

DAY OF WEEK EFFECT: EVIDENCES FROM INDIAN STOCK MARKET

Dr. Sanjeet Sharma

Assistant Professor, Department of Commerce,
Govt. College Haripur(Guler), Distt.Kangra, ,
Himachal Pradesh, India.

ABSTRACT

This study has been undertaken to examine whether day of week effect exist in Indian Stock Market or not. To analyses whether anomalies exist in India the data has been collected for the period form January 2008 to December 2009 for two indices: Sensex and Nifty. The results of this study show that the day of the week effect do not exist in the Indian Stock Market and this market can be considered as informationally efficient. Monday Effect and Friday Effect are also found insignificant while comparing Friday and Monday returns with other days mean returns. The above indicates that the Indian Stock Markets efficient now a days in years 2008 and 2009. The study suggest to investors that the non existence of anomalies may not provide opportunities to formulate profitable trading strategies so as to earn the abnormal return and can adopt a fair return for risk strategy.

Keywords: Day of Week effects, Monday Effect, Stock Market efficiency, Friday Effect, Efficient Market Hypothesis.

Introduction:

In an era of scarcity of capital, the stock markets are vital economic institutions in developing countries since they facilitate the transfer of private savings in to business investment and provide the much needed liquidity to investors. It is important to understand the concept Stock market efficiency to understand the working of the capital market.

Market efficiency implies that stock prices reflect all available information so that prices are near their intrinsic value. The theory of efficient market describes efficiency in three forms. These are weak form, the semi strong form and the strong form. The weak form of efficient Market hypothesis (EMH) (Which is used synonymously with random walk theory) holds that prices have no memory and yesterday has nothing to do with tomorrow and in efficient market information is freely available.

Hence in efficient market the prices reflect the effects of both the information pertaining to the events occurred in the past as well as those which are expected to occur in the near future based on the information estimates. In an efficient market the stock prices must be independent of the day, week, month and other calendar dummies. When a market suffers from day of week effect anomaly, then the returns in that market follow a pattern and these returns are not independent of the day of week. Further, day of week effect shows evidence against random walk theory.

The paper is organized as Section II reviews the literature, in section III the research methodology employed is presented. In section IV the key results from the empirical investigation are reported, and in section V conclusions are drawn.

Literature Review:

The day of the week effect is one of the widely reported calendar anomalies. Many studies have been carried out to examine the day of week effect. French (1980) in his paper attempted to test weekend effect on stock returns. The findings of the study revealed that there was a tendency for returns to be negative on Mondays whereas they were positive on other days of the week. Lakonidhok and Levi (1982) argued for investor's willingness to pay a higher price for stock on Friday as this give them more calendar days for payment. Keim and Stambaugh (1984) claimed that the Monday can be partially attributed to positive errors on Friday.

Jaffe and Westerfield (1985) identified week day effects on the UK, Japanese, Canadian and Australian markets. Abraham and Ikenberry (1994) attempted to explain the positive autocorrelations between Friday and Monday returns on the basis of individual investor's behaviour. The results of the study have shown that the price trend of Friday gets repeated on Monday.

Anup Agarwal and Koishore Tandon (1994) in their study of 18 countries stock returns found evidence for significant positive return on Friday in all countries except Luxembourg, also found highest stock return variance on Mondays and lowest on Fridays which was again documented due to market falling down in the previous week. Aydogan (1994) in study of day-of-the-week effecting Turkish Stock Market concluded that highest and lowest average returns were on Fridays and Thursdays, respectively along with the highest standard deviation on Monday and lowest volatility was observed on Thursday. Further, Dubois and Louvet (1996) had shown in their study that Monday effect existed in nine developed markets. Sunil Poshakwale (1996) in their study provided evidence of day of the week effect and that the stock market is not weak form efficient

Deepak Chawla and Munish Makkad (2000) attempted to test the weak form of efficiency in India. Serial correlation and run tests were conducted on price changes and log price changes to test the random walk hypothesis. The results indicated a tilt in favour of weak form efficiency in the Indian stock market. Nath and Dalvi (2005) examined the day of the week effect anomaly during 1999 to 2003 for Nifty. They found that market inefficiency exists. Tong (2000) found in his study that stock market anomaly existed in twenty three stock markets. These stock markets included European, Asian and North American markets.

