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WEEK OF THE MONTH EFFECT IN INDIAN AUTOMOBILE SECTOR – USING KRUSKAL WALLIS TEST & REGRESSION ANALYSIS

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Abstract
The objective of this paper is to explore the week of the month effect in Indian stock market and more specifically in the Automobile sector. However, later studies identified certain anomalies in the efficient market postulate. One major anomaly brought forth was the calendar-related abnormal rates of return. Various studies in this domain empirically demonstrated, through parametric and non-parametric tests on the stock returns data, that turn of the year, month, week, and holidays have consistently generated abnormal equity returns in both the developed and emerging markets unrelated to the attendant risks. The period of the study is from 1st January 2007 to 31st December 2014 consisting of observations of the daily price series from six automobile companies namely Bajaj Auto, Hero Honda, Mahindra & Mahindra, Maruti, Tata Motors and TVS Motors. For the purpose analysis, the study has employed daily price series that have been obtained from the official website of National Stock Exchange (NSE). For this study, and used Kruskal-Wallis test 'H' statistics for trading strategy, multiple regression technique to examine the significance of the regression coefficient for investigating week of the month effect. The major findings the 1st week-3rd week and 2nd week-5th week sets have positive deviations for all the companies and evidenced on week of month effect mostly 3rd week effect except Mahindra & Mahindra 1st week and 4th week effect.

Key Words: Efficient Market, Non-parametric, Abnormal equity, Emerging Market, Kruskal-Wallis Test, Trading Strategies.

Introduction

The automotive industry in India is one of the largest in the world and one of the fastest growing globally. India's passenger car and commercial vehicle manufacturing industry is the sixth largest in the world, with an annual production of more than 3.9 million units in 2011. According to recent reports, India overtook Brazil and became the sixth largest passenger vehicle producer in the world (beating such old and new auto makers as Belgium, United Kingdom, Italy, Canada, Mexico, Russia, Spain, France, Brazil), growing 16 to 18 per cent to sell around three million units in the course of 2011-12. In 2009, India emerged as Asia's fourth largest exporter of passenger cars, behind Japan, South Korea, and Thailand. In 2010, India beat Thailand to become Asia's third largest exporter of passenger cars. As of 2010, India is home to 40 million passenger vehicles. More than 3.7 million automotive vehicles were produced in India in 2010 (an increase of 33.9%), making the country the second (after China) fastest growing automobile market in the world. According to the Society of Indian Automobile Manufacturers, annual vehicle sales are projected to increase to 5 million by 2015 and more than 9 million by 2020. By 2050, the country is expected to top the world in car volumes with approximately 611 million vehicles on the nation's roads.

Since from 1900, a vast number of the literature from both the practitioner and academic fields examined day-of-the-week effects or day seasonality, week-of-the-month effects on returns of various assets, such as stocks, debt securities, futures, foreign currencies and even commodities. The security prices in an efficient capital market fully reflect their investment value. 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

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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. The security prices in an efficient capital market fully reflect their investment value. The market has the capability to instantaneously impound the given set of information into the pricing process. It is impossible to consistently make abnormal returns using a trading strategy based on a given set of information when the markets are efficient. Many models related to security valuation have been based on this concept of 'informational efficiency of capital markets.' However, the late seventies and the eighties brought in evidences questioning the validity and highlighting various anomalies related to the capital market efficiency.

Objectives of Study

The study of seasonality is segregated into analyzing and measuring the week of the month effect in Automobile sector.

1) To analyze the basic descriptive statistics like mean, median, standard deviation, kurtosis and skewness for daily return.
2) To analyze the trading strategy of Indian stock market for buys with sale or hold.
3) To examine the significance of regression coefficient for the daily effect using multivariate technique.

