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DAY-OF-THE-WEEK AND OTHER MARKET ANOMALIES IN THE INDIAN STOCK MARKET

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Abstract

The anomalies of the market relating to the calendar period are the source of introspection for the efficient market hypothesis. As the market tries to take and assimilate information in the prices, it becomes more efficient and predicting price and tiding over market situation becomes more and more difficult. The fact that market prices are predictable as there are patterns in it, make it non-random and weak. This paper tries to understand in this context the price behaviour of the Indian stock market and find if the market prices of the calendar event such as day of the week and month of the year has any effect on the Indian stock market. The data for this study consist of NSE data that comprise of weekly data for the period 1995-2015 and daily data for the period 2001-2015. This study indicates that though the Indian market does exhibit seasonality in returns, this seasonality is very different from that observed commonly in other markets.

Key Words: Efficient Market Hypothesis, Day of the week, Month of the Year

1. Introduction

The strong seasonal effect in stock market returns has been clearly established through a large number of studies. This anomaly has strong implications for stock market efficiency as well as trading strategies in the market. Many recent studies have tried to see if it is possible to outperform the market based on these seasonal variations in returns, with mixed results. Ward (1997) claims that because these seasonal patterns are anticipated now, it is becoming increasingly difficult to make money from these effects. It is interesting to note that the January effect has not been observed in the US market over any four consecutive years (Star, 1996). As opposed to these findings, a study by Chow et al. (1997) indicates that it is possible to attain

superior trading returns by making use of the negative Friday returns (intra-day) and confining trading to weekends. Whatever the truth maybe, the interest in this area has continued to sustain through this decade as seen from the research conducted in the area.

1.1 Day-of-the-week effect

This effect relates to the difference in returns across different days of the week. The main findings have been lowest and usually negative returns on Mondays and exceptionally large returns on Fridays as compared to other days of the week (French, 1980; Hess, 1981; Cornell, 1985; Keim and Stambaugh, 1984). The variance in stock returns is found to be largest on Mondays and lowest on Fridays. A study by Wang et al. (1997) finds that the negative Monday returns occur in the last two weeks of the month and that mean Monday returns for the first three weeks of the month are not significantly different from zero.

The international evidence of this effect has been somewhat mixed. Dubois and Louvet (1996) find returns to be lower for the beginning of the week (but not necessarily Monday) for European countries, Hong Kong and Canada. They did, however, observe that the anomaly disappeared in the USA for the most recent periods. Agrawal and Tandon (1994), find negative Monday returns in nine countries and negative Tuesday returns in eight countries (out of a total of 19 countries). Also, the Tuesday returns are lower than Monday returns in eight countries. Draper and Paudyal (2001) find that once fortnight, ex-dividend day, account period, news flow, trading activity and bid-ask spread effects are controlled for the Monday returns do not differ significantly from returns of other days.

Studies done on bond markets have also acknowledged the day-of-the-week effect (Kohers and Patel, 1996; Adrangi and Ghazanfari, 1996) but results are significantly different from that in the stock market. Monday returns are found to be positive on the average.

Many theories have been postulated to explain the day-of-the-week effect with the popular ones are as follows.

a. **Settlement period hypothesis.** This attributes seasonality across days of the week to the settlement dates with prices being higher on the pay-in days as compared to the pay-out days. This theory has

been opposed by some as the anomaly holds across markets that have different settlement periods (varying from one day in France and Hong-Kong to six-fifteen days in the UK – Agrawal and Tandon, 1994).

b. **Calendar time/trading time hypothesis**. Calendar time trading implies that Monday returns should be three times as high as that for other days because Monday returns are spread across three days. The observed negative Monday returns go against this intuitive reasoning and another theory was proposed, which postulates that returns should be proportional to the trading time as opposed to calendar time. An interesting study on the weekend returns (Rogalski, 1984) shows that the negative returns over the weekend occurs during the non-trading period from Friday-close to Monday-opening and that Monday trading returns are actually positive.

c. **Information flow hypothesis**. This theory postulates that the difference in information flow over the weekend as compared to other days of the week causes the Monday effect (Dyl and Maberly, 1988). Often companies hold back negative information till the weekend as it gives the investors two non-trading days to absorb the information before reacting with trading activity. Consequently, all the sell orders get pushed to Monday, thereby giving negative returns.

d. **Retail investor trading hypothesis.** Brooks and Kim (1997), suggest that negative Monday returns could be the result of individual investor trading activity. Using odd lot trades as proxy for individual investors, they found that trading activity is significantly lower on Monday for large size trades. Moreover, small size trades have a higher percentage of sell orders on Monday as compared to other days of the week.

