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STOCK PRICE SEASONALITY EFFECT AND TRADING STRATEGY – AN EMPIRICAL STUDY OF SELECTED IT COMPANIES IN INDIA

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Abstract. The primary objective of the study is to investigate the existence of seasonality in stock price behavior in Indian stock market and more specifically in the IT sector. The period of the study is from 3rd November 1994 to 31st December 2010. The study has employed daily price series of selected seven IT companies obtained from the official website of National Stock Exchange (NSE). The study used multiple regression technique to examine the significance of the regression coefficient for investigating day of week effects and week of the month effect, and Kruskal Wallis for analysis of trading strategy. It is found that all the seven selected IT companies evidenced day of the week effect and mostly either on Monday, Tuesday or Wednesday. Only Patni and Wipro evidenced significant Thursday effect. Similarly, evidence on week of month effect mostly either on 1st week, 2nd week or 3rd week. This implies that active portfolio management taking into account the findings will provide superior returns on investment in the IT sector in India.

Keywords: Stock market, seasonality, trading strategy, regression, Kruskal Wallis test, Significance.

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JEL classification: G1, G12, G14.

1. Introduction

Over the last hundred years, a vast number of the literature from both the practitioner and academic fields examined day-of-the-week effects or day seasonality on returns of various assets, such as stocks, debt securities, futures, foreign currencies and even commodities. The earliest research can be traced back to as early as the late 1920s. Calendar anomalies, relying on the assumption that a certain pattern of stock markets is formed on the basis of the past stock price, can be used to predict the future stock price. If the pattern is fixed, informed investors can utilize the pattern to earn a risk-free profit by trading the stocks. The study of seasonality implies that investors could

employ the findings on anomalies to predict the future behavior of prices (Fama 1965). Certainly, seasonal anomalies are in contradiction to any form of efficient market hypothesis (EMH), particularly the weak-form efficiency.

Capital market operations consist mainly of primary market operations and secondary market operations or stock market. The origin of stock market in India can be traced to the later part of the Eighteenth Century. The earliest security dealings were transactions in loan securities of the East India Company, the dominant institution of those days. Corporate shares came into the picture by 1830's and assumed significance with the enactment of the Companies Act in 1850. The introduction of limited liability marked the beginning of the era of modern joint stock enterprises. The American Civil War followed this in 1860-65. However, the bubble burst with the end of the Civil War and a disastrous slump followed which lasted for a long time and also resulted in complete ostracism of the broker community. The tremendous social pressure on the brokers led to their forming an informal association called, 'The Native Share and Stock Brokers' Association' (now known as the Bombay Stock Exchange) in 1887.

The Indian capital market is more than a century old. Its history goes back to 1875, when 22 brokers formed the Bombay Stock Exchange (BSE). Over the period, the Indian securities market has evolved continuously to become one of the most dynamic, modern, and efficient securities markets in Asia. Today, Indian market confirms to best international practices and standards both in terms of structure and in terms of operating efficiency. Indian securities markets are mainly governed by a) The Company's Act1956, b) the Securities Contracts (Regulation) Act 1956 (SCRA Act), and c) the Securities and Exchange Board of India (SEBI) Act, 1992. The national stock exchange, or NSE, is a recent entrant in the stock exchange scene in India. It was incorporated in November 1992, at the behest of the Government of India. The shares of about 1,589 companies trade on this exchange. Its daily average turnover for the year 2009-10 is Rs. 28,476 crores. The total market capitalization of stocks trading in NSE is Rs. 67, 45,724 crores, as on 31st March 2010. Regional exchanges also sponsor trading of some firms that are traded on national exchanges. This dual listing enables local brokerage firms to trade in shares of large firms without needing to purchase membership on the larger exchanges like BSE and NSE. Thus, for example, Infosys is listed on the Bangalore Stock Exchange apart from BSE and NSE. However, BSE and NSE are still the preferred exchanges for large traders.

The primary objective of the study is to investigate the existence of seasonality in stock price behavior in Indian stock market. The study of seasonality is segregated into analyzing and measuring the day of the week effect in IT sector. The specific objectives of the study are:

a) To present a panoramic view of the Indian stock market.
b) To present the prior studies on stock price seasonality, both in national and international market.
c) To analyze the basic descriptive statistics like mean, median, standard deviation, kurtosis and skewness for daily return.

d) To analyze the trading strategies of Indian stock market for buy with sale or hold.
e) To examine the significance of regression coefficient for the daily effect using multivariate technique.

2. Previous Research

The famous efficient market hypothesis (EMH) was introduced by Fama (1965) few decades ago which claims that in an efficient market stock prices always fully reflect available information. If the stock markets are efficient, stock prices are supposed to follow random walk. The random walk hypothesis states that future prices are not predictable on the basis of past prices, that is, stock price changes are unpredictable. The information contained in the past prices is fully and instantaneously reflected in current prices in an efficient market as argued by Fama (1965). Subsequent to study of Fama (1965) a good number of researches have been conducted to examine the randomness of stock price behavior to conclude about the efficiency of a capital market. In an earlier study, Ignatius (1998) examined seasonality in a BSE index and in the Standard and Poor's 500 stock index for the period 1979–1990. Ignatius found that December generated the highest mean returns, and that April and June generated high returns in the Indian stock index.

During the past five decades, much time and effort have been devoted in the field of finance to investigate the behaviour of certain speculative prices such as those of securities and commodity futures. Research efforts have been directed, in particular, to study price behaviour of common stocks or equity shares as they are popularly called in India with a view to understanding the underlying stochastic processes which determine the prices of these shares. In an earlier study, Sharma and Kennedy (1977) found that the Indian markets obeyed the theory of random walk and concluded that markets were efficient. Ignatius (1998) examined seasonality in a BSE index and in the Standard and Poor's 500 stock indexes for the period 1979–1990. Halil and Hakan (2001) in their study tests the presence of the day of the week effect on stock market volatility by using the S&P 500 market index during the period of January 1973 and October 1997. The findings show that the day of the week effect is present in both volatility and return equations. While the highest and lowest returns are observed on Wednesday and Monday, the highest and the lowest volatility are observed on Friday and Wednesday, respectively. Another study by Brooks and Persand (2001) examined the evidence for the day of the week effect in five Southeast Asian stock markets including Taiwan, South Korea, the Philippines, Malaysia and Thailand. The time period was from 1989 to 1996 and the major stock indices in each country were used. They found that neither the stock indices of South Korea nor Philippines had significant calendar effects. Instead both Thailand and Malaysia stock index had significant positive average returns on Monday and significant negative average returns on Tuesday.

Pandey (2002) studied the presence of the seasonal or monthly effect in stock returns has been reported in several developed and emerging stock markets. This study

investigates the existence of seasonality in the post-reform period. The study uses the monthly return data of the Bombay Stock Exchange's Sensitivity Index for the period from April 1991 to March 2002 for analysis. The results confirm the existence of seasonality in stock returns in India and the January effect. Another study by Nath and Samanta (2003) used Granger causality test in VAR framework and Gewek's feedback measures on daily data of the exchange rate of Indian Rupee vis-à-vis US Dollar and Nifty, the stock price index of NSE (National Stock Exchange of India), for the period from April 1993 to March 2003. They found that Granger causality test did not show significant causal relationship between returns in the two markets though there was evidence of strong causal relationship in some specific financial years, whereas Geweke's feedback measures detected a strong bi-directional and contemporaneous causal relationship between returns in these markets. Sarma (2004) examined calendar effects during the post reform era in the Indian stock market. He investigated the BSE 30, the BSE 100, and the BSE 200 stock indexes to detect the day-of-the-week effect. Utilizing Kruskal-Wallis test statistics, the study concluded that the Indian stock market exhibited some seasonality in daily returns over the period January 1, 1996 to August 10, 2002. The major findings of the study are the Monday-Tuesday, Monday-Friday, and Wednesday-Friday sets have positive deviations for all the indices, The Monday-Friday set for all the indices has the highest positive deviation thereby indicating the presence of opportunity to make consistent abnormal returns through a trading strategy of buying on Mondays and selling on Fridays. Hossain (2004) investigated day of the week effect in small portfolios in Bangladesh. The result showed that the strategy "buy on day 1 and sell on Monday" generates the highest mean daily return from D1-D6 strategy-buy on day one and sell on day six. The study also found that on average, above average return is not possible if portfolios are sold on Saturdays and Mondays.