Related Literature

Research efforts have been directed, in particular, to study price behaviour of common stocks. In an earlier study, by Pandey (2002) used three-year' high-frequency data set of five-minutes returns to construct measures of realized volatility with which some of the extreme-value estimators proposed in the literature and the traditional estimators are compared. Based on five criteria used to evaluate the bias, efficiency and predictive power, the study find that almost all the extreme-value estimators are free of bias and perform well compared to their traditional counterparts for the S&P CNX Nifty stock-index and the 10 constituent stocks studied. A study by Gupta (2002) tried to examine the impact of introduction of index futures on the underlying stock market volatility in India and then compared the futures market volatility with the spot market volatility. Analyzing the daily price data for BSE Sensex and S&P CNX Nifty index from June 1998 to June 2002, the empirical results reported that the overall volatility of the stock market has declined after the introduction of the index futures for both of the indices. However, there was no conclusive evidence, which suggested that, the futures volatility was higher (lower) in comparison to the underlying stock market in terms of both the indices. Joshi and Mukhopadhyay (2004) in their study tried to address whether, and to what extent, the introduction of index futures trading had changed the volatility structure of the underlying NSE Nifty Index. Using a CUSUM plot, Bayesian analysis, the classical F-Test (Variance-Ratio test) and GARCH family of techniques, the results indicated that while the introduction of futures trading had no effect on the underlying mean level of the returns and marginal volatility, it had significantly altered the structure of spot market volatility. Moreover, it was found that new information was assimilated into prices more rapidly than before, and there was a decline in the persistence of volatility since the onset of futures trading. These results for NSE Nifty were obtained after using a control index, namely, NIFTY Junior, which does not yet have a derivative segment. 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.

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. Eleftherios (2009) in his study examines the calendar anomalies/effects in 55 Stock market indices of 51 countries around the world. The calendar effects which are examined are the turn-of-the-Month effect, the day-of-the-Week effect, the Month-of the-Year effect and the semi-Month effect. The methodology followed is to the test hypothesis of two unequal data samples with bootstrapping simulated t-statistics. Simultaneously, with the same procedure a seasonality test is applied in order to investigate if more frequent seasonality on expected returns or in volatility is presented. The study rejected all calendar effects in a global level, except from the turn-of-the-Month effect, which is found present in 36 stock indices and that there is higher seasonality in volatility rather on expected returns, concerning the day of the week and the month of the year effects. 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.

Overview of the NSE

The National Stock Exchange (NSE) is a stock exchange located at Mumbai, India. It is the 11th largest stock exchange world in capitalization and largest in India in terms of daily turnover. NSE has a market capitalization of around Rs 1,97,15,352 crore at December 2014, average daily turnover Rs.99,797 crore and is expected to become the biggest stock exchange in India in terms of market capitalization. Though a number of other exchanges exist, NSE and the Bombay Stock Exchange are the two most significant stock exchanges in India, and they are responsible for the vast majority of securities transactions. The NSE's key stock index is the S&P CNX Nifty, known as the NSE NIFTY (National Stock Exchange Fifty), an index of fifty major stocks weighted by market capitalization.

Data and Methodology

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 six companies based on the three criteria namely profit position, turn over and market capitalization. At the end of the second stage the total six companies could be selected. In the third stage the researcher tried to obtained continuous data for the selected Automobile. In this paper we have taken six selected companies from Automobile sector (Bajaj Auto, Mahindra & Mahindra, Tata Motors, Hero Honda, Maruti and TVS Motors). The period of the study is from 1st January 2007 to 31st December 2014. For the purpose analysis, the study has employed daily price series that have been obtained from the official website of National Stock Exchange (NSE).

Statistical Techniques

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 and is presented in equation 1

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

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 weekly 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 week of the month effects.

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 week of the month.

The hypothesis to be tested relates to equality of mean returns across all the five weeks. In other words, the null hypothesis is that mean returns across all the five 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 (Jason, 1996).

Notational expression of the hypothesis would be as under:

The accepted model for return is presented in equation 2

$R_u = \mu + \tau_i + \varepsilon_{ij}$, …… (2)

i = 1,2……..n

j = 1,2 …….. 5

where, μ is the overall weekly mean, τj quantifies the 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 $j = 1, 2, \ldots.5$ 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 week of the month — 1st week through 5th week.