1.2 Month of the year effect

This effect looks at the variation in returns across different months of the year (Gultekin and Gultekin, 1983) and most studies find that the returns are large in January and low in December (Keim, 1983; Chatterjee and Maniam, 1997). The January effect is also related to the size of the firm

with evidence showing that small capitalisation stocks outperform large capitalisation stocks in January. Again, many theories have been postulated to explain this phenomenon. Dutta (2008), found that there are no month of year effect as far as the season of festive hypothesis (in the Month of October) hold good for BSE.

a. Tax-loss selling hypothesis (Branch, 1977). This states that year-end tax-loss selling of shares is responsible for the disproportionate returns in January. A recent study by Johnston and Cox (1996) corroborates this theory through their study of firms that are likely candidates for tax-loss selling. For firms that experience the largest declines in the last half of the year, positive January returns are found in the following year.

   January effect has been found mainly in the USA and Canada (Athannassakos, 1997) and also in many of the Pacific-basin countries (Lee, 1992). It should be noted that many of the Pacific-basin countries (Lee, 1992) have no taxes on capital gains and have different financial year endings. A study by Raj and Thurston (1994) indicates that there is no January or April effect in New Zealand. Portfolio rebalancing by institutions is a phenomenon which has been found to exist in sufficient size to affect prices around the end of the year (Porter et al., 1996) and may be responsible for a large part of the small firm January effect in the USA.

   A study by Ligon (1997) suggests that the January effect is significantly related to excessive investor liquidity in that month. He finds that higher January volume and lower real interest rates are correlated with higher January returns. Bensman (1997) also attributes this effect to a behavioural finance phenomenon of irrational exuberance of investors.

1.3 Some other seasonal effects

Apart from these two main seasonal effects, there are others like the December-end holiday effect (Ariel, 1990) which finds that the pre-holiday returns are usually large. Then there is the turn of the month effect (Ariel, 1987) where returns are found to be higher around the end of the month. The Friday the Thirteenth effect suggests that returns on these days is negative as compared to other Fridays (Kolb and Rodriguez, 1987; Dyl and Maberly, 1988). Lamb et al. (2004) find that negative returns for the spring and

fall daylight savings time weekend returns found by Kamstra et al. (2000) are not consistent and significant.

1.4 Implications for stock market efficiency

There are two views as to whether these effects can in fact be called aberrations at all. One opinion is that the expectation of uniform returns across any unit of time is not a necessary condition for market equilibrium (though it is statistically convenient to assume so) and hence should be taken as a fact with efforts to incorporate it in various market efficiency tests (Hess, 1981). The other and more popular belief is that homogenous distribution of stock market returns across any unit of time is a necessary condition for market equilibrium and hence these are anomalies of the efficient market hypothesis. Khaksari and Bubnys (1992) find that these anomalies exist even after adjusting the returns for risk premium and suggest that they provide scope for trading profits.

1.5 Gap in research

Most of the work in this area has concentrated on the developed markets with only a few studies covering the emerging markets of Asia. This paper investigates the evidence of these effects in the Indian market, a market not studied before. The Indian market is unique as it has its own financing system (Badla financing), settlement period durations as well as trading regulations. The existence of these seasonal anomalies in this market will help verify/contradict some of the hypothesis discussed above as possible explanations. This paper examines the two major indices of the market and a comparison between these helps verify the existence of seasonality across a large band of stocks. In view of the burgeoning interest in the emerging markets, this paper is a step towards understanding these markets better and finding anomalies that could seriously influence trading strategies within the same.

1.6 Scope

This paper attempts to study the existence of the seasonal stock market anomalies in the Indian stock market and it tests the market for day-of-the-week effect, weekend effect and January effect. The next section discusses

the Indian stock market, its peculiarities and differences from the other developed markets of the world. An outline of the methodology adopted as well as the data used follows in Section 4. The results from the statistical tests are then discussed in Section 5 followed by the conclusion and implications of this study.