Al-Saad and Moosa (2005) studied monthly patterns on Kuwait stock markets using the Global Market Index of the Kuwait Stock Exchange. They found that over a sample period from 1984 to 2000 returns were significantly higher on July compared with the other months, therefore creating a July effect rather than January effect. Kumari and Mahendra (2006) studied the day of the week effect and other market anomalies in the Indian Stock Market over a period from 1979 to 1998 both in The Bombay Stock Exchange and in the National Stock Exchange. They found that the Monday returns were higher compared with the other days of the week but on the other hand the returns on Tuesday were negative. In the case of monthly returns they documented that the returns in April were significantly higher and different from the rest of the months. Alejandro (2006) in his study on the day of the week effect found that the stock return is not independent of the day of the week in which they are generated. The existence of seasonal behavior in return and volatility of different international stock exchanges may be considered as an indication of non integrated financial markets. Investment opportunities can therefore arise from this abnormal behavior. This study focuses on this type of opportunity, specifically on the analysis of the day of the week effect on the major European stock markets by means of GARCH and T-ARCH models. The findings indi-

cate that abnormal behavior is not present in the returns of these stock markets. Another study by Arora and Das (2007) investigated the existence of seasonality in India's stock market, primarily trying to detect the "Day of the Week Effect" in selected stocks listed on the National Stock Exchange. The study covers the post-reform period from November 1994 to September 2007. After examining the stationarity of the return series, by applying "Kruskal Wallis" test and "One Way ANOVAs" i.e. using both Parametric and Non Parametric Tests, the study specified an Augmented Dummy Regressive model to find the Day of the week effect monthly effect in stock returns in India.

Agathee (2008) investigated the day of the week effects in an emerging market, in particular the Stock Exchange of Mauritius, using observations as from the year the SEM started its operation on a daily basis for a full calendar year to 2006. The study shows that Friday returns appeared to be higher relative to other trading days. However, on overall, further empirical results suggest that the mean returns across the five week days are jointly and not significantly different from zero across all given years as well as for the whole sample period of 1998–2006. Choudhary and Choudhary (2008) studied 20 stock markets of the world using parametric as well as non-parametric tests. He reported that out of twenty, eighteen markets showed significant positive return on various day other than Monday. The scope of the study is restricted to day of the week effect, weekend effect and monthly effect in stock returns of S&P CNX Nifty and selects firms. The half month effect and holiday effect are not studied here. Singhal and Bahure (2009) studied the behavior of stock prices based on the belief that stock returns are not influenced by the day of the week. In this paper, they argued that the measured daily returns should depend on the day of the week by taking the context of the Indian stock market. More specifically, they found the expected returns on Monday to be lower and returns on Friday to be higher than on other days, thus evidencing the existence of this 'weekend effect'. A partial explanation to this anomalous behavior as provided by considering a model for adjusted stock returns based on the delay between the trading and settlement period, complex effects of holidays on daily returns and effect of investor expectations.

Rahman (2009) examined the presence of day of the week effect anomaly in Dhaka Stock Exchange (DSE). Dummy variable regression with the GARCH (1, 1) model was used in the study. The result indicates that Monday returns are negative with only positive returns on Thursdays found statistically significant. The result also reveals that the mean daily returns between two consecutive days differ significantly for the pairs Monday-Tuesday, Wednesday-Thursday and Thursday-Sunday. Gupta and Singh (2009) in their study investigated the price discovery efficiency and validity of Law of One Price in the Indian equity market by using tick-by-tick data available at National Stock Exchange of India. The study finds that strong and stable long-run relationship exists between Indian equity futures and cash markets. Empirical findings in the study suggest that price discovery takes place in both markets, whereas, the Indian equity futures market dominates the information transmission process and the duration of lead-lag between two markets has been found to be varying in the range of five to fifty five

minutes. The study has further found that days to expiry do not play significant role in the price discovery mechanism of Nifty futures contracts. Mishra (2009) in their study provided some empirical evidence on the efficiency of Indian stock market in the context of recent global financial crisis. The study, by employing the unit root tests on the sample of daily stock returns, presents the evidence of weak form market inefficiency in India. Tripathy (2010) investigated the expiration day and week effects for nifty futures by using statistical t-test, F-test and Kruskal-Wallis test for the period from November 2007 to November 2009. The study also analyzed the day of the week effect in Bearish phase and Bullish phase to see whether the day of the week effect was visible in these specific market phases or not. The study explains that the Day of the Week effect found to be absent in the Bullish as well as the Bearish phase. The study found that the trading volume for the NIFTY future index increased as the expiration date move towards nearer. It was highest around 10–15 days prior to expiration and decreased as the expiration approached.

3. Methods/ Theoretical Framework

3.1. Scope of the study

In the study we have taken seven selected companies from IT sector (I-Flex, Infosys, Patni, Polaris, Satyam, TCS and Wipro), The period of the study is from 3rd November 1994 to 31st December 2010. For the purpose analysis, the study has employed daily price series that have been obtained from the official website of National Stock Exchange (NSE). The study has used basic descriptive statistics like mean and median for central tendency; standard deviation for measuring the dispersion; kurtosis for peakedness of the distribution and skewness to measure the symmetry of the return distribution. The hypothesis to be tested relates to equality of mean returns across all the five days and weeks.

Regression analysis is employed to further examine the day of week effect, companies. A regression analysis is a statistical method used to estimate the strength of a relationship between one or more dependent variable and one or more independent variables. It assumes that the relationship between the dependent and independent variables is linear; that these variables have equal variance (homoscedasticity); that there is no correlation between two or more of the independent variable (multicollinearity); and the data is normally distributed. Regression analysis can be simple involving one dependent variable and one independent variable, or multiple involving one dependent variable and two or more independent variable. Regression analysis was used by the researcher to gain a deeper understanding of the relationship between the log return of the closing price of one day with other day of the week, one week with other week of the month, and one month with other month of the year. We have used F-test, t-test, adjusted R^2 and P test for hypothesis testing and significance test.

3.2. Sample, Source and Period of The Study

For the micro level study the researcher used a three stage approach of sample selection. In the first stage leading sector that contribution significance to the economy(in terms of GDP) were selected and it was purposed to use the leading companies under these sectors depending on availability of stock data and other criteria. In the second stage attempt was made to select nine banks based on the three criteria namely profit position, turn over and market capitalization. At the end of the second stage the total nine banks could be selected. In the third stage the researcher tried to obtained continuous data for the selected banks. In this study we have taken seven selected companies from IT sector (I-Flex, Infosys, Patni, Polaris, Satyam, TCS and Wipro). The period of the study is from 3rd November 1994 to 31st December 2010. For the purpose analysis, the study has employed daily price series that have been obtained from the official website of National Stock Exchange (NSE).