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

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

…….. (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 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 paper 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 week of the month effect for the selected 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 1st week with other week of the month. The regression analysis was to examine the significance of the seasonality of return for the companies.

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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 week of the month effect on the stock return in the Indian selected companies The regression equation for week of the month is presented below in equation 4,

$$R_t = \alpha + B_2 D_{2t} + B_3 D_{3t} + B_4 D_{4t} + B_5 D_{5t} + e_t \quad \text{…….. (4)}$$

where R_t is weekly returns, calculated using in above both equation D_{2t} , D_{3t} …… D_{5t} are dummy variables from 2nd week to 5th week.

Descriptive Statistical Analysis

Table 1 depicts the values of descriptive statistics for each of the weeks for the selected six companies. The statistical parameters studied are mean, median, Standard deviation, Kurtosis and Skewness. It is observed that relatively higher values of mean return (in consistent manner) is for Tata Motors in the range of 0.0005 to 0.0458,

with the exception of 5th week mean return with negative value of -0.003. Only Bajaj Auto evidenced consistently positive mean return for each for the five weeks with all week average of 0.0073. Lower levels of mean return for the weeks are observed for TVS Motors in the range of -0.0004 to 0.0061 with all week mean return of -0.0432. Further, it is found that very high level of mean return for some weeks and lower levels for other weeks is observed for Hero Honda in the range of 0.0418 to -0.0001 for 1st week to 4th week, while lower values in range of levels of -0.0001 to -0.0046 for 1st week, 3rd week and 5th week with all weeks mean return of 0.0014. For Mahindra & Mahindra, negative mean return is found for 5th week with positive values for remaining weeks and all week average of 0.0638. In case of Tata Motors, there is evidence of inconsistently higher and lower values of mean return for the weeks with all week's average being 0.0013. Hero Honda, Tata Motors and Bajaj have lower levels of week returns with all week mean of 0.0014, 0.0013 and 0.0073 respectively. TVS Motors is found to have the minimum weeks mean return for 2nd week (-0.0004), with all week average value of 0.0432.

With regard to median, it is observed that higher values are observed for Bajaj Auto in the range of 0.0014 to 0.0457 with the exception of 1st week and 5th week median return with lower value of 0.0023 and 0.0014, respectively. Only. Bajaj Auto evidenced consistently positive median return for each for the five weeks. Lower levels of median return for the weeks are observed for Maruti in the range of -0.0014 to .0081 with all week median of 0.0238. Further, it is found that very high level of median return for some weeks and lower levels for other weeks is observed for Hero Honda in the range of -0.0019 to 0.0628 for all four weeks are lower values except 4th week median value 0.0628 and all week median of 0.0034. For Tata Motors, negative median return is found for 2nd week and 4th week with positive values for remaining weeks and all week median of return -0.0021. In case of TVS Motors, there is evidence of inconsistently higher and lower values of median return for the weeks with all week median return being positive at 0.0349. Tata, Bajaj and Maruti have lower levels of week returns with all week median of -0.0021, 0.0009 and 0.0238, respectively. Mahindra & Mahindra is found to have the minimum weeks median return for 5th week (-0.0034), with all week median value of 0.0638.

Table 1 Descriptive statistics

Name of company	Parameter	1ST week	2nd week	3rd week	4th week	5th week	All weeks
Bajaj Auto	Mean	0.0017	0.0503	0.0016	0.0464	0.0007	0.0073
	Median	0.0023	0.0457	0.0071	0.0348	0.0014	0.0009
	Standard deviation	0.0356	0.0355	0.0406	0.03643	0.0367	0.0335
	Kurtosis	3.8122	20.5666	1.2177	36.4683	1.8415	0.9013
	Skewness	-0.4548	3.5369	-0.0176	4.9196	-0.0345	0.1324
Mahindra &Mahindra	Mean	0.0005	0.0398	0.0005	0.0433	-0.0004	0.0475
	Median	0.0041	0.0231	0.0012	0.0097	-0.0034	0.0638
	Standard deviation	0.0242	0.0204	0.0280	0.0211	0.0258	0.0250
	Kurtosis	1.3046	4.4363	2.1547	3.0418	1.8527	0.1062
	Skewness	0.5271	1.6937	0.2135	1.5293	0.6198	0.8547