K. Mittal and Sonal Jain (2009) examined three types of anomalies namely Monday Effect, Friday effect and day of the week effect. The findings of the study brought out that none of the above anomalies exist in the Indian stock market. Further, results of serial correlation and runs tests also supported the Random Walk Theory and market efficiency hypothesis

It has been revealed from review of literature that there have been so far very few formal attempts to test the day of the week effects on the Indian stock market. Against this backdrop in the present paper attempted to test the presence of day of the week effects in the Indian stock market.

Research Methodology:

Objective and Scope of Study:

All anomalies and seasonality in stock market add impurities in efficiency; and add tension to the regulators of the market. For developing economies the problem aggravates more. This paper investigates three types of anomalies namely, Monday Effect, Friday Effect and Days of Week Effect in the Indian Stock Market represented by two independent indices namely Sensex and Nifty which represents a true picture of the Indian Stock market performance. In the present study closing market price data of two indices viz. Sensex and Nifty from 01-01-2008 to 31-12-2009 has been taken. Further, in this study daily returns are computed as the first differences of the natural logarithm in order to avoid the influences of extreme index

values. The data for a two year period is further divided into Mondays, Fridays and remaining other working days of the week for examining to of week effect. The daily closing prices of both the indices have been collected from the websites of National Stock Exchanges of India Ltd. (NSE) and Bombay Stock Exchange (BSE). Further, the scope of the study is limited as number of observations is limited as it considers data for two years.

Methodology:

Unit Root Tests:

If y_t is a random walk, then Δy_t must be stationary. A data series is called stationary if its mean and variance of series are non-changing over time. The correlation between a series and its lagged values are assumed to depend only on the length of the lag and not when the series started. A series observing these properties is called a stationary time series. It is also referred to as a series that is integrated of order zero or as $I(0)$. The unit root test checks whether a series is stationary or not. Augmented Dickey-Fuller (ADF) has been used to test Stationary condition. The ADF approach controls for higher-order correlation by adding lagged difference terms of the dependent variable to the right-hand side of the regression.

$$\Delta y_t = \alpha_0 + \beta_0 t + \lambda y_{t-1} + \sum_{i=1}^p \gamma_i \Delta y_{t-i} + \mu_1$$

To test for stationary, the null hypothesis is: $H_0: \lambda = 0$
And alternative hypothesis is: $H_1: \lambda < 0$

Run test:

Test is another to test and detect statistical dependencies (randomness) which may not be detected by the autocorrects test. The null hypothesis of the test is that the observed series us random variable. The number of runs is computed as a sequence of the price changes of the same sign (such as; + +,-, 00). When the expected number of runs is significantly different from the observed number of runs, the test rejects the null hypothesis.

Under the null hypothesis that successive outcomes are independent, and assuming that $N_1 > 10$ and $N_2 > 10$. the number of runs is asymptotically normally distributed with

$$\text{Mean: } E(R) = \frac{2N_1N_2}{N} + 1$$

$$\text{Variance: } = \frac{2N_1N_2(2N_1N_2-N)}{(N)^2(N-1)}$$

- Where N = total number of observations
- N1 = number of + symbols
- N2 = number of - symbols
- R2 = number of runs

The run test converts the total number of runs into a Z statistic. For large samples the Z statistic gives the

probability of difference between the actual and expected number of runs. If the Z value is greater than or equal to $+_{-}1.96$, the null hypothesis is rejected at 5 percent level of significance.

Kolmogorov-Smirnov (K-S) Test:

The K-S test was originally proposed in the 1930s. K-S is one of the best known and most widely used goodness-of-fit tests. It is based on the empirical distribution function and converges uniformly to the population cumulative distribution function with probability measure one. The one sample K-S test procedure compares the observed cumulative distribution function for a variable with a specified the oretical distribution which may be normal, uniform, Poisson. Or exponential. The K-S Z is computed form the largest difference (In absolute value) between the observed and theoretical cumulative distribution functions.

T-test and ANOVA:

In order to analyze the Monday Effect, the return of the Monday has been compared with the average return of rest of the days. Similarly, in Friday Effect, return of the Friday has been compared with the return of the rest of the days. The significance of the differences between average returns are verified with the help of T-test. Further, in order to measure the significant difference between days of the week returns one-way ANOVA (Analysis of Variance) technique has been used.

The Regression Models:

The dummy variable regression model has been used to analyze the effect of the day-of-the-week on stock market return. Five dummies were constructed with values '1' and '0' to represent five trading days of week. In order to test the existence of statistically significant difference among index returns on different days of the week the following regression is carried out for the period 2008-2009

$R_t = B1D_M + B2D_T + B3D_W + B4D_{TH} + B5D_F + ut$
 Where $D_M = 1$ if day is a Monday and 0 otherwise; $D_T = 1$ if day is a Tuesday and 0 otherwise; and so on. The OLS coefficients B1 to B5 are the mean returns for Monday to Friday, respectively. The stochastic disturbance term is indicated by ut.