3.3. Tools of Analysis

It is found from the extensive review of prior studies that most of the earlier works on stock price behavior have used closing price for return generating procedure with an implied assumption of trading done at the closing price. The continuous compounded annual return is well accepted approach to measuring the daily returns. The natural log of daily relative mean index value is, thus the measure of daily used for this study. The log return is calculated based on the closing price.The study has used basic descriptive statistics like mean and median for central tendency; standard deviation for measuring the dispersion; kurtosis for peakedness of the distribution and skewness to measure the symmetry of the return distribution. The hypothesis to be tested relates to equality of mean returns across all the five days and weeks.

Statistical Tools and Techniques Used. The continuous compounded annual return is well accepted approach to measuring the daily returns. The natural log of daily relative mean index value is, thus the measure of daily used for this study. The log return is calculated based on the closing price and is presented in equation 1:

$$R_t = \ln[\frac{C_t}{C_{t-1}}]. \quad (1)$$

Where: R_t = return on day 't';

C_t = Closing Price on day 't';

C_{t-1} = Closing on day 't-1';

and ln = natural log.

The study has analyzed the returns on daily basis. In the first phase, we employ basic descriptive statistics like mean, median, standard deviation, Kurtosis and skewness. In the last phase, the study used multiple regression technique to examine the significance of the regression coefficient for investigating day of week effects.

Univariate analysis using Kruskal-Wallis test. In the study **Kruskal–Wallis one-way analysis of variance** by ranks (named after William Kruskal and W. Allen Wallis) is a non-parametric method for testing equality of population medians among groups. It is identical to a one-way analysis of variance with the data replaced by their ranks. It is an extension of the Mann–Whitney U test to 3 or more groups. Since it is a non-parametric method, the Kruskal–Wallis test does not assume a normal population, unlike the analogous one-way analysis of variance. However, the test does assume an identically-shaped and scaled distribution for each group of the study period in between day of the week, week of the month and month of the year.

The hypothesis to be tested relates to equality of mean returns across all the five days and weeks. In other words, the null hypothesis is that mean returns across all the five days and weeks do not exhibit statistically significant differences. A nonparametric Kruskall-Wallis test (by computing *'H'* statistic) is applied in place of a conventionally used parametric one-way analysis of variance. In the seasonality literature, it appears that researchers tend to perform parametric tests (typically dummy variable regressions) on any data set without first checking the data's distributional properties which makes the testing results highly suspicious. It is undoubtedly true that non-parametric tests are less powerful than parametric tests when conditions for parametric tests are met. But, when the conditions do not hold, we must choose between a valid test with less power (i.e., a non-parametric test) and an invalid test with appealing (yet shaky) statistics (i.e., a parametric test). When the conditions are far from holding precisely, the choice is clear. The difficult case is when the conditions are closely or approximately met so that the higher testing power may justify the impreciseness. But, the challenge is to know how close is '*close.*' On balance, a non-parametric test is always in order, especially when in doubt. One obvious advantage of a nonparametric test is that it is independent of distributional assumptions. Another advantage is its immunity to outliers. In a rank-based non-parametric test, one of the disadvantages is loss of information. But, for a seasonality study, this is not a concern, because the focus is not on precise estimation of, say, daily returns. Therefore, it is felt that the Kruskall-Wallis test is an appropriate one for the data typified of non-normality, heteroscedastic variance like the security returns.

The accepted model for return is presented in equation 2:

$$R_u = \mu + \iota_i + \varepsilon_{ij}\,, \qquad (2)$$

i = 1,2……..n

j = 1,2 …….. 5

where, μ is the overall daily or weekly mean, τj quantifies the day or week effect whose expected value is '0,' and is Eij mutually independent random variable. The null hypothesis for the given model would be that the population means are all equal.

H_0 : $\mu_1 = \mu_2 = \mu_3 = \mu_4 = \mu_5$ or
H_0 : $\tau_j = 0$ for j = 1, 2, ….5 and
H_1 : $\mu_1 \neq \mu_2 \neq \mu_3 \neq \mu_4 \neq \mu_5$ or
H_1 : $\tau_j \neq 0$ for at least one value of j.

The Kruskall-Wallis test requires the entire set of observations being ranked – higher the value, higher is the rank and vice-versa — then arranged into *nj* x 5 matrix where *nj* represents the rank of the return and columns represent the day-of-the-week or week of the month — Monday through Friday or 1st week through 5th week.

The formula for calculating the test statistic '*H*' is as under and provided in equation 3.

$$H = \left[\frac{12}{N(N+1)} x \sum_{j-2}^{5} \frac{R_j^2}{n_j} \right] - 3(N+1), \quad (3)$$

where: *Rj* = sum of the ranks in the *j*th column, *nj* = number of cases in the *j*th column, *N* = sum of observations in all the columns.

To test whether the differences in the mean returns across the weekdays or weeks are statistically significant, we use the '*H*' statistic. The critical value of 'H' at 99 per cent confidence level and four degrees of freedom is 13.28.

The calculations compiled in chapter six present the deviations of actual from the expected average rank differences. A comparison of annual rates of return generated by a passive strategy of 'buy and hold' and various alternative active strategies as evidenced from Kruskal-Wallis analysis is presented.

Regression analysis. Regression analysis is employed to further examine the day of week effect for the selected stocks. A regression analysis is a statistical method used to estimate the strength of a relationship between one or more dependent variable and one or more independent variables. It assumes that the relationship between the dependent and independent variables is linear; that these variables have equal variance (homoscedasticity); that there is no correlation between two or more of the independent variable (multicollinearity); and the data is normally distributed. Regression analysis can be simple involving one dependent variable and one independent variable, or multiple involving one dependent variable and two or more independent variable. Regression analysis was used by the researcher to gain a deeper understanding of the relationship between the log return of the closing price of one day with other day of the week, ist week with other week of the month, and one month with other month of the year. The regression analysis was to examine the significance of the seasonality of return for the stocks and indices.

Linear regression: In linear regression, the model specification is that the dependent variable, y_i is a linear combination of the *parameters* (but need not be linear in the *independent variables*). For example, in simple linear regression for modeling *n* data points there is one independent variable: x_i, and other days parameters, β_0, β_1, β_2, β_3, β_4…… .*n*.(n for day, 5). In order to test the day of the week effect, week of the month effect and month of the year effect on the stock return in the Indian selected companies and indices, The regression equation for day of the week is presented below in equation 4,

$$Rt = \infty + B_2D_{2t} + B_3D_{3t} + B_4D_{4t} + B_5D_{5t} + e_t, \quad (4)$$

where R_t is daily returns, calculated using in above both equation D_{2t} , D_{3t} …… D_{5t} are dummy variables from Tuesday to Friday.

3.4. Stock Seasonality Effect

Day of The Week Effect –The day of the week effect refers to the existence of a pattern on the part of stock returns, whereby these returns are linked to the particular day of the week. The last trading days of the week, particularly Friday, are characterized by the positive and substantially positive returns, while Monday, the first trading day of the week, differs from other days, even producing negative returns. The presence of such an effect would mean that equity returns are not independent of the day of the week, evidence against random walk theory.

Week of The Month Effect – Week of the month effect refers to the observation significantly deferent return on a particular week of every trading month, distinctively deferent from return on other week. A variation to month of the year effect, turn of the month effect in which the return on the last week of the month or first week of the successive month significantly deferent. The presents of such an effect would imply that abnormal returns can be generated by active trading on the weeks evidencing week of the month effect.

