CALENDAR EFFECTS IN INDIAN STOCK MARKETS

Abhay Chawla[1], Rohini Singh[2] and Hamendra Kumar Porwal[3]

This paper contests against the theory of Efficient Market Hypothesis by detecting the presence of broad monthly calendar return patterns in the Indian stock market. It first studies the broad market index of Bombay Stock Exchange's BSE 500 and then further 11 BSE sectoral indices for the period Jan 2000-Dec 2012 for most of the indices. Two broad monthly patterns are detected which generate substantially higher mean monthly returns as compared to the remaining months of the year. The first is the 'November-December' pattern existing in BSE500, BSE Consumer Durables, BSE Healthcare & BSE TECk and the second is a whole new calendar pattern that hasn't been studied or detected before by researchers namely, the 'April-August-November-December' pattern, existing in BSE500, BSE Consumer Durables, BSE Healthcare, BSE Auto & BSE FMCG. Finally the various indices are ranked from the point of view of investors, assigning a better rank to the Index with higher mean monthly return and statistical significance for the two patterns.

Key words: Calendar Effects, Indian Stock Market, Sectoral Study, BSE, Efficient Market Hypothesis, November-December Effect, April-August-November-December Effect, Month of the Year Effect

INTRODUCTION

According to the Efficient Market Hypothesis (EMH), markets are efficient and at any given point in time, security prices or overall Index value fully reflects all available information and investors can make higher returns only by purchasing higher risk investments. Thus, it disputes the belief that investors can outperform the market by predicting trends or prices using fundamental or technical analysis as attempts to outperform the market are that of chance and not of skill. However, there are a number of examples that go some way in disproving the EMH like the bursting of stock market

[1] Researcher, abhaychawla.cbs@gmail.com

[2] Associate Professor, Shaheed Sukhdev College of Business Studies, University of Delhi bbsbfia@yahoo.co.in

[3] Associate Professor, Shaheed Sukhdev College of Business Studies, University of Delhi porwalhk@yahoo.com

bubbles or some investors like Warren Buffet or Rakesh Jhunjhunwala making supernormal returns and beating the market year after year.

Another concept that is inconsistent with and goes against the notion of EMH is that of Calendar Return or Time-Return regularities which links the stock market behavior with the calendar, like certain days, months or times of the year generating above/below average returns on a regular basis. Numerous researchers have carried out several studies to show that stock markets do show such time-return patterns or effects, like the January effect which wherein stock returns during the month of January are substantially greater than returns in other months of the year or the Day-of-the-Week effect wherein stocks tend to generate higher returns on Fridays and lower returns on Mondays. These calendar return patterns can thus be used to improve market timing and to make better investment decisions.

However, as new information and data gets available with time, we may or may not see previously established conclusions and may rather find out new patterns of calendar returns. With these thoughts in mind, this study has been carried out to find out the existence of calendar effects in the Indian stock market and to identify broad monthly investment patterns that can be strategically used by investors to beat the market and make above average returns.

OBJECTIVES

The objectives of this study are as follows:

(a) To identify broad monthly patterns in the Indian stock market which provide above-average returns as compared to the other months of the year.

(b) To establish statistical significance of the high return patterns identified in (a) above.

(c) To determine whether the statistically significant patterns found in (b), if any, also exist in the various sectoral indices of the Indian stock market.

(d) To establish the statistical significance for each such pattern for each sectoral index where it is detected.

(e) To rank the various indices in (d) from the point of view of investors, assigning a better rank to the Index with higher mean monthly return and statistical significance for the two patterns.

SCOPE AND METHODOLOGY

This study focuses on the broad monthly return patterns in the Indian stock market, specifically the Bombay Stock Exchange (BSE) which is the largest stock exchange in India and the 10th largest in the world by market capitalization . The BSE has been successful in creating indices that continue to accurately represent the changing face of the overall Indian market.

The various indices that come under the scope of this project include the BSE 500 and 11 of the 13 BSE sectoral indices. Only those sectoral indices were included that allow the data study of monthly returns for a minimum period of 10 calendar years so that the existence of calendar effects can be established with much more confidence.

All the data was obtained from the official website of BSE and values for each index were collected for the last trading day of each month during the period of study.

