

# “Day of the Week Effect” Anomaly and Efficiency: A Recent Study on Indian Stock Market

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**Abstract – This paper attempts to investigate the “Day of the week effect” anomaly in Indian stock market. As the stock market is more efficient, the chances of occurring different market anomalies would be less. So it is also tried out to check at least the weak form of efficiency of Indian stock market. NSE Nifty is a leading market performance indicator, so daily closing value of Nifty is collected between the year 2009 and 2018. Under different parametric tests, it is found that “Day of the week effect” anomaly is not found in Indian stock market and the market shows the Weak form of Efficiency. This result is opposite to the previous findings in respect to Indian market.**

**Keywords: Day-of-the-week effect, EMH, NSE**

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## INTRODUCTION

We see a continuous momentarily variation in stock prices or Indices (e.g. Nifty, Sensex) of a stock market in both the directions. It is very difficult to anticipate the direction for very short period of time or its value at an instance of time. Even it is difficult to estimate for long time horizon. But with the help of extensive research on historical data we can somehow find the trend and maturity value of Index up to some extent. This tendency of stock market makes it highly volatile and risky for investment purpose. Stock Market Efficiency and market Anomaly have been two major things which have been a matter of concern for investor as well as for researcher. A better understanding of both makes safe for stakeholder to take correct decision and parking of capital in more efficient manner. The term “Efficient Market Hypothesis (EMH)” has been widely used in stock market and extensive researches have been carried out in both developed and emerging market. In contrary of this, stock market anomaly has also been observed in different forms.

## EFFICIENT MARKET HYPOTHESIS (EMH)

A market theory proposed by Eugene Fama in 1960. His theory states that it is impossible to beat the stock market because at any point of time security prices reflect all available information in the market. Stocks are traded at their fair value. It is impossible to trade in under or overvalued securities. Investor can earn abnormal return only by way of speculation

through investment in riskier securities. There are three type of EMH which are as follows:

The weak form of EMH assumes that current stock price fully reflect all security related information. Historical price data has no bearing on the future movement of stock price and hence therefore it is impossible to earn excess return with the help of technical analysis.

The semi-strong form of EMH assumes that current stock prices adjust rapidly to the release of all new public information. Security price incorporates both public and private available market information. Excess returns cannot be achieved using fundamental analysis.

The strong form of EMH assumes that current stock prices fully reflect all public and private information. Public, private and inside market related information, all are reflected in the stock price and no one has significant access to relevant market information. Thus in a perfect market it is impossible to earn excess return consistently over a period of time.

Thus we can see that there is little possibility to earn excess return in inefficient market but not in efficient one on the basis of available information. One can beat the market even in efficient market only on the basis of his skill or by chance.

Now if we talk about the stock market anomaly, so it can be defined as distortion in the pattern of price

or return in financial market that seems to contradict the efficient market hypothesis. The market anomaly may be related to lack of market transparency, regulatory action, behavioral biasness by traders and agents or calendar effect such as January effect or day of the week effect.

Several researches have been carried out on different market anomalies in which Calendar anomaly has been studied for past two decades. “The day of the week effect” has been studied extensively in developed and emerging market.

**The day of the week effect** refers that average return on an Index on a particular day of the week shows a particular pattern. Studies have shown that distribution of stock returns varies according to the day of the week (Cross 1973, French 1980; Kin and Stambaugh 1984; Rogalski 1984; Aggarwal and Riyoli 1989)

The focus of our research is to test the Weak form of Market Efficiency of Indian stock market and study on “The day of the week effect”.

## LITERATURE REVIEW

The day of the week effect has been extensively investigated in different stock markets. Several studies showed that the distributions of stock returns differ with days of the week (Cross 1973; Lakonishok and Levi 1982; Keim and Stambaugh 1984; Rogalski 1984; Harris 1986). They documented that The last trading day i.e. Friday is characterized by substantial positive returns. Most of the studies carried out in USA stock market. Similar Day-of-the-week effect also found in Canadian stock market (Jaffe and Westerfield 1985; Dubois and Louvet 1996; Kiyamaz and Berument 2003). In other developed stock markets like France, Germany and UK Austria and Netherland. It is found that average negative return on Monday and average positive return on Friday (Condoyanmi *et al* 1987; Jaffe, Jeffrey F, Westerfield and Ma 1989; Kiyamaz and Berument 2003). In Contrary to US and Canadian stock market, lowest mean return is found on Tuesday in Japanese and Australian stock market (Dubios and Louvet 1996;) Italy stock market showed the same anomaly with lowest mean return on Friday (Barone 1990). The Day-of –the-week effect also shown in other international stock market ( Solnik and Bousquet 1990; Barone 1990; Balaban 1995 and Agarwal and Tandon 1994). In Taiwan stock market, the mean negative return found Tuesday and Wednesday for two different periods (Choudhary 2000, Brooks and Persand 2001). South korea market showed no strong evidence of seasonal anomaly. In china, positive mean return found on Thursday and Friday (Mookerjee and Yu 1999). India showed positive return on Friday (Choudhary 2000). Similar result found in most of the Asian markets like Thailand, Indonesia, Malaysia etc. (Choudhary 2000; Kamnath 2002; Lian and Chen 2004).