4. Result, discussion and limitations

4.1. Analysis of Descriptive statistics for daily return for IT sector

Table 1 depicts the values of descriptive statistics for each of the week days for the selected seven companies in the IT sector. It is observed that relatively higher values of mean return (in consistent manner) is for Satyam in the range of –0.095 to 0.036, with the exception of Tuesday mean return with lower value of 0.00154. Only Polaris evidenced consistently positive mean return for each for the five week days with all day mean return 0.00021. Lower levels of mean return for the week days are observed for TCS in the range of -0.0025 to 0.00033 with all days mean of –0.0027. Further, it is found that very high level of mean return for some weekdays and lower levels for other week days is observed for Patni in the range of 0.035 to –0.0035 for Thursday to Friday, while lower values in range of levels of 0.0018 to 0.002 for Monday and Wednesday with all day mean of 0.00018. For Infosys, negative mean return is found for Friday with positive values for remaining weekdays and all day average return of 0.00292. In case of I-Flex, Satyam, Patni and Wipro there is evidence of inconsistently higher and lower values of mean return for weekdays with all day's average being at 0.0.0021, 0.02624, 0.00082 and –0.11331 respectively.

With regard to median, relatively higher values of median return for the weekdays are observed for Patni in the range of –0.0082 to 0.094, with the exception of Thursday median return of 0.00903. Lower levels of median return for the week days are observed for Polaris in the range of –0.0076 to 0.0052 with all day average median of 0.00124. Further, it is found that very high level of median return is observed for Wipro in the range of 0.087 to –0.0012 for Monday and Thursday, while lower values in range of levels of 0.0046 to 0.0087 for Tuesday and Friday with all day median of –0.00034.

Table 1. Descriptive statistics of daily return for selected companies in IT sector

Name of company	Parameter	Monday	Tuesday	Wednesday	Thursday	Friday	All Days
I-Flex	Mean	0.00377	0.04936	0.00363	0.06104	–0.00165	0.0021
	Median	0.09453	0.03781	0.00967	0.09351	0.00141	0.0729
	Standard deviation	0.04113	0.03208	0.05024	0.03840	0.03721	0.04243
	Kurtosis	0.27052	0.68841	0.50452	1.09555	1.61185	3.21436
	Skewness	–0.01521	0.67962	0.07696	0.95485	–0.23194	0.01845
Infosys	Mean	0.00308	0.04046	0.00296	0.00292	–0.00489	0.00292
	Median	0.00671	0.00632	0.02098	0.00534	–0.00967	0.00183
	Standard deviation	0.04598	0.02141	0.05776	0.02281	0.04477	0.02538
	Kurtosis	0.44483	1.67627	1.81804	4.51152	2.83271	2.20648
	Skewness	0.15501	1.27561	0.07633	0.81067	–0.06396	0.58611
Patni	Mean	0.00183	–0.00018	0.00203	0.03508	–0.00352	0.00082
	Median	0.00672	0.00742	0.09451	0.00903	–0.00823	0.00942
	Standard deviation	0.02654	0.02240	0.03295	0.01720	0.02713	0.21273
	Kurtosis	1.77913	3.14896	3.65157	3.95244	1.52494	7.63077
	Skewness	0.92415	0.67089	1.04601	1.59921	0.69356	0.06015
Polaris	Mean	0.00074	0.03439	0.00047	0.00166	0.03981	0.00021
	Median	0.00521	0.00348	0.00167	–0.00764	0.00358	0.00124
	Standard deviation	0.21005	0.01901	0.03168	0.03261	0.03540	0.02604
	Kurtosis	7.33287	2.06663	14.73201	6.28889	35.18260	8.55858
	Skewness	0.03702	1.23650	0.57335	–0.65408	4.97291	0.78487
Satyam	Mean	0.00174	0.00154	0.00171	0.03605	–0.09512	0.02624
	Median	0.00129	0.00956	0.00089	0.00892	–0.00367	0.00863
	Standard deviation	0.02097	0.02515	0.02424	0.03105	0.02205	0.01979
	Kurtosis	0.96784	1.50032	1.30471	11.93544	2.07099	2.36733
	Skewness	–0.03734	–0.22463	–0.01702	2.85875	0.26806	0.94835
TCS	Mean	0.00033	0.00024	0.00025	–0.00196	–0.00257	–0.0027
	Median	0.00067	0.01276	0.00039	–0.00001	0.00653	0.00581
	Standard deviation	0.02104	0.02636	0.02848	0.03019	0.01927	0.02987
	Kurtosis	2.13601	2.80579	6.67192	3.52877	2.38805	8.20669
	Skewness	–0.03803	0.91629	0.72007	–0.2893	–0.02197	–1.2231
Wipro	Mean	0.03033	0.01039	0.02039	0.01041	0.00022	–0.11331
	Median	0.08732	0.00461	0.07901	–0.00123	0.00879	–0.00034
	Standard deviation	0.02593	2.71258	0.01831	2.71204	2.99671	0.01798
	Kurtosis	7.98644	–0.87587	7.72701	–0.87619	–1.09881	13.33486
	Skewness	2.38806	–0.00039	2.06871	–0.00071	–0.00904	0.92351

I-Flex is observed to have consistently positive median return for each of the five weekdays with all day median return 0.0729. For Patni, negative median return is found for Friday with positive values for remaining weekdays and all day median of 0.00942. In case of Infosys and Satyam, there is evidence of inconsistently higher and lower values of median return for weekdays with all day average being positive at 0.0018 and 0.0086, respectively. Both Polaris and TCS have lower levels of weekday returns with all day average median of 0.00124 and 0.00581, respectively. For I-Flex the all day median return is maximum with value 0.0729 and Wipro has all day median value minimum at –0.00034.

With regard to standard deviation of daily returns, higher values for the weekdays are observed for Wipro in the range of 0.018 to 2.99, with all day standard deviation of 0.01798. Lower levels of standard deviation for the week days are observed for TCS in the range of 0.019 to 0.028 with all day standard deviation of 0.02987. Further, it is found that very high standard deviation for some weekdays and lower levels for other week days is observed for I-Flex in the range of 0.032 to 0.050 for Tuesday to Wednesday, while for I-Flex, Infosys, Patni, Polaris, Satyam and TCS the standard deviation of returns is found consistent. Wipro evidenced inconsistently higher and lower values of standard deviation with all day value positive at 0.01798. Patni is found to have the minimum weekday standard deviation return for Thursday (0.0172), with all day standard deviation of 0.21273.

With regard to Kurtosis, relatively higher values of Kurtosis (in consistent manner) for the weekdays are observed for Polaris in the range of 2.06 to 35.18, with the all day Kurtosis of 8.55858. Lower range of kurtosis for the week days are observed for I-Flex in the range of 0.27 to 1.61 with all day average kurtosis of 3.21436. Further, it is found that very high range of kurtosis for some weekdays and lower levels for other week days is observed for Satyam in the range of 11.93 to 0.96 for Thursday and Monday, I-Flex is observed to have consistently positive kurtosis value for each of the five weekdays with all days average of 3.21436.

With regard to skewness of return series, higher values for the weekdays are observed for Polaris in the range of –0.65 to 4.97, with the all day skewness of 0.78487. Lower range of skewness for the week days are observed for I-Flex in the range of –0.23 to 0.95 with all day average skewness of 0.01845. The daily return series on Mondays and Fridays are negatively skewed for the selected IT companies. For Patni, skewness on all is positive, consistent but less skewed. Very high range of skewness for some weekdays and positive skewed is observed for Wipro in the range of –0.009 to 2.38 for Friday and Monday, with all day positive skewness of 0.92351. On basis of all day skewness, Satyam is more skewed with value of 0.94835 and TCS return is negatively skewed.