Table 1: Indices Studied

INDEX	Period of Study	Number of Years	Number of Monthly Return observations
BSE 500	Jan'00 -Dec'12	13	156
BSE CONSUMER DURABLES	Jan'00 -Dec'12	13	156
BSE BANKEX	Jan'02 -Dec'12	11	132
BSE FMCG	Jan'00 -Dec'12	13	156
BSE HEALTHCARE	Jan'00 -Dec'12	13	156
BSE OIL & GAS	Jan'00 -Dec'12	13	156
BSE AUTO	Jan'00 -Dec'12	13	156
BSE PSU	Jan'00 -Dec'12	13	156
BSE TECk	Jan'02 -Dec'12	11	132
BSE METAL	Jan'00 -Dec'12	13	156
BSE IT	Jan'00 -Dec'12	13	156
BSE CAPITAL GOODS	Jan'00 -Dec'12	13	156

as on 31st December 2012-

The BSE launched the BSE-500 Index on August 9, 1999. The index comprises of 500 scrips that well represent the changing pattern of the economy and that of the Indian stock market. The index represents nearly 93% of the total market capitalization on BSE and covers all 20 major industries of the economy. It initially used the full market capitalization method but later shifted to the free-float methodology on August 16, 2005.

The BSE sectoral indices cover 90% of the sectoral market capitalization and are based on the Free-Float methodology.

The BSE TECk Index represents the most frequently traded stocks in the Indian Telecom, Media, and Telecommunications (TMT) sectors. In 1990s, TMT sector had a remarkable growth in the financial market. It had become a major force in the Indian economy. Recognizing the growing importance of the TMT sector, BSE TECk index was launched in July 11, 2001.

(http://www.wikinvest.com/index/BSE_TECk_Index_(BSETECk-BY))

Monthly return patterns were identified using Clustered Columns and Line charts in MS Excel.

In order to establish the statistical significance of the patterns that were identified, two tests were used – the parametric 'Independent Samples T-test' and the non-parametric 'Mann-Whitney test' in SPSS.

LITERATURE REVIEW

The following undertakes a review of some of the literature on calendar effects and seasonality in the Indian and foreign stock markets that is relevant to this study.

Poshakwale (1996) studied the Bombay Stock Exchange from 1987-94. His results provided evidence of day of the week effect and that the stock market were not weak form efficient. The weekend effect was found to be evident as the returns achieved on Fridays were significantly higher compared to rest of the days of the week. Pandey (2002) studied the BSE Sensex Returns for the post reforms period from April 1991 to March 2002 and found the existence of seasonality in stock returns in India and the January effect. The findings were also consistent with the 'tax-loss selling' hypothesis for the month of March.

Patel (2008) analyzed the broad monthly patterns of calendar effects in the Indian stock markets from July 1999 – June 2007, finding two separate calendar effects: a November-December effect, wherein the mean returns for the two months were found to be significantly higher than those of the remaining ten months of the year, and a March-to-May effect, where mean returns for the months from March to May were significantly lower than those during the other nine months; and also established that the two effects were independent of each other.

Anokhi Parikh (2009) who used different tests and methodology than Patel (2008), found the presence of a positive December effect in the Nifty Index for the period January 1999 – December 2008. He attributed this to the festive season wherein people buy expensive durables, cars, gold, new homes etc and the fact that most of the jobs in India pay a 'bonus' to employees in the months of November or December which leads to higher liquidity and better access to cash which in turn affects the stock markets in a positive way. Similar reasons were given by Gagari Chakrabarti and Chitrakalpa Sen (2008) in their study of the Indian stock markets where they found a positive November effect at the market level in the BSE SENSEX as well as all the sectoral indices (BSEIT, BSEAUTO, BSECG, BSEFMCG, BSEPSU, BSEMETAL, BSEHC, BSECD) under study over the period 1999-2006.