The efficiency of stock markets has been tested for different developed and developing countries. There are mixed results on empirical studies. Broges, M (2010) has done detailed empirical study on European Stock Market. He took UK, Germany, France, Spain, Greece and Portugal for his study for the period of 1993 to 2007. His finding revealed that only Germany and Spain stock market are weak form of efficient market and rest of the markets are inefficient market. For the period of 1995 to 2000, three most developed countries- Czech, Hungary and Poland showed weak form of efficient market (Gilmore and McManus; 2003). Two major Chinese stock markets Shanghai and Shenzhen were tested for the period of 1992-2005 and result showed that both the markets are not the weak form of efficient (Chung; 2006). Dhaka Stock market showed the weak form of market efficiency (Mollik and Bepari; 2009). Gupta and P. Basu (2007) did his empirical research on both of the Indian Stock Markets NSE and BSE for the period of 1991 to 2006 and revealed that both of the markets do not show the weak form of market efficiency.

## DATA AND METHODOLOGY USED

To proceed with this research, daily closing value of CNX Nifty from year April 2009 to Mar 2018 is made available from the official website: [www.nseindia.com](http://www.nseindia.com). Further this data is segregated day wise i.e.; Monday to Friday. To find the daily return on Nifty, following formula is used:

$$R_t = \log (I_t / I_{t-1}) \times 100$$

Where  $R_t$  is the daily percentage return on CNX Nifty on day  $t$ ,  $I_t$  and  $I_{t-1}$  are closing values of the stock index on days  $t$  and  $t-1$  respectively. So in this way, we have returns on CNX Nifty for each Monday, Tuesday, Wednesday, Thursday and Friday from April 2009 to Mar 2018 separately.

To proceed further, first we check that how data would be treated either through Parametric or Non parametric test. Once, it is confirmed then we use different tools under that test to achieve our objective.

## FINDING & ANALYSIS

### Applicability of Parametric or Non Parametric test

To check the applicability of either Parametric or Non parametric test, we first check the validity of its assumptions. For parametric test, two most important assumptions are: (i) Data should be normality distributed and (ii) equal variances of populations from which samples are drawn.

To check the normality, the hypothesis is as follows:

**Ho:** The distribution of returns for each day is normality distributed.

**H1:** The distribution of returns for each day is not normality distributed.

Now we find the Kolmogorov-Smirnov statistic at 95% confidence level whose result as follows:

**Tests of Normality**

	Kolmogorov-Smirnov <sup>a</sup>			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Monday	.124	429	.000	.868	429	.000
Tuesday	.077	429	.000	.939	429	.000
Wednesday	.078	429	.000	.964	429	.000
Thursday	.069	429	.000	.964	429	.000
Friday	.068	429	.000	.921	429	.000

a. Lilliefors Significance Correction

As we are seeing that P value is almost ZERO for each day, so our null hypothesis is rejected and hence the returns for each day are not normally distributed.

As data do not follows the first assumption of parametric test so there is no need to go for validity check of other assumptions and we can conclude that data would be processed under non parametric test.