Tata Motors	Mean	0.0005	0.0458	0.0006	0.0035	-0.0030	0.0013
	Median	0.0072	-0.0098	0.0012	-0.0083	0.0040	-0.0021
	Standard deviation	0.0315	0.0276	0.0365	0.0739	0.0327	0.0278
	Kurtosis	2.9895	13.9181	4.9632	0.0784	6.5916	3.1725
	Skewness	0.0755	2.4391	0.3310	0.0920	0.6319	0.5342
Hero Honda	Mean	-0.0001	0.0009	-0.0003	0.0418	-0.0046	0.0014
	Median	0.0002	0.0012	0.0001	0.0628	-0.0019	0.0034
	Standard deviation	0.0308	0.0353	0.0307	0.0249	0.0301	0.0361
	Kurtosis	1.3285	0.1671	1.1156	1.1308	1.1448	2.5428
	Skewness	0.2446	0.4329	0.5821	1.0720	0.5265	0.4408
Maruti	Mean	0.0004	0.0008	0.0004	-0.0024	-0.0034	0.0506
	Median	0.0048	0.0038	0.0081	0.0001	-0.0014	0.0238
	Standard deviation	0.0323	0.0443	0.0391	0.0341	0.0322	0.0234
	Kurtosis	3.9689	0.4675	4.0429	0.8293	3.5152	0.0561
	Skewness	0.0245	0.2534	-0.0254	0.1057	-0.0553	0.6987
TVS Motors	Mean	0.0017	-0.0004	0.0015	-0.0061	0.0012	0.0432
	Median	0.0196	0.0001	0.0029	-0.0012	0.0089	0.0349
	Standard deviation	0.0355	0.0325	0.0384	0.0282	0.0310	0.0241
	Kurtosis	1.2317	5.1176	3.4608	3.5284	2.0514	2.3583
	Skewness	0.1269	0.2229	-0.0613	0.2242	0.3223	1.4374

Relatively higher values of standard deviation for the weeks are observed for Tata Motors in the range of 0.027 to 0.0739, with the exception of 2nd week with lower value of 0.0276. Lower standard deviation for the weeks are observed for Bajaj Auto in the range of 0.0355 to 0.0406 with all week standard deviation of 0.0335. Maruti Auto is observed to have consistently positive standard deviation for each of the five weeks with all weeks value of 0.0238. Bajaj is found to have the minimum standard of deviation return for 2nd week (0.0355), with all week value of 0.0335. Mahindra & Mahindra have lower standard deviations value in 4th week (0.0211) along with Tata Motors evidencing higher standard deviations in 4th week with value of 0.0739.

With regard to Kurtosis, higher values are observed for Bajaj Auto in the range of 1.2177 to 36.4683, the all week Kurtosis lower at 0.9013 with 4th week and 2nd week highly peaked having value of 36.4683 and 20.5666,

respectively. Lower range of kurtosis for the weeks are observed for Hero Honda in the range of 0.1671 to 1.3285 with all week kurtosis of 2.5428. Further, it is found that very high range of kurtosis for some weeks and lower levels for other weeks is observed for Bajaj Auto in the range of 1.2177 to 1.8415 for 3rd week to 5th week. Mahindra & Mahindra is observed to have consistently positive kurtosis value for each of the five week Kurtosis with all weeks of 0.1062. For Mahindra & Mahindra, Maruti, TVS, Bajaj and Tata Motors kurtosis is found highly peaked for three weeks, while Maruti, TVS and Bajaj evidenced highest Kurtosis value for two weeks.