The hypothesis to be tested for any presence of weekday effects is as follows:

$$B1 = B2 = B3 = B4 = B5$$

Empirical Results:

The empirical results are presented as below.

Unit Root Test:

First of all, an attempt has been made to verify the stationary nature of the time series under study. For an empirical test of the above, Augmented Dickey-Fuller (ADF) test is applied with null hypothesis as there is unit root in the series and alternate hypothesis as there is no

unit root and the series in stationary. The ADF test results prove that both the stock market indices are non stationary at the logs of prices. However, it is observed that the hypothesis of unit root test based on returns computed using first difference of logs of prices is rejected. So it can be said that all the variables contain a unit root, that is, non-stationary in their level forms, but stationary in their first differenced forms.

Table 1: The ADF tests for Unit Roots

Variable	Level	
	With Constant	With Constant and Trend
BSE-Sensex		
Closing Price Series	-1.9530	-1.7327
Return Series	-15.556*	-15.7169*
NSE-Nifty		
Closing Price Series	-1.9976	-1.7573
Return Series	-15.4475*	-15.6169*

* Significant at 1 percent level of significance

** Significant at 5 percent level of significance

Descriptive Statistics:

Table 2 shows the computed values of mean daily returns and daily volatilities from Monday to Friday for Sensex. Table 3 gives the corresponding statistics for Nifty. From Tables 2 and 3, it is seen that average daily return is the lowest on Thursday for both the indices. For Sensex, highest average return occurred on Monday and, for Nifty, on Wednesday. In case of Nifty, the returns are negative on Monday and Tuesday. The standard deviation, i.e. risk or volatility, is the highest on Monday for both the indices. The Kolmogorov-Smirnov (K-S) statistic for testing normality is insignificant indicating that the distributions of the returns for each of the weekdays are normal. Further the results of Run test also show that the returns series of both the indices accepts the hypotheses of randomness for each of the weekdays.

Monday Effect in stock market shows that the return of Monday is significantly different form the return of other days. Further, it is found that return of Monday is usually negative. It is against this background, in this study the return of the Monday is compared with the returns of the rest of the days in order to examine whether this type of anomaly exists in the Indian stock markets. The results obtained in this regard are shown in Table 2 and 3. The results indicate that in the Indian Stock Markets average return on Monday is not significantly different from the returns of the rest of the days.

Friday Effect:

Friday Effect shows that Friday is the last trading day of the week and most of the results of the companies are made public on this day, it brings enthusiasm in the market resulting in a bulk buying by the investors. To analyze the

Table 2: Descriptive Statistics (sensex)

	Monday	Tuesday	Wednesday	Thursday	Friday	All days
Mean	0.0006	0.0001	0.0006	-0.0019	0.0021	-0.0003
Minimum	-0.08	-0.07	-0.08	-0.05	-0.12	-0.12
Maximum	0.16	0.06	0.06	0.05	0.08	0.16
Std. Deviation	0.03637	0.02149	0.02333	0.02149	0.02852	0.02567
Skewness	1.583	-0.139	-0.118	0.488	-0.793	0.276
Kurtosis	6.293	1.117	0.928	0.485	2.908	3.876
Run statistic (Z)	2.145	-1.393	1.276	-.504	-.104	-.591
Sig. (2-tailed)	.032	.164	.202	.614	.917	.555
K-S statistic	1.246	.832	.778	1.174	.786	1.104
Sig. (2-tailed)	.090	.493	.580	.127	.568	.174
Monday effect (t-test)	-	0.183	0.116	0.66	-0.356	0.622
P-Value	-	0.855	0.908	0.511	0.722	0.535
Friday effect (t-test)	0.356	0.459	0.664	0.967	0.962	-
P-Value	0.722	0.648	0.509	0.336	0.339	-

Table 3: Descriptive Statistics (Nifty)