4.2. Analysis of Descriptive statistics of Weekly returns for IT sector

Table 2 depicts the values of descriptive statistics for each of the weeks for the selected seven company in the IT sector. The statistical parameters studied are mean, median, Standard deviation, Kurtosis and Skewness. Relatively higher values of mean return (in consistent manner) for the weeks are observed for Polaris in the range of –0.0107 to 0.049, with the exception of 3rd week mean return of –0.0015. Only I-Flex and Satyam evidenced consistently positive mean return for each for the five weeks with all week average return of 0.0051 and 0.0324, respectively. Lower levels of mean return for the weeks are observed for Patni in the range of –0.0046 to 0.0038 with all week mean of 0.0554. Further, it is found that very high level of mean return for some weeks and lower levels for other weeks is observed for Infosys in the range of –0.0003 to 0.0335 for 1st week to 3rd week, with all week mean of 0.0579. For Wipro, negative mean return is found for 5th week with positive values for remaining weeks and all week average of 0.0705. In case of Infosys, Patni, Polaris, and TCS there is evidence of inconsistently higher and lower values of mean return for the weeks. I-Flex, Satyam and Wipro have lower levels positive return of week's returns with all week mean of 0.0051, 0.0324 and 0.0705, respectively while Polaris and TCS have lower levels negative return of week's returns with all week mean of –0.0041 and –0.0052, respectively . TCS is found to have the minimum weeks mean return for 2nd week (–0.0224).

With regard to median, it is observed that relatively higher values for the weeks are observed for I-Flex in the range of 0.0045 to 0.65, with the exception of 1st week median return with lower value of 0.0056. Three companies namely, I-Flex, Infosys, Patni and Satyam evidenced consistently positive median return for each for the five weeks. Lower levels of median return for the weeks are observed for Satyam in the range of 0.0001 to 0.017 with all week median of 0.0423. Further, it is found that very high level of median return for some weeks and lower levels for other weeks is observed for TCS in the range of –0.0097 to 0.0239 for all four weeks with all week median of 0.0093. For Polaris, negative median return is found for 1st week with positive values for remaining weeks and all week median return of 0.0765. In case of Wipro, there is evidence of inconsistently higher and lower values of median return for weeks with all week average being positive at 0.0012. I-Flex, Infosys, Patni, TCS and Wipro have lower levels of median returns with all week median of 0.0096, 0.0056, 0.0017, 0.0093 and 0.0012, respectively. TCS is found to have the minimum weeks median return for 4th week (–0.0097).

With regard to standard deviation, it is observed that relatively higher values are for Wipro in the range of 4.16 to 0.019. Lower levels of standard deviation for the returns on the weeks are observed for Polaris in the range of 0.028 to 0.04 with all week standard deviation of 1.3275. I-Flex, Infosys and Polaris are observed to have consistently positive standard deviation for each of the five weeks with all week

standard deviation of 0.0441, 0.0375. and 1.3275 respectively. Wipro has higher value of all week standard deviation with 4.24 and TCS have lower value of all week with 0.0206 and is found to have the minimum week standard deviation return for 5th week (0.0167). Infosys has lowest standard deviations value in 1st week with value 0.0196 and Wipro have highest standard deviations value in 3rd week of month with value of 4.1592.

With regard to Kurtosis, higher values for the weeks are observed for Patni in the range of 0.98 to 28.8, with the all week Kurtosis lower value of 1.9766, all week highly peaked(leptokurtic) except 1st week(0.9865). Lower range of kurtosis for the weeks are observed for Polaris in the range of 1.7 to 3.9 with all week kurtosis of 1.4041. Further, it is found that very high range of kurtosis for some weeks and lower levels for other weeks is observed for Satyam in the range of –1.09 to 19.09 for 1st week to 3rd week. Infosys is observed to have consistently positive kurtosis value for each of the five weeks with all week Kurtosis of 2.9446(normal). Kurtosis is found high in four weeks for Patni and Satyam, three weeks for Wipro, two week for I-Flex and Polaris and one week for TCS. In respect of all week kurtosis, I-Flex and Satyam are more peaked distribution (leptokurtic) with value of more then 3, Infosys having normal (mesokurtic) return distribution and other weeks more flat (platykutic) with the Kurtosis value less then 3.

With regard to skewness, it is observed that relatively higher values of skewness is for Patni in the range of –0.0071 to 6.12, with the all week skewness of 1.2714, 5th week highly skewed with value of 6.1208 followed by 4th week with value of 0.7915 and other weeks skewness inconsistent. Lower range of skewness for the weeks are observed for TCS in the range of –0.016 to 0.44 with all week skewness of 0.484. Further, it is found that the weekly return for Infosys has all positive but very less skewness for the weeks. Very high range of skewness for some weeks and positive skewness is observed for Wipro in the range of –0.85 to 2.309 for 5th week and 4th week, with all week negative skewness of –0.0002. With respect to all week skewness, Infosys is more skewed with value of 2.0702 and I-Flex, Patni, Satyam and TCS have relatively positive skewed return distribution while Polaris and Wipro evidence negative skewness.

The non-parametric test Kruskal-Wallis test for calculation of expected average rank and compares it with actual rank to find deviation for each pair of trading days and the paired combination of weeks. This is done for each of the selected companies and the four selected NSE indices. Such an analysis is performed for investigating the day of the week and the week of the month effect over the study period. Since the month-wise paired combinations are vary large in number, it was not feasible to present the findings for the month of the year effect.

Table 2. Descriptive statistics of weekly returns for selected companies in IT sector

Name of company	Parameter	1ST week	2nd week	3rd week	4th week	5th week	All weeks
I-Flex	Mean	0.0016	0.0287	0.0016	0.0023	0.0009	0.0051
	Median	0.0056	0.0045	0.0143	0.0056	0.6571	0.0096
	Standard deviation	0.0213	0.0381	0.0267	0.4306	0.0229	0.0441
	Kurtosis	1.3011	7.0306	3.2738	2.9471	2.3984	4.4284
	Skewness	0.5701	5.6306	–0.0197	0.0904	0.7723	0.0837
Infosys	Mean	–0.0003	0.0321	0.0335	0.0022	–0.0005	0.0579
	Median	0.0032	0.0056	0.0675	0.0063	0.0091	0.0056
	Standard deviation	0.0196	0.0267	0.0149	0.4302	0.0281	0.0375
	Kurtosis	0.1052	0.5112	2.8067	3.9551	0.7867	2.9446
	Skewness	0.0506	0.8645	1.3988	0.0842	0.2168	2.0702
Patni	Mean	–0.0012	0.0038	–0.0011	–0.0046	0.0021	0.0554
	Median	0.0028	0.0843	0.0075	0.0511	0.0098	0.0017
	Standard deviation	0.0279	1.3262	0.0530	0.0381	0.0376	0.0334
	Kurtosis	0.9865	19.3819	28.8095	4.3701	5.7373	1.9766
	Skewness	0.3246	–0.0071	0.4315	0.7915	6.1208	1.2714
Polaris	Mean	–0.0017	–0.0107	–0.0015	0.0496	–0.0037	–0.0041
	Median	–0.0056	0.0067	0.0097	0.0934	0.0765	0.0765
	Standard deviation	0.0376	0.0354	0.0402	0.0337	0.0281	1.3275
	Kurtosis	1.7394	3.9001	1.7057	3.6774	2.6113	1.4041
	Skewness	0.0368	–0.3665	0.0413	1.8336	0.0512	–0.0163
Satyam	Mean	0.0002	0.0012	0.0014	0.0011	0.0175	0.0324
	Median	0.0083	0.0723	0.0674	0.0008	0.0706	0.0423
	Standard deviation	2.9939	0.5404	0.0201	0.5421	0.0233	0.0235
	Kurtosis	–1.0995	4.7261	19.0906	3.6461	8.2099	3.3574
	Skewness	–0.0091	0.1987	0.9018	0.2271	2.4472	1.2202
TCS	Mean	0.0305	–0.0224	0.0305	–0.0220	–0.0011	–0.0052
	Median	0.0045	0.0035	0.0045	–0.0097	0.0239	0.0093
	Standard deviation	3.3233	2.3609	3.3184	2.3607	0.0167	0.0206
	Kurtosis	–1.0188	2.2978	–1.0189	2.2888	16.3963	2.2777
	Skewness	0.0082	–0.0142	0.0088	–0.0166	0.4409	0.0484
Wipro	Mean	0.0003	0.0194	0.0003	0.0139	–0.0006	0.0705
	Median	0.0045	0.2967	0.0041	0.0078	0.0086	0.0012
	Standard deviation	4.1636	0.0242	4.1592	0.0202	0.0195	4.2413
	Kurtosis	–1.3258	3.6184	–1.3254	6.6912	10.2891	–1.3471
	Skewness	–0.0171	1.7658	–0.0161	2.3093	–0.8565	–0.0002

4.3. Analysis of Kruskal-Wallis test for Day of the week effect

In this section, we have calculated the expected Multiple Comparisons value and compared that with actual value to find the deviation for each of the ten pairs of trading days. Further, we have calculated Annual Returns for the active and passive strategies.