With regard to skewness, it is observed that relatively higher values for the weeks are observed for Bajaj Auto in the range of -0.4548 to 4.9196, with the all week skewness of 0.1324. The returns on 4th week is highly skewed with value of 4.9196 followed by 2nd week Kurtosis value of 3.5369, and other weeks less consistent . Lower range of skewness for the weeks are observed for TVS in the range of -0.0613 to 0.3223 with all week skewness of 1.4374. Further, it is found that Hero Honda has Kurtosis value of returns all positive but very less skewed. Very high range of skewness for some weeks and positive skewed is observed for Bajaj in the range of -0.4548 to 4.9196 for 1st week to 4th week. In all week skewness, TVS is more skewed with value of 1.4374 and Bajaj has less positive skewness.

Analysis of Kruskal-Wallis Test

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 weeks. Further, we have calculated Annual Returns for the active and passive strategies.

Table 2 presents the value of actual and expected multiples comparison from Kruskal-Wallis test, along with the deviation for each pair of trading week combination. It is observed that the deviation between actual and expected value is positive for all the six Automobile companies with respect to two combinations namely 1st-3rd week and 2nd-5th week. For the combination 1st-3rd week, highest positive deviation of 28.69 is evidenced for Maruti Auto and lowest deviation 7.45 for Bajaj Auto. Similar observation is also found for the 2nd-5th week combination with highest positive deviation of 31.55 for Maruti Auto and lowest positive deviation of 8.41 for Mahindra & Mahindra.

This implies that with the respect to the six Automobile companies positive higher return could be generated by following either of the activity trading strategy of 1st-3rd week combination or 2nd-5th week combination, thus evidencing week of the month effect. Further, it is observed that positive deviations exist for the other trading week combination for some of the Automobile companies and negative for others. Since the deviations are not positive across each of the six companies for the other trading week combination all the pairs of combination are not considered for calculating the annual return.

The study has analyzed and calculated the annual return generated for 1st-3rd week and 2nd-5th week combination of along with passive strategy buy-hold. Table 6.16 depicts the annual returns for each of the six Automobile companies with respect the 1st-3rd, and 2nd-5th week and buy-hold strategy. It is observed that annual return for Mahindra & Mahindra shows positive return for 1st-3rd week combination (0.54%) and annualized return of -2.36% for the passive strategy of buy and hold over the study period.

Similarly in case of Tata Motors, the passive strategy of buy and hold generates annual return of 5.99% and also positive return of 0.65% for 1st-3rd week combination. But the annual return for 2nd-5th week combination is negative at 0.23% for TVS Motors. On the other hand, both M & M and TVS Motors are observed to generate annual return of -2.36% and -3.54% respectively for the passive strategy of buy and hold during the study period. Similarly negative return is also observed for the active strategy of 1st-3rd week for the Hero Honda. The notable exceptions being the positive return of 0.87% for 1st-3rd week combination with respect to Bajaj Auto, and the positive annual return of 0.31% for 2nd-5th combination for Maruti.

On the whole, it is observed that the active strategy of 1st-3rd week and 2nd-5th week generates lesser return (less then 1%) as compared to passive strategy of buy and hold for the six Automobile companies. Further, highest positive return is for Tata Motors, and maximum negative return for TVS Motors with respect to passive strategy.

Table 2 Actual and Expected Multiple Comparisons value and the Deviations for pairs of weeks