	Monday	Tuesday	Wednesday	Thursday	Friday	All days
Mean	-0.0007	-0.0008	0.0012	-0.0013	0.0003	-0.0003
Minimum	-0.09	-0.07	-0.06	-0.05	-0.13	-0.13
Maximum	0.16	0.06	0.06	0.05	0.07	0.16
Std. Deviation	0.03181	0.021	0.02257	0.02097	0.02788	0.02522
Skewness	1.08	-0.167	-0.063	0.332	-1.077	0.183
Kurtosis	6.585	1.583	0.679	0.471	4.788	4.985
Run statistic (Z)	2.325	-1.484	1.276	-.713	1.161	.500
Sig. (2-tailed)	.020	.138	.202	.476	.246	.617
K-S statistic	1.108	.934	.854	1.000	.635	1.167
Sig. (2-tailed)	.171	.347	.459	.270	.815	.131
Monday effect (t-test)	-	0.06	-0.446	0.183	-0.34	0.406
P-Value	-	0.952	0.657	0.855	0.735	0.685
Friday effect (t-test)	0.34	0.231	-0.026	0.481	0.567	-
P-Value	0.735	0.818	0.979	0.631	0.572	-

Table 4: ANOVA: Analysis of Variance

	F	P-value
BSE-Sensex	0.284433	0.888079
NSE-Nifty	0.157822	0.959423

Friday Effect, the return of the Friday has been compared with the return of the rest days (Tables-3 and 4). The results has revealed that in India, for the period 2008-09, the Friday returns are positive and the difference between the returns is found statistically insignificant. These findings are in the sharp contrast with existing studies which has revealed that mean return on Friday is higher compared to other days Gibbons and Hess (1981).

ANOVA:

The anomalies on stock market returns in the context of capital market efficiency, includes different returns on different working days of the week. Here with the help of ANOVA, effort is being made to identify such difference for different week days for years 2008 and 2009 for selected two indices i.e. BSE -30 and Nifty-50. By seeing the value of F-test it is concluded that the difference between the returns of week days is insignificant. These

finding supports the view point that Indian stock market is efficient in nature.

Testing of the day of weak effects (BSE): Multiple Regression Analysis:

The dummy variable regression model has been used to analyze the effect of the day-of-the-week on stock market return. Five dummies were constructed with values '1' and '0' to represent five trading days of week. The results of regressions with dummy variables are presented below in Table 3. It is clear from the table that for the whole period, the coefficients for the five trading days are jointly statistically equal to zero showing no clear evidences on a day of the week effect. Further, these results also indicate that day of the week effect do not exist in both the Indian stock markets (NSE and BSE). The results are in sharp contrasts with the findings of Gibbons and Hess (1981),

Table 5: Testing of the day of weak effects (BSE): Multiple Regression Analysis

Model	Un standardized Coefficients		Standardized Coefficients	t	Sig.	R	R ²	Ad. R ²	F
	B	Std. Error	Beta						
(Constant)	-.006	.012		-.563	.574	.063 ^a	.004	-.006	378
DummyM	.006	.012	.086	.470	.639				
DummyT	.006	.012	.094	.513	.608				
DummyW	.008	.012	.124	.660	.510				
DummyTh	.004	.012	.059	.323	.747				
DummyF	.008	.012	.120	.658	.511				

Table 6: Testing of the day of weak effects (NSE): Multiple Regression Analysis

Model	Un standardized Coefficients		Standardized Coefficients	t	Sig.	R	R ²	Ad. R ²	F
	B	Std. Error	Beta						
(Constant)	-.006	.011		-.487	.626	.063 ^a	.004	-.006	.384
DummyM	.004	.012	.067	.367	.714				
DummyT	.005	.012	.082	.444	.657				
DummyW	.007	.012	.108	.575	.566				
DummyTh	.003	.012	.045	.249	.803				
DummyF	.007	.012	.110	.601	.548				

where the significant day of the weeks effects were noted on the US and UK markets respectively.

Conclusion:

Stock market efficiency is an important concept, in terms of understanding of the working of the capital market. This study has been undertaken to examine whether day of week effect exist in Indian Stock Market or not. To analyses whether anomalies exist in India the data has been collected for the period form January 2008 to December 2009 for two indices: Sensex and Nifty. Further, the results of this study show that the day of the week effect do not exist in the Indian Stock Market and this market can be considered as informationally efficient. Monday Effect and Friday Effect are also found insignificant while comparing Friday and Monday returns with other days mean returns. The above indicates that the Indian Stock Markets efficient now a days in year 2008 and year 2009. The study suggest to investors that the non existence of anomalies may not provide opportunities to formulate profitable trading strategies so as to earn the abnormal return and can adopt a fair return for risk strategy. Further, the scope of the study is limited as number of observations is limited as it considers data for two years. So, in future study of long period may be carried out to contribute to the body of existing knowledge on the subject under reference.

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