**Descriptive Statistics:**

To take an overview of data, we find the different descriptive statistics as per the given table. Here we can see range of returns is highest for Monday with lowest positive return and highest variance. While the mean return on Thursday is lowest and negative with lowest variance. But this information is not sufficient for making any conclusion. We proceed with further analysis

**Descriptive Statistics**

	N	Range	Minimum	Maximum	Mean	Std. Deviation	Variance
Monday	453	29.388177	-13.053862	16.334315	.00369479	1.997492811	3.990
Tuesday	446	14.858737	-6.889645	7.969092	.10092527	1.531607369	2.346
Wednesday	444	12.402197	-6.380205	6.021992	.09797565	1.537443591	2.364
Thursday	429	12.394698	-7.013124	5.381575	-.00903032	1.482550152	2.198
Friday	457	19.771612	-13.014185	6.757427	.05244733	1.760128264	3.098

**Correlation among returns:**

To check correlation among the returns on each day, we find the Spearman's correlation coefficients which tell us that how return on a day is affected by the return on other day. As from the table we can see that correlation coefficient between Monday-

Thursday and Tuesday-Thursday is positive. The correlation coefficient between Tuesday-Friday is highest (-ve sign) with very low significance and lowest between Monday-Friday (-ve sign) with very high significance.

		Tuesday	Wednesday	Thursday	Friday
Monday	Correlation Coefficient	-0.079	-0.042	0.057	-0.007
	Significant (2 tailed)	0.097	0.378	0.243	0.879
Tuesday	Correlation Coefficient		-0.021	0.054	-0.099
	Significant (2 tailed)		0.659	0.268	0.037
Wednesday	Correlation Coefficient			-0.063	-0.027
	Significant (2 tailed)			0.194	0.567
Thursday	Correlation Coefficient				-0.019
	Significant (2 tailed)				0.688

**Checking of Equality of Variance:**

As in Parametric test there is no direct way to check the equality of variances of more than two populations. So in that situation we use the Non parametric Leven's test. Our hypothesis is as follows:

**Ho:** Variances of returns of each day are equal

**H1:** Variances of returns of each day are not equal

The table shows the result as follows. Here we can see the F statistics for equality of variances among each day's return is significant with value of 0.548(P>0.05). Our null hypothesis would be accepted and we can conclude that variances of returns of each day are equal.

**ANOVA**

difference

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	12703.057	4	3175.764	.764	.548
Within Groups	9241693.187	2224	4155.438		
Total	9254396.245	2228			

**To check the equality of medians:**

As we have more than two related variables (return on each day), we would use Friedman's test in alternative of repeated measures ANOVA in parametric test. Our hypothesis would be as follows:

**Ho:** There is no significant difference among returns of each day

**H1:** There is significant difference among the returns of each day

As per the result shown in given table we can see that the Chi-Square statistics is 0.539 with

asymptotic significance level of 0.970 ( $p > 0.05$ ). Hence we accept the null hypothesis and conclude that there is no significant difference among the returns on each day.

	Mean Rank
Monday	2.97
Tuesday	3.04
Wednesday	2.98
Thursday	3.01
Friday	3.00

N	429
Chi-Square	.539
df	4
Asymp. Sig.	.970

a. Friedman Test

**Serial dependence:**

For investigating the randomness in shares price movement Wald-Wolfowitz Runs Test is used. For a given sequence of observations, run test examines the dependence of consecutive observations and tells whether one observation influences the values taken by later observations. The total number of runs with a level of significance shows whether the observations are random or not. Here our hypothesis would be as follows:

**Ho:** Returns of a particular day is random.

**H1:** Returns for a particular day is not random

The result of Run test is shown in the given table. Here we can see that there are sufficient number of runs for each of the day with sufficient level of significance ( $p > 0.05$ ). Hence we accept the null hypothesis and conclude that returns for a particular day is random i.e. returns on either Monday or Thursday is independent from other returns on the same day. Here the cut point is taken as median because for non parametric test, median is best estimate for central tendency.

	Monday	Tuesday	Wednesday	Thursday	Friday
Test Value <sup>a</sup>	.088621	.122671	.114395	.139359	.062446
Cases < Test Value	226	223	222	214	228
Cases >= Test Value	227	223	222	215	229
Total Cases	453	446	444	429	457
Number of Runs	246	208	239	214	224
Z	1.740	-1.517	1.520	-.145	-.515
Asymp. Sig. (2-tailed)	.082	.129	.128	.885	.607