COMPANY	BAJAJ AUTO			MAHINDRA &MAHINDRA			MARUTI			HERO HONDA			TATA MOTORS			TVS MOTORS		
Week	Actual	Exp.	Dev.	Actual	Exp.	Dev.	Actual	Exp.	Dev.	Actual	Exp.	Dev.	Actual	Exp.	Dev.	Actual	Exp.	Dev.
1st -2nd	12.87	95.53	-82.66	23.67	96.45	-72.78	108.66	95.67	12.99	98.09	95.03	3.06	6.43	95.67	-89.24	109.45	96.94	12.51
1st -3rd	103.78	96.33	**7.45**	117.93	96.33	**21.6**	124.77	96.08	**28.69**	107.87	96.68	**11.19**	107.94	96.09	**11.85**	118.03	95.34	**22.69**
1st -4th	112.65	95.67	16.98	98.43	95.33	3.1	76.65	96.85	-20.2	74.53	89.98	-15.45	123.75	95.05	28.7	109.54	96.67	12.87
1st -5th	7.08	96.12	-89.04	103.78	96.67	7.11	102.74	95.65	7.09	115.46	95.03	20.43	65.89	96.56	-30.67	102.64	96.56	6.08
2nd-3rd	85.33	95.23	-9.9	33.88	96.23	-62.35	5.78	95.73	-89.95	45.03	96.56	-51.53	104.25	96.04	8.21	115.53	96.02	19.51
2nd-4th	90.11	95.67	-5.56	78.09	96.77	-18.68	88.33	96.73	-8.4	112.97	96.62	16.35	111.03	96.87	14.16	93.09	96.03	-2.94
2nd-5th	114.23	96.46	**17.77**	103.45	95.04	**8.41**	127.89	96.34	**31.55**	118.38	95.96	**22.42**	123.03	96.94	**26.09**	105.09	95.33	**9.76**
3rd -4th	4.02	96.67	-92.65	108.89	96.02	12.87	83.73	96.12	-12.39	38.08	96.05	-57.97	4.75	95.48	-90.73	87.89	95.09	-7.2
3rd -5th	76.91	96.35	-19.44	137.46	96.77	40.69	67.98	96.08	-28.1	108.76	96.23	12.53	115.75	95.9	19.85	95.9	96.05	-0.15
4th -5th	100.02	95.13	4.89	77.85	95.33	-17.48	112.67	96.23	16.44	6.43	95.67	-89.24	34.86	96.74	-61.88	114.95	96.35	18.6

Notes:-1st-3rd denotes the paired combination of 1st week-3rd week for which the actual and expected comparison values are calculated. Similarly for the other pairs of trading weeks.

Table 3 Annual Returns (in %) generated by paired week active strategy and passive strategy						
COMPANY / WEEK	**BAJAJ AUTO**	**M & M**	**MARUTI**	**HERO HONDA**	**TATA MOTORS**	**TVS MOTORS**
1^{st} -3^{rd}	0.87%	0.54%	0.45%	-0.12%	0.65%	0.61%
2^{nd} -5^{th}	0.59%	-0.35%	0.31%	0.58%	0.32%	-0.23%
Buy- Hold	4.58%	-2.36%	2.32%	3.21%	5.99%	-3.54%

Regression Result Analysis

Table 4 shows the results of regression analysis regarding week of the month effect for the selected automobile companies. It is observed that for Bajaj Auto, there is positive 2^{nd} week effect (with B_2 co-efficient of 0.00687) found significant at 1%, and a significant (at 5 % level) positive effect on 3^{rd} week with the co-efficient (B_3) value of 0.0054. Further, the regression analysis failed to observe any significance for 1^{st} week, 4^{th} week and 5^{th} week coefficients with regard to Bajaj Auto.

It is observed that for Mahindra and Mahindra there is positive effect both for 1^{st} week effect (B_1 coefficient value 0.0068) and 4^{th} week effect (B_4 coefficient value 0.0065) found significant at 1%. For Maruti Auto there is negative 2^{nd} week effect (B_2 coefficient value -0.0087) found significant at 1%, but without any significance for 1^{st} week, 3^{rd} week, 4^{th} week and 5^{th} week coefficient.

Table 4 Regression results							
Company	**Constant**	**B_2**	**B_3**	**B_4**	**B_5**	**R^2**	**F-value**
Bajaj Auto	-0.0025	0.00687*	0.0054**	-0.154	0.0003	0.57	2.11(0.075)
Mahindra & Mahindra	0.0068*	-0.0034	0.0008	0.0065*	-0.0087	0.61	1.76(0.058)
Maruti	0.0065	0.0005	-0.0087*	0.00784	0.00054	0.78	3.34(0.003)
Hero Honda	0.0037**	0.0074*	0.00545***	0.00651	-0.0058	0.59	2.42(0.045)
Tata Motors	-0.0034	0.0065	0.00671*`	0.0006	0.00246	0.81	6.67(0.007)
TVS Motors	0.00154*	-0.0023	-0.00571**	0.0069	0.00874	.52	6.25(0.004)
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.							

