-1'

ln = natural log of underlying market series.

3.3. The Regression Model:

To investigate the Day-of-the-Week Effect we estimate the following regression equation. Following dummy variable regression model has been used to investigate the day of the week effect:

$Rt = \alpha + \beta1\ M + \beta2\ T + \beta3\ W + \beta4Th + \beta5\ F + \acute{\epsilon}\ t$

Where Rt is the daily returns.M, T, W, Th and F are dummy variables for Monday, Tuesday, Wednesday, Thursday, and Friday respectively. β1, β2, β3, β4 and β5 are restrictive coefficients. $\acute{\epsilon}\ t$ = error term.

If it is a Monday, then M=1 and "0" for all other days, if T is a Tuesday then T = 1 and "0" for all other days and so forth $\acute{\epsilon}$ is a random term. β1- β5 are co-efficient to be estimated using Ordinary Least Square. Also it is important to select Constant is Zero checkbox. Since the study has 5 explanatory variables adding a constant will over-specify the regression equation and the study will have erroneous results.

4. Results

Table I Descriptive Statistics

	Monday	**Tuesday**	**Wednesday**	**Thursday**	**Friday**	**Total**
Mean	0.000454	-8E-05	0.000634	0.00021	0.000263	0.001481
Standard Error	0.000572	0.000553	0.000482	0.000559	0.00059	0.002756
Median	0.000683	0.000167	0.000258	0.000977	-0.00018	0.001907
Standard Deviation	0.010678	0.010338	0.008912	0.010318	0.010808	0.051054
Sample Variance	0.000114	0.000107	7.94E-05	0.000106	0.000117	0.000524
Kurtosis	3.150732	1.35289	0.841519	1.01007	0.471651	6.826862
Skewness	-0.4604	-0.07858	0.294037	-0.31697	0.031482	-0.53043
Range	0.096378	0.072138	0.061143	0.075843	0.071912	0.377414
Minimum	-0.0612	-0.0351	-0.02808	-0.04213	-0.04054	-0.20705
Maximum	0.035181	0.037035	0.033064	0.033714	0.031374	0.170368
Sum	0.157982	-0.02783	0.216746	0.071691	0.088334	0.506921
Count	348	349	342	341	336	1716

By descriptive statistics we note that mean return of Wednesday is higher when compared to the rest of the week. The mean return on Wednesday is 0.000634followed by Monday at 0.000454and Friday 0.000263. The study also found that the highest value of standard deviation was recorded on Monday (0.016375) followed by Friday (0.015588) and the least value of standard deviation were recorded on Thursday (0.013612). However, for the entire week it stood (0.051054).This indicates that the Indian stock market was more volatile on Friday and Monday and least volatile on Wednesday during the study period.

Table II: Fitness of the Model

Regression Statistics	
Multiple R	0.037852866
R Square	0.001432839
Adjusted R Square	-0.00148097
Standard Error	0.010224747
Observations	1719

As the Table No. II depicts, there is very little support for the model. R-square value of (0. 0.001432839) represents a no support for the model indicating that only 0.037% of the information of dependent variable is predicted by the model, and F-Statistic indicates that the overall fit of the model was poor.

Table: III ANOVA Results

ANOVA					
	df	SS	MS	F	Significance F
Regression	5	0.00025712	5.14E-05	0.491882	0.782537023
Residual	1714	0.17919091	0.000105		
Total	1719	0.17944803			

F test has been conducted to check the fitness of the model. The results show that there is no Day-of-the-Week effect in Bombay Stock market. ANOVA suggest that model with F value (0.491882) does not support any significance (0.782537023).

Table IV: OLS Equation Coefficients

	Coefficients	Standard Error	t Stat	P-value
Monday	0.000453971	0.000548104	0.828257	0.40764
Tuesday	-7.97489E-05	0.000547318	-0.14571	0.884169
Wednesday	0.000643972	0.000552084	1.166438	0.2436
Thursday	0.000210239	0.000553701	0.379697	0.704217
Friday	0.000276639	0.000556153	0.497416	0.61896

Standard error measures the variability in approximation of the coefficient and lower standard error means coefficient is closer to the true value of the coefficient. It is clear from the above Table No. IV, that only one variable (Tuesday) recorded negative Coefficient Value for and other variables (Monday, Wednesday, Thursday and Friday) recorded Positive Coefficient Value during the study period. But none of the coefficients (days of the week) were statistically significant at conventional level of significance (5%) indicating that there was no Day-of-the-Week Effect in the Sensex Returns. We can see that according to the p-value there is indeed a statistically insignificant seasonality in the implied volatility for all the days of the week under study.

Conclusion

The study has tested the presence of day of the week effect in Indian stock market volatility in addition to returns during the April, 2010 and March, 2017 periods by using the BSE SENSEX. OLS model has been employed. The findings based on this model indicate that day of the week effect is not present in the return equation. The highest return is observed on Wednesday, while the lowest return is observed on Tuesday. But none of the coefficients (days of the week) were statistically significant at conventional level of significance (5%) indicating that there was no Day-of-the-Week Effect in the Sensex Returns.

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