2. A Contextual understanding of the Indian stock markets for understanding the background of the anomalies.

India has a very well-developed stock market with over 5,000 companies listed. With the economic liberalisation process that began in 1991, and the entry of foreign institutional investors, the market has grown in terms of market capitalisation as well as trading volumes. The Bombay Stock Exchange (BSE) and the National Stock Exchange (NSE) are the two major stock exchanges in the country, which are supplemented by a few other regional stock exchanges. Based on the two major exchanges, the main indices in the Indian market are:

BSE index. The BSE is the largest stock exchange in India with over 5,000 listed companies. The BSE Index is composed of thirty blue chip companies that are weighted by their market capitalisation. The criterion for inclusion of companies in the Index is based on their market size and trading volumes.

NSE. The NSE was set up as recently as 1990 with the objective of making trading broad based at a national level. The NSE was made operational in 169 cities including regional and non-regional centres. The NSE Index is composed of 50 main companies and this index is aimed to be more broad-based as compared to the BSE Index.

Badla financing. The Indian stock market has some features that make it different from other markets in the world. It used a unique financing system known as Badla financing to carry forward trades from one settlement period to the next. Badla financing was done in two ways – by direct lending or by lending short positions (Narasimhan, 1996; Surana, 1998).

In direct lending, the Badla financier lent money to the long buyer to carry the trade forward. When the long buyer decided to settle his position, he returned this money to the Badla financier along with the interest (Badla charge) due on it.

In lending short positions, carry forward was done as a two-way transaction, both parts of which were executed simultaneously by the Badla financier during the Badla session. The first leg was a stock purchase transaction at the standard rate in the current settlement while the second leg was a stock sale transaction (to the long buyer) at the standard rate plus the interest charge (Badla charge) in the next settlement.

This system imparted liquidity to the market but the lack of adequate margin requirements made it very easy to indulge in speculative trading.

In 1994, the market crashed after a long bull run and the trading volumes were very low. At this stage, the Securities and Exchange Board of India (SEBI) banned Badla financing as well as forward trading until 1996.

Many different forms of forward trading system were considered subsequent to the era of Badla financing and the current one consists of three groups of shares:

(1) BSE forward shares. These are the most frequently traded shares and trading in these shares can be carried forward to the next settlement. There is a 10 per cent margin requirement on all trading with the exchange reserving the right to impose further ad hoc margins in case of volatile trading in any particular scrip .

(2) BSE cash B1 shares. Trading in these shares has to be completed by the end of the settlement period.

(3) BSE cash B2 shares. This category comprises the remaining stocks on the market, which have to be dealt in strictly on a cash basis.

Until 1994, the Indian market had a 14-day settlement period but since 1996 it has been shortened to one week. The settlement period ends on a Friday on the BSE and a Tuesday on the NSE.

Trading on the Indian market is through brokers and sub-brokers. The market was computerised on the NSE in 1990 and on the BSE in 1996. This made it possible to offer direct market quotes to investors. Prior to that, investors had to give trading limits and depend upon brokers for the actual price of trade execution. Often, members of the exchange specialise in trading of specific stocks and offer two-way quotes, but there

are no official market makers. Another feature of the market is the 31 March financial year ending (as opposed to 31 December in many countries). There is a capital gains tax imposed on gains from the market. One can also offset capital losses against capital gains for tax purposes.

3. Data and method of study

3.1 Data

The data for this study consist of NSE data that comprise of weekly data for the period 1995-2015 and daily data for the period 2001-2015. The daily data are used for the day-of-the-week and weekend effect while the weekly data are used for the January effect. All the data points where returns are zero have been eliminated. Also those weeks where data are not available for all days of the week have been eliminated.