Hero Honda evidenced positive 1^{st} week effect (B_1 coefficient value 0.0037) found significant at 5%, 2^{nd} week effect (B_2 coefficient value 0.0074) and also significant 3^{rd} week effect (B_3 coefficient value 0.00545) found at 10% significance. Tata Motors, showed positive 3^{rd} week effect (with B_3 co-efficient of 0.00671) found significant at 1%, while the regression analysis failed to observe any significance for 1^{st} week, 2^{nd} week, 4^{th} week and 5^{th} week coefficients. The regression results for TVS Motors, evidenced positive 1^{st} week effect (with B_1 co-efficient of 0.00154) found significant at 1% and negative 3^{rd} week effect (with B_3 co-efficient value of -0.00571) found significant at 5% and no significance for the other weeks.

The highest value of R^2 (coefficient of determination), at 0.81 is observed for Tata Motors and lowest value of 0.52 for TVS Motors. The R^2 values for the other automobile companies are in the range of 0.52 to 0.81 which implies that the regression model is an appropriate one and provides good results regarding the significance of the regression coefficients. The F-value found from the regression analysis is relatively higher in the range of 1.76 to

6.67 with respect the selected automobile companies. Tata Motors has highest F-value of 6.67 (with P-value of 0.006), followed by TVS Motors with F-value 6.25 and the corresponding P-value of 0.004.

Findings of Descriptive Statistics

With regard to average all week return, highest and lowest value is found for Maruti and Tata Motors, respectively. Similarly with regard to standard deviation for all week return, highest and lowest value is found for Tata Motors and Mahindra & Mahindra, respectively. The kurtosis for all week return is highest and lowest for Tata Motors and Maruti, respectively. Similarly with respect to skewnes for all week return, highest and lowest value is observed for TVS Motors and Bajaj Auto, respectively.

Findings on Kruskal-Wallis Analysis

Positive deviation between actual and expected values from the Kruskal-Wallis test is observed for all companies in respect of two pairs of trading week namely 1st week-3rd week and 2nd week-5th week with highest value of 28.69 and 31.55 both for Maruti. This implies that abnormal return could be generated by following these pairs of trading weeks. Overall, it was observed that the active strategy of buy and sell for 1st week-3rd week and 2nd week-5th 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 Tata Motors (5.99%) and lesser returns for TVS Motors (-3.54%).

Findings on Regression Analysis

The study has analyzed the week of the month effect in the selected six automobile companies. It is found that Bajaj Auto has 2nd week effect and 3rd week effect significant at 1% and 5%, respectively. Further, Mahindra & Mahindra has 1st week effect and 4th week significant both at 1%. In case of Maruti, the study finds significant 3rd week effect at 1%.Hero Honda is also observed to have significant 1st week effect, 2nd week effect and 3rd week effect significant at 5%, 1% and 10%, respectively. In case Tata Motors, the study finds 3rd week effect significant at 1%. With respect to TVS Motors, the study finds significant 1st week effect (at 1%), and 3rd week effect (at 5%). On the whole, there is an evidence of week of the month effect in the automobile sector. Further, the value of R^2 (in the range of 0.52 to 0.81) is relatively higher which indicates that the deviation in the dependent variable is well explained by the independent variables (week dummies). Moreover the F-value in the range of 1.76 to 6.67 is also relatively higher.

Conclusion

The study aims at exploring comprehensive analysis of the stock price behavior, more specifically on the seasonality effect, in the Indian stock market. The seasonality effect is examined by a detailed analysis of trading strategy of week of the month effect and the period from 1st January 2007 to 31st December 2014. The study found significant week of the month effect for specific trading weeks. The multiple regression analysis also found evidence of week of the month for the price series with regard to the selected companies. Further, the value of R^2 for the derived regression models for each of the selected companies relatively higher which indicate that the deviation in the dependent variable is well explained by the independent variables. On the whole, the price series in the Indian stock market showed signs of return seasonality with respect to week of the month.

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