Table 3 presents the value of actual and expected multiple comparisons from Kruskal-Wallis test, along with the deviation for each pair trading day combination, with respect to the seven IT companies. It is observed that the deviation between actual and expected value is positive for all seven companies with respect to two combinations namely Monday-Wednesday, and Tuesday-Thursday. For the combination Monday-Wednesday, highest positive deviation of 44.16 is evidenced for I-Flex and lowest deviation 6.75 for Satyam. Similar observation is also found for the Tuesday-Thursday combination with highest positive deviation 52.75 for TCS and lowest positive deviation 16.33 for Patni. This implies that with the respect to the seven IT companies positive higher return could be generated by following either of the activity trading strategy of Monday-Wednesday combination or Tuesday-Thursday combination, thus evidencing day of the week effect. Since the deviations are not positive across each of the seven companies for the other trading day combinations these pairs of combination are not considered for calculating the annual return as depicted in table 4.

Table 4 depicts the annual returns for each of the seven IT companies with respect the Monday-Wednesday, Tuesday-Thursday and buy-hold strategy. It is observed that I-Flex shows positive annual return for Monday-Wednesday combination (0.25%) and annualized return of 4.32% for the passive strategy of buy and hold over the study period. Similarly in case of Infosys, TCS and Wipro the passive strategy of buy and hold generates annual return of 2.21%, 4.65% and 7.54%, respectively and also positive return of 0.41%, 0.27% and 0.57%, respectively for Monday-Wednesday combination. But the annual return for Tuesday-Thursday combination is negative at 0.32% for Satyam. On the other hand, both Patni and Satyam are observed to generate annual return of –1.21% and –5.63%, respectively for the passive strategy of buy and hold during the study period. Similar observation of negative return is also observed for the active strategy of Monday-Wednesday and Tuesday-Thursday, for the both Patni. The exception being the positive return of 0.54% for Monday-Wednesday with respect to Satyam.

On the whole, it is found that the active strategy of Monday-Wednesday and Tuesday-Thursday generates lesser return (less then 1% return) as compare to passive strategy of buy and hold over study period for the seven IT companies. Further, highest positive abnormal return is for Wipro and maximum negative return for Satyam, with respect to passive strategy.

Table 3. Actual and Expected Multiple Comparisons value and the Deviations for the pairs of trading days in IT sector

COM-PANY	I-FLEX			INFOSYS			PATNI			POLARIS			SATYAM			TCS			WIPRO		
Day	Actual	Exp.	Dev.	Actual	Exp.	Dev.	Actual	Exp.	Dev.	Actual	Exp.	Dev.	Actual	Exp.	Dev.	Actual	Exp.	Dev.	Actual	Exp.	Dev.
M-T	23.45	95.3	–71.85	84.56	95.54	–10.98	38.18	95.38	–57.2	139.74	96.34	43.4	56.99	96.88	–39.89	135.67	95.06	40.61	6.77	96.58	–89.81
M-W	140.56	96.4	**44.16**	130.45	96.45	**34**	137.16	96.39	**40.77**	125.55	95.37	**30.18**	103.09	96.34	**6.75**	137.58	95.16	**42.42**	107.43	96.49	**10.94**
M-TH	137.43	95.32	42.11	63.29	96.34	–33.05	128.45	95.33	33.12	50.67	95.74	–45.07	85.44	96.35	–10.91	39.56	95.38	–55.82	90.53	95.14	–4.61
M-F	104.56	95.36	9.2	93.54	96.33	–2.79	38.45	96.43	–57.98	84.83	96.23	–11.4	127.56	95.03	32.53	102.88	96.21	6.67	112.09	95.38	16.71
T-W	58.55	96.15	–37.6	20.45	95.31	–74.86	136.09	96.39	39.7	94.19	96.4	–2.21	108.09	95.45	12.64	45.06	96.35	–51.29	115.78	95.45	20.33
T-TH	134.56	96.38	**34.18**	115.48	95.17	**20.31**	111.59	95.26	**16.33**	124.09	95.3	**28.79**	132.67	95.38	**37.29**	147.78	95.03	**52.75**	128.56	96.26	**32.3**
T-F	56.55	96.1	–39.55	21.33	95.2	–73.87	71.45	95.39	–23.94	25.06	96.49	–71.43	48.79	96.03	–47.24	129.58	95.01	34.57	35.19	96.56	–61.37
W-TH	38.45	95.27	–56.82	108.4	96.09	12.31	30.98	96.45	–65.47	27.55	95.22	–67.67	10.56	96.3	–85.74	39.98	96.49	–56.51	98.56	96.43	2.13
W-F	65.45	95.32	–29.87	76.55	95.31	–18.76	88.03	95.23	–7.2	120.46	96.44	24.02	18.49	96.2	–77.71	76.45	95.64	–19.19	110.45	96.12	14.33
TH-F	100.9	96.11	4.79	73.96	95.05	–21.09	63.12	96.2	–33.08	36.11	96.45	–60.34	38.05	95.1	–57.05	72.45	95.1	–22.65	67.57	96.13	–28.56

Notes:-M-W denotes the paired combination of Monday-Wednesday for which the actual and expected comparison values are calculated.
Similarly for the other pairs of trading days.

Table 4. Annual Returns (in %) generated by paired day active strategy and passive strategy in IT sector

COMPANY / DAY	I-FLEX	INFOSYS	PATNI	POLARIS	SATYAM	TCS	WIPRO
Mon-wed	0.25%	0.24%	–0.76%	0.41%	0.54%	0.27%	0.57%
Tue-Thurs	0.63%	0.34%	–0.27%	0.36%	–0.32%	0.63%	0.32%
Buy- Hold	4.32%	2.21%	–1.21%	1.32%	–5.63%	4.65%	7.54%

4.4. Analysis of Kruskal-Wallis test for Week of the month effect in IT sector

Table 5 presents the values of actual and expected multiple comparison from the Kruskal-Wallis test, along with the deviation for each pair trading week combination, with respect to the selected seven IT companies. It is observed that the deviation between actual and expected value is positive for all seven IT companies with respect to two combinations namely 1st- 2nd week and 1st- 4th week. For the combination 1st-2nd week highest of positive deviation (43.48) is evidenced for Infosys and lowest deviation 2.09 for TCS. Similar observation is also found for the 1st-4th week combination with highest positive deviation of 40.04 for Wipro and lowest positive deviation of 2.67 for Polaris. This implies that with the respect to the seven IT companies positive abnormal return could be generated by following either of the trading strategy of 1st-2nd week combination or 1st-4th week combination, thus evidencing week of the month effect. Since the deviations are not positive across each of the seven companies for the other trading week combinations, these pairs of combination are not considered for calculating the annual return as depicted in table 6.