3.2 Method of Study

The tests performed are from the parametric group and the various hypothesis tested are listed below. Multiple Regression using dummy variables as been carried out and the F-as well as t-tests have been done to test for significance. The daily returns are calculated as:

$$R(t) = \frac{\text{Ln [I (t)]}}{\text{(t-1)}} \times 100 \quad \text{..... Equation (1)}$$

Where I(t) refers to index price on day t

2.1 Week day effects. Day-of-the-week effect.

Model : $R_t = a_1 d_1 + a_2 d_2 + a_3 d_3 + a_4 d_4 + a_5 d_5 + \varepsilon_t$ ……Equation (2)

Where, Rt is the return on day t, R_t = Ln(I (t))/I (1-t)*100 where I(t) is the index price on day t, a_1 is the mean return of each day and d_1 to d_2 are day of the week dummy variables that are either 0 or 1 (d_1= 1 for Monday and 0 otherwise and so on) and ε is the random error term for day t.

Hypothesis (Ho): a1 = a2 = a3 = a4 =a5

If this hypothesis is rejected, it would imply that the mean daily returns a1 are significantly different from each other, i.e. there is seasonality in returns across different days of the week.

Hypothesis (Ho): Each a_1 is tested for significance (difference from zero)

Weekend effect. This tests the following two hypotheses:

Trading time hypothesis. Mean return (Monday)= Mean return (other days of the week):

Model : $R_t = a_1 d_1 + a_2 d_{2t} + a_3 d_{3t} + a_4 d_{4t} + a_5 d_{5t} + \varepsilon_t$ ……Equation (3)

Where Rt is the return on day t; a0, expected Monday return; a2 to a5, difference between expected Monday returns and the returns on other days of the week; d2 through d5 are day-of-the-week dummies that are either 0 or 1 (d2 = 1 for Tuesday and 0 otherwise and so on).

Hypothesis (Ho): a2 = a3 = a4 =a5 =0

If this hypothesis is rejected, it implies that the Monday returns are significantly different from other days of the weeks. Moreover, the sign of coefficients a2 to a5 indicates whether the difference is positive or negative.

For the calendar time hypothesis. Mean return (Monday) = 3 X mean return (other days of the week):

Model : $R_t = a_1 d_1 + a_2 d_{2t} + a_3 d_{3t} + a_4 d_{4t} + a_5 d_{5t} + \varepsilon_t$ …… Equation (4)

Where Rt is the return on day t; a0, expected Monday return/3; a2 to a5, difference between one-third of Monday returns and the returns on other days of the week; d2 through d5 are day-of-the-week dummies that are either 0 or 1 (d2 ¼ 1 for Tuesday and 0 otherwise and so on).

Hypothesis (Ho): a2 = a3 = a4 =a5 = 0

If this hypothesis is rejected, it implies that one-third of Monday returns are significantly different from other days of the weeks. The sign of coefficients a2 to a5 indicates whether the difference is positive or negative.

3.3 Month of the year effect. January effect

Model : Rt = a_0 + a_i d_{it} + εt …… Equation (5)

Where Rt is the monthly return in month t; a0, expected January return; ait, difference between the expected return for January and the other months of the year; dit, dummy variable for months of the year and are 0 or 1 (d2t = 1 for February and 0 otherwise and so on).

Hypothesis (Ho): a2 = a3 = · · · = a12 =0

If this hypothesis is rejected, it implies that January returns are significantly different from other months of the year. The signs of coefficients a2 to a12 indicate whether the difference is positive or negative.

April effect: The April effect test is similar to the January effect test. It is being done for the Indian market to test the tax-loss selling hypothesis because the financial year ending in India is 31 March.

Model : Rt + a_0 + $a_i d_{it}$ + ε_t …….. Equation 5

Where Rt is the return in month t; a0, expected April return; ait, difference between the expected return for April and the other months of the year; d_{it}, dummy variable for months of the year and are 0 or 1 (d_2 t = 1 for February and 0 otherwise and so on).

Hypothesis (Ho): a2 = a3 =· · · = a12 =0

If this hypothesis is rejected, it implies that April returns are significantly different from other months of the year. The sign of coefficients a_2 to a_{12} indicates whether the difference is positive or negative.

4. Results and Discussion

a. **Week day effects Day-of-the-week effect**. The results indicate that the variation in the returns across different days of the week is not significant at the 10 per cent level, i.e. the null hypothesis cannot be rejected (Table 4.1). The Monday returns are however, not negative, thereby contradicting the negative Monday effect. In fact, Monday returns are strongly positive (at the 5 per cent significance level). The Tuesday returns are negative (though not significant) as also found by Agrawal and Tandon (1994) and Dubois and Louvet

(1996). The day-of-the-week effect being insignificant is in contrast to the result found by Chan et al. (1996) on the Indian market.