a. Median

**Serial Correlation Coefficients Test:**

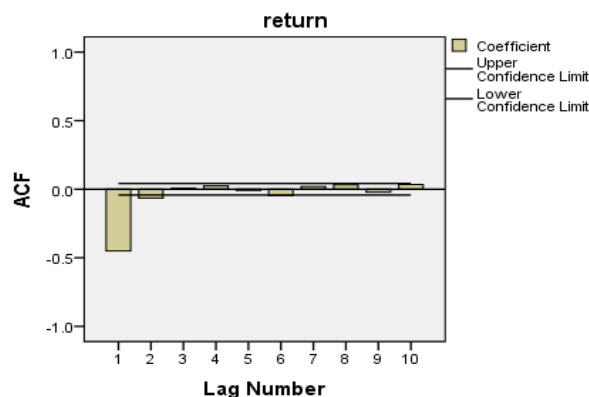
This test is widely used for testing the weak form of Efficient Market Hypothesis (EMH) in stock market. The Serial Correlation Coefficient measures the relationship between the values of a random variable

at time t and its value in the previous period at time t-k, where k is the time lag. Auto correlation is a reliable measure for testing the dependence or independence of random variable in time series data. Our hypothesis would be as follows:

**Ho:** There is no first order correlation present in series i.e. weak form of EMH exists.

**H1:** There is first order correlation exist in series i.e. weak form of EMH does not exist.

Here data are not segregated day wise. It is taken as it is available in continuity with time. Now from figure we can see that auto correlation coefficients exist in the 1<sup>st</sup> lag, 2<sup>nd</sup> lag and 6<sup>th</sup> lag which suggest the serial dependence among returns. Therefore we reject the Null Hypothesis and conclude that weak form of EMH does exist in Indian stock market.



**CONCLUSION:**

After testing the data set of daily return on CNX Nifty with several statistical tools, we can say that the average return or pattern of distribution of returns over all five week days are same as well as their variances of returns for all days are same. As far as correlation of returns among any two days is concerned, we get no strong evidence. So day of the week effect is not observed in Indian stock market. Analyses also suggest that Indian stock market is not even weakly efficient which requires several corrective measures by regulatory body and government to make it strongly efficient. Although Week of the Day Effect not observed but several other anomaly may exist which may cause the Indian stock market inefficient in even weak form.

**REFERENCES:**

Lakonishok, Josef and Maurice Levi (1982). "Weekend Effects on Stock Returns: A Note", Journal of Finance.

Hassan Aly, Seyed Mehdi and Mark J. Perry (1999). "An Analysis of Monday Effect: Evidence from International Stock

Markets”, Journal of Business Finance and Accounting.

Hassan Aly, Seyed Mehdi and Mark J. Perry (2004). “An Analysis of Day-of-the-week-effect in the Egyptian Stock Market”, International journal of Business.

Jaffe, Jeffrey F, Randolph Westerfield and Christopher Ma, (1989). “A Twist on the Monday Effect in Stock Prices: Evidence from the U.S. and Foreign Stock Markets”, Journal of Banking and Finance.

Dubois and P. Louvet (1996). “The-Day-of-the-Week-Effect: The International Evidence”, journal of Banking and Finance.

French, Kenneth R. (1980). “Stock returns and the Weekend Effect”, Journal of Financial Economics.

Hakan, Berument and Halil Kiyimaz (2001). “The Day of the Week Effect on Stock market Volatility”, Journal of Economics and Finance.

Balaban, Ercan (1995). “Day of the Week Effects: New Evidence from an Emerging Stock Market”, Applied Economics Letters, 2.

Truong Dong Loc (2012). “Day-of-the week effect on stock returns and volatility: The case of Ho Chi Minh Stock Exchange, Vietnam”, Asian Journal of Management Research, Volume 2 Issue 1.

Choudhry, Taufiq (2000). “Day of the Week Effect in Emerging Asian Stock Markets: Evidence from the GARCH Model”, Applied Financial Economics.

Mookerjee, Rajen and Qiao Yu (1999). “An Empirical Analysis of the Equity Markets in China”, Review of Financial Economics.

Sunil Poshakwale (1996). “Evidence on Weak form Efficiency and Day of the Week Effect in the Indian Stock Market” Finance India, Vol. X No.3.

Brogos M. (2010). “Efficient Market Hypothesis in European Stock Markets”, European Journal of Finance.

Mollik and Bepari (2009). “Weak form of Market Efficiency of Dhaka Stock Exchange”, Social Science research Network.

Gupta and P. Basu (2007). “Weak Form Efficiency in Indian Stock Markets”, International Business and Economics research Journal.

Chung (2006). “Testing Weak Form Efficiency of the Chinese Stock Market”, Working Paper, Lappeenranta University of Technology, Department of Business Administration.

Fama, E. (1970). “Efficient Capital Markets: A Review of Theory and Empirical Work”, The Journal of Finance.

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