Consequently, the study has analyzed and calculated the annual return generated for 1st-2nd week and 1st-4th week combination along with passive strategy of buy-hold. Table 6 depicts the annual returns for each of the seven IT companies with respect the 1st-2nd week, 1st-4th week, and buy-hold strategy. It is observed that I-Flex shows positive annual return for 1st-2nd week combination (0.32%) and annualized return of 2.34% for the passive strategy of buying and holding over the study period. Similarly in case of Infosys, the passive strategy of buy and hold generates annual return of 4.51% and also positive return of 0.44% for 1st-2nd combination. But the annual return for 1st-4th combination is negative at 0.78% for Polaris. On the other hand, Patni, Polaris and Satyam are observed to generate annual return of –1.24%, –0.45% and –7.25%, respectively for the passive strategy of buy and holding during the study period. Similar observation of negative return is also observed for the active strategy of 1st-2nd week and 1st-4th week, for the both Patni and Satyam. The exception being the positive return of 0.34% for 1st-2nd week with respect to Polaris. The study also observed that for I-Flex, Infosys, TCS and Wipro the active strategy for 1st-2nd week and 1st-4th week combination generate positive annualised return.

On the whole, it is observed that the active strategy of 1st–2nd week and 1st–4th week generates lesser abnormal return (less then 1% return) as compared to the passive strategy of buy and hold over study period for the seven IT companies. Further, highest positive abnormal return is for Wipro and maximum negative return for Satyam, with respect to passive strategy.

Table 5. Actual and Expected Multiple Comparisons value and the Deviations for pairs of weeks in IT sector

COM-PANY	I-FLEX			INFOSYS			PATNI			POLARIS			SATYAM			TCS			WIPRO		
Week	Actual	Exp.	Dev.	Actual	Exp.	Dev.	Actual	Exp.	Dev.	Actual	Exp.	Dev.	Actual	Exp.	Dev.	Actual	Exp.	Dev.	Actual	Exp.	Dev.
1st -2nd	138.64	95.32	**43.32**	140.24	96.76	**43.48**	135.65	96.45	**39.2**	134.57	96.33	**38.24**	138.56	95.43	**34.13**	98.45	96.36	**2.09**	108.56	96.49	**12.07**
1st -3rd	30.56	95.29	–64.73	138.56	96.09	42.47	121.08	96.05	25.03	136.75	96.54	40.21	100.45	96.32	4.13	44.12	96.88	–52.76	138.45	96.43	42.02
1st -4th	112.54	95.4	**17.14**	133.76	95.35	**38.41**	130.54	95.88	**34.66**	98.55	95.88	**2.67**	125.46	95.36	**30.1**	134.36	96.77	**37.59**	135.34	95.3	**40.04**
1st -5th	28.45	96.1	–67.65	130.55	95.65	34.9	54.65	95.34	–40.69	45.09	95.32	–50.23	109.36	96.21	13.15	126.54	95.66	30.88	123.09	95.4	27.69
2nd-3rd	9.45	96.3	–86.85	118.09	96.34	21.75	88.65	96.67	–8.02	43.65	96.05	–52.4	125.64	95.12	30.52	127.45	95.78	31.67	90.45	96.02	–5.57
2nd-4th	111.45	96.43	15.02	67.45	96.09	–28.64	56.76	95.09	–38.33	56.05	95.23	–39.18	56.45	95.38	–38.93	34.45	96.08	–61.63	96.55	95.1	1.45
2nd-5th	124.04	95.23	28.81	76.3	95.32	–19.02	45.53	95.23	–49.7	18.45	95.3	–76.85	15.45	96.76	–81.31	6.66	96.56	–89.9	40.85	96.45	–55.6
3rd -4th	136.95	95.09	41.86	86.57	95.12	–8.55	10.67	96.33	–85.66	17.34	96.43	–79.09	30.47	96.4	–65.93	4.09	95.54	–91.45	36.06	96.2	–60.14
3rd -5th	67.53	95.2	–27.67	134.02	95.23	38.79	23.34	96.32	–72.98	125.47	95.67	29.8	13.48	96.03	–82.55	88.6	95.65	–7.05	43.33	95.42	–52.09
4th -5th	34.22	96.1	–61.88	98.34	96.55	1.79	33.23	95.13	–61.9	124.35	96.88	27.47	5.43	95.17	–89.74	67.59	95.18	–27.59	31.09	95.32	–64.23

Table 6. Annual Returns (in %) generated by paired week active strategy and passive strategy in IT sector

COMPANY / WEEK	I-FLEX	INFOSYS	PATNI	POLARIS	SATYAM	TCS	WIPRO
1st-2nd	0.32%	0.44%	–0.12%	0.34%	–0.68%	0.25%	0.87%
1st-4th	0.54%	0.74%	–0.25%	–0.78%	–0.08%	0.65%	0.22%
Buy- Hold	2.34%	4.51%	–1.24%	–0.45%	–7.25%	2.54%	4.65%

4.5. Analysis of Regression Results for Day of the week effect

In this section, we have used regression technique to analyze the findings of the day of the week effect. We have used four weekday dummies namely Tuesday dummy, Wednesday dummy, Thursday dummy and Friday dummy with the constant signifying the Monday effect. A significant value of a weekday dummy indicates presence of the day of the week effect for that weekday.

Table 7 shows the results of regression analysis regarding day of week effect for the selected IT companies. It is observed that for I-Flex, there is positive Tuesday effect (with B_2 co-efficient of 0.02506) found significant at 1%, while there is a significant (at 5 % level) positive effect on Wednesday with the co-efficient (B_3) value of 0.00028. Further, the regression analysis failed to observe any significance for Monday, Thursday and Friday coefficients with regard to I-Flex. For Infosys there is both positive Wednesday effect (B_3 coefficient value 0.00112) and Thursday effect (B_4 coefficient value 0.05206) found significant at 1%, while there is significant (at 5% level) positive effect on Tuesday with coefficient (B_2) value of 0.0654. Patni computers evidenced positive Monday effect (B_1 coefficient value 0.00078) found significant at 5% and negative Tuesday effect (B_2 coefficient value -0.0056) found significant at 1%, with no significance for Wednesday, Thursday and Friday coefficient. In case of Polaris there is negative Wednesday effect (B_3 coefficient value –0.00852) found significant at 1%, and positive Thursday effect (with B_4 co-efficient value of 0.00001) significant at 1 % level, without significant regression coefficients for other weekdays. For Satyam, there is positive Wednesday effect (with B_3 co-efficient of 0.00965) found significant at 5% and a significant (at 1 % level) positive effect on Friday with the co-efficient (B_5) value of 0.01111. The study failed to observe any significance for Monday, Tuesday and Thursday coefficients with regard to Satyam. TCS showed positive Tuesday effect (with B_2 co-efficient of 0.00503) and negative Wednesday effect (with B_3 co-efficient value of –0.00032) both found significant at 1%. There was no significance for Monday, Thursday and Friday coefficients with regard to TCS. For Wipro there is negative Monday effect (with B_1 co-efficient of –0.00085) found significant at 1%, and significant (at 5 % level) positive effect on Wednesday with the co-efficient (B_3) value of 0.00011. Further, the regression analysis failed to observe any significance for Tuesday, Thursday and Friday coefficients with regard to Wipro.

With respect to R^2 (coefficient of determination), the highest value of 0.88 is observed for Infosys and lowest value of 0.52 for Polaris. The R^2 values of the other companies are in the range of 0.52 to 0.88 which implies that the regression model is an appropriate one. Further, the F-value is relatively higher in the range of 1.93 to 7.33 with respect the selected IT Companies with I-Flex having highest F-value of 7.33 with P-value of 0.0014, followed by Satyam with F-value 6.49 and the corresponding P-value of 0.0019.