Table 4.1 Coefficients of the regression of the Week days tested on NSE data

Week days	Coefficients (F=5950=1.007)	t-statistics
Monday	0.315	1.743 * *
Tuesday	-0.203	-1.125
Wednesday	0.160	0.888
Thursday	0.050	0.282
Friday	0.284	1.571

Notes: *Significant at 5 per cent; * *significant at 10 per cent

Source: Computed

b. Weekend effect.

As Monday returns are found to be significantly positive, the data has been analysed for the weekend effect (Table 4.2). The Monday returns again are not significantly different from the other days of the week at the 10 per cent level. The returns for all four days are lower than Monday.

As Monday returns are much higher than for other days of the week, the calendar time hypothesis has been tested (Table 4.3) and proves significant at 1.6 per cent. Tuesday and Thursday returns are still significantly lower than Monday returns.

Table 4.2 Week End effect coefficients

Week days	Coefficients (F=4950=1.346)	t-statistics
Monday	0.315	1.745 * *

Tuesday	-0.518	2.029 *
Wednesday	-0.155	0.605
Thursday	-0.264	1.033
Friday	-0.031	0.122

Notes: *Significant at 5 per cent; * *significant at 10 per cent

Source: Computed

Table 4.3 Calendar Time Coefficients

Week days	**Coefficients (F=4950=3.038)**	**t-statistics**
Monday	0.105	1.016
Tuesday	-0.309	2.110 *
Wednesday	0.055	0.380
Thursday	-0.054	0.370
Friday	0.179	1.223

Notes: *Significant at 5 per cent; * *significant at 10 per cent

Source: Computed

c. Month of the year effect

January Effect:

The January returns as given in table 4.4, are not seen with great difference since the return of January is not significantly higher that other months as noted by Lee (1992) in the Pacific basin countries.

April Effect :

April returns are found in table 4.5 to be significantly different from other months and are significant at 10 percent. The April effect test has been done to collaborate with the tax loss selling hypothesis.

Table 4.4 January Month effect Coefficient

Months	Coefficients (F11383 =3.038)	t-statistics
January	1.103	0.112
February	10.042	0.706
March	-1.952	0.138
April	0.063	0.004
May	-4.517	0.315
June	2.693	0.183
July	-30.366	2.154
August	4.053	0.294
September	1.110	0.079
October	-5.461	0.396
November	-4.555	0.325
December	0.366	0.026

Notes: *Significant at 5 per cent; * *significant at 10 per cent

Source: Computed

Table 4.5 April Month effect Coefficient

Months	Coefficients (F11383 =3.038)	t-statistics
January	1.166	0.110
February	0.063	0.004
March	9.979	0.676
April	2.015	0.137**
May	4.580	0.308
June	2.630	0.172
July	30.429	2.076
August	3.990	0.278
September	1.046	0.072
October	5.524	0.385
November	4.618	0.317
December	0.303	0.021

Notes: *Significant at 5 per cent; * *significant at 10 per cent

Source: Computed

5. Conclusion

This study indicates that though the Indian market does exhibit seasonality in returns, this seasonality is very different from that observed commonly in other markets. The negative Monday effect and the positive January effect have not been observed. In fact, Monday returns are significantly higher than the other days of the week even for the calendar time hypothesis. The Tuesday returns are negative (though not significantly so) as has been observed by some other studies.

The positive Monday returns could have a possible explanation in the settlement period hypothesis because the 14-day settlement period in India used to start on a Monday and end on a Friday. Thus, low Friday closing prices coupled with high opening Monday prices could lead to the positive Monday returns.

The April effect held true for nine out of 11 months and seems to corroborate the tax-loss selling hypothesis to some extent. It should however, be noted that the March returns are not among the lowest in the year (as should be the case for the tax-loss selling).

The variance in seasonality in the Indian market as compared to the other developed markets implies that this market is not yet integrated with the other world markets and can provide a good portfolio diversification opportunity.

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