Table 7. Regression results of day of week effect in IT Sector

Company	Constant	B_2	B_3	B_4	B_5	R^2	F-value
I-Flex	0.00008	0.02506*	0.00028**	0.00112	0.08523	0.68	7.33 (0.0014)
Infosys	0.00089	0.0654**	0.00112*	0.05206*	0.07412	0.88	2.88 (0.025)
Patni	0.00078**	–0.0056*	0.00336	-0.05603	–0.06589	0.58	5.56 (0.0017)
Polaris	–0.00075	–0.00985	–0.00852*	0.00001*	–0.03214	0.52	2.99 (0.0214)
Satyam	–0.00009	0.00203	0.00965**	0.00023	0.01111*	0.75	6.49 (0.0019)
TCS	0.00025	0.00503*	–0.00032*	–0.00045	0.06632	0.69	1.93 (0.112)
Wipro	–0.00085*	–0.00852	0.00011**	0.00111	–0.0334	0.59	2.47 (0.057)

Note: *, ** and ***denote significance at 1%, 5% and 10%, respectively; the values in parenthesis under F-value denote the p-value of the regression analysis.

4.6. Regression Result analysis for Week of the Month effect in IT sector

Table 8 shows the regression results regarding week of month effect for the seven selected IT companies. It is observed that I-Flex, there is positive 1st week effect (with B_1 co-efficient of 0.0058) found significant at 1%, a significant (at 5 % level) positive effect on 3rd week with the co-efficient (B_3) value of 0.00258 but without any significance for 2nd week, 4th week and 5th week coefficients. It is observed that for Infosys there is positive 2nd week effect (B_2 coefficient value 0.00111) found significance at 5% while negative 3rd week effect (B_3 coefficient value -0.00052) found significant at 1%. For Patni there is positive 1st week effect (B_1 coefficient value 0.0063) found significant at 5%, 3rd week effect (B_3 coefficient value 0.02222) found significant at 1%, and no any significance for 2nd week, 4th week and 5th week coefficient. Polaris showed positive 2nd week effect (B_2 coefficient value 0.00552) and negative 4th week effect (B_4 coefficient value –0.009) found significant at 5%, but without significance for 1st week, 3rd week and 5th week coefficient. For Satyam, there is negative 1st week effect (with B_1 co-efficient of –0.0065) found significant at 1%, and positive 3rd week effect (B_3 coefficient value 0.00111) found significant at 5%. Similarly TCS evidenced negative 2nd week effect (with B_2 co-efficient of –0.00057) found significant at 1% and 3rd week effect (with B_3 co-efficient value of –0.0152) found significant at 5%. In case of Wipro there is negative 1st week effect (B_1 coefficient value –0.0074), positive 4th week effect(B_4 coefficient value 0.00852) both found significant at 1%, while the regression results fail to observe any significance for 2nd week, 3rd week and 5th week coefficient with regard to Wipro.

On the analysis of the values of R^2 (coefficient of determination), it is found that highest value of 0.92 is observed for Infosys and lowest value of 0.58 for Wipro, with values in the range of 0.58 to 0.92. A relatively high R^2 value is an indicator that which implies that the regression model is an appropriate one. Analysis of the last column of Table 8 show that the F-value found from the regression analysis is relatively higher in the range of 1.96 to 6.98 with Satyam having highest value of 6.98 (with P-value of 0.0016), followed by Wipro with F-value 5.57 and the corresponding P-value of 0.0028.

Table 8. Regression results of week of the month effect in IT Sector

Company	Constant	B_2	B_3	B_4	B_5	R^2	F-value
I-Flex	0.0058*	–0.00852	0.00258**	0.00112	–0.05096	0.71	2.88 (0.012)
Infosys	–0.0235	0.00111**	–0.00052*	–0.00226	0.00806	0.92	1.96 (0.092)
Patni	0.0063**	0.00052	0.02222*	0.08838	0.00001	0.68	5.53 (0.0027)
Polaris	0.0088	0.00552**	0.00006	–0.009**	–0.00008	0.79	2.65 (0.017)
Satyam	–0.0065*	0.75083	0.00111**	0.00008	0.01235	0.76	6.98 (0.0016)
TCS	0.0083	–0.00057*	–0.0152**	–0.08075	0.00069	0.59	3.99 (0.0018)
Wipro	–0.0074*	–0.00352	–0.00096	0.00852*	–0.08569	0.58	5.57 (0.0028)

Note: * , ** and ***denote significance at 1%, 5% and 10%, respectively; the values in parenthesis under F-value denote the p-value of the regression analysis.

4.7. Limitations of the study

The limitations of the study are:

a) use of secondary data for the price series of selected stocks;
b) an extended period of study of over 16 years, and thus very specific conclusions cannot be effectively reached;
c) only one sector namely Information Technology (IT) sector is used and thus general conclusion on Indian stock market cannot be derived.

5. Conclusions

The study finds that highest average daily return and highest average weekly return in evidenced for Satyam Computers and I-Flex, respectively which indicate that investors should remain invested in such stocks over longer period of time. On other hands, lowest average daily and weekly return is seen for Wipro and TCS respectively,

indicating that these stocks has been under-performer over the study period. The daily volatility and weekly volatility (measured by standard deviation is found to be highest for I-Flex and Wipro, respectively signifying that the returns are not uniform over the period and investors should be careful in day trading in these stocks. Further, Positive deviation between actual and expected values from the Kruskal-Wallis test is observed for all the seven IT companies with respect to two pairs of trading day namely Monday-Wednesday and Tuesday-Thursday with highest value of 44.16 (for I-Flex) and 52.75 (for TCS), respectively. This indicates that abnormal return could be generated by following these pairs of trading days. On the whole, it was observed that the active strategy of buy and sell for Monday-Wednesday and Tuesday-Thursday combination generate relatively less return as compare to passive strategy of buy and hold during the study period. Further, the passive strategy generates highest positive return for the Wipro (7.54%) and lesser returns for Satyam (-5.63%). The study also observed positive deviation between actual and expected values for all the seven IT companies in respect of two pairs of trading week namely 1st week-2nd week and 1st week-4th week with highest value of 43.48 (for Infosys) and 40.04 (for Wipro), respectively. This implies that abnormal return could be generated by following these pairs of trading weeks. On the whole, it was observed that the active strategy of buy and sell for 1st week-2nd week and 1st week-4th week combination generate relatively less return as compared to passive strategy of buy and hold during the study period. Further, the passive strategy generates highest positive return for the Wipro (4.65%) and lowest returns for Satyam (–7.25%). With the exception of Infosys and Satyam Computers, the other five IT stocks under study have shown significant Monday and Tuesday effect in daily return analysis. Infosys evidenced significant Wednesday effect and Thursday effect while the stock returns on Satyam Computers showed significant Wednesday effect and Friday effect On the whole, there is an evidence of day of the week effect in the IT sector. Further, the value of R^2 (in the range of 0.52 to 0.88) is relatively higher which indicates that the deviation in the dependent variable is well explained by the independent variables (week day dummies). Moreover the F-value in the range of 1.93 to 7.33 is also relatively higher.

One possible explanation for such day of the week effect anomaly may be that most of the positive economic news comes at the week end and investors show affirmative and hopeful investment behavior which result in a positive return on first two-three trading days of the week. The results have important practical implications to different capital market participants such as investors, managers and regulatory authorities. Investors can formulate their investment strategies and timing on the basis of this result and can earn some abnormal return by predicting future prices. As the presence of the day of the week anomaly indicates inefficiency of the market, it informs the regulators and policy makers that appropriate measures should be taken to bring informational and operational efficiency in the market. The results of this study pertain only to the IT sector in India and any general conclusions on the Indian stock market with regard to stock price seasonality cannot be inferred from this study.

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