Mihir Dash, Anirban Dutta and Mohit Sabharwal (2011) studied the seasonality and market crashes in Indian stock markets. The results of the study provided evidence for month-of-the-year effect, with a clear indication of positive November, August, and December effects, and a negative March effect. They attributed the November and December effect to the festive season and the Diwali effect. They also pointed towards the Rabi harvest/winter crop which affected the commodity prices and, in turn, the stock market prices, as an additional contributing factor for the November and December effect, and the Kharif harvest/monsoon crop as a contributing factor for the August effect. The negative March returns were attributed to tax-loss selling as the Indian Financial year ends in March. Further, they suggested that the incidence of market crashes reduced the occurrence of these seasonal effects.

A study of seasonality based trading strategy for Indian Stocks and Indices was undertaken by Jay Desai, Nisarg Joshi, Atul Chokshi and Dr. Ashvin Dave (2011) which found day of the month and week of the month effect to be present in three major indices of the Indian stock market- S&P Nifty Index, BSE Sensex and BSE 100 for the period ranging from January 2000 – October 2010. They also tested 13 heavyweight Indian company stocks for week of the month effect and in all the cases found 23rd of a month to 4th of next month range to be abnormally positive against overall average.

In terms of Calendar effects, China differs from the world stock markets vastly because the Chinese year ends in February unlike December in most of the countries. Lei Gao and Gerhard Kling (2005) found that the extent of the calendar effects considerably flattened over time in China. They used data from the Shanghai and the Shenzhen stock exchange for a period of 13 years since the restart of security trading in China in the

1990's and found that the highest monthly returns were achieved after the Chinese year end in February. This they pitched to be a similar to the January effect for countries where the financial year ends in December.

Maria Rosa Borges (2009) examined the day of the week and month of the year effects in seventeen European stock market indexes for the period 1994-2007. She found no strong convincing evidence of an across-the-board calendar effect in West and Central European countries. In particular, she found no statistically significant across-the-board January effects or weekend effects and gave the argument that the statistically stronger calendar effects are not stable over time.

The presence of the Day of the week effect in the stocks listed on National Stock Exchange and Bombay Stock Exchange for the period Nov 1994 to Sept 2007 was tested by Sromon Das and Varun Arora (2007). They found the effect to be present during the consolidation phase but absent during the bearish as well as bullish phase. However, in the latest study under review, Manish R Pathak (2013) found both the Day of the week effect and the Month of the year effect to be non-existent in S&P CNX Nifty (NSE) over the period 1st April 2002 to 31st March 2012 for Month of the year effect and 1st April 2007 to 31th march 2012 for Day of the week effect. His results indicated that seasonality was not present in Indian stock Market.

ANALYSIS & OBSERVATION

Firstly, the monthly returns were calculated for BSE 500 from Jan'00 to Dec'12. The monthly returns were calculated using the equation -

$$Rt = (Vt - Vt\text{-}1)/Vt\text{-}1 * 100$$

Wherein

Rt : Return for Month t
Vt : Closing value of the Index for the last trading day of month t
Vt : Closing value of the Index for the last trading day of the month immediately preceding the month t.

Then, from the monthly return data the mean monthly returns were obtained as follows:

Table 2 Mean Monthly Returns on the BSE-500

BSE 500	Mean Monthly Return	Observations
January	-0.48928	13
February	0.884764	13
March	-1.65182	13
April	1.877758	13
May	0.493212	13
June	1.054122	13
July	1.085304	13
August	2.819896	13
September	1.631135	13
October	-0.75777	13
November	3.973883	13
December	4.513653	13
OVERALL	1.286238	156

With the help of graphs and charts, two broad monthly high return patterns were identified -

1. The first was the 'November-December' pattern - last two months of the year also showing the highest mean monthly returns for the year at 3.97% and 4.51% for November and December respectively.

2. The second was a whole new calendar pattern that hasn't been studied or detected before by researchers - the 'April-August-November-December' pattern. This pattern sees the Index starting the year from a low monthly return and hitting a high mark at the fourth month of the year i.e. April, then sliding down sharply and again hitting a new high at the eight month of the year i.e. August, sliding sharply again and finally achieving the highest monthly return for the year in the 11th and 12th months i.e. November and December. Thus, this pattern is formed by three similar cycles of roughly 4 months each.

In order to find out the statistical significance of these patterns so as to establish that these are not chance events, rather regular time-return patterns that can be strategically

used to earn higher returns, the parametric Independent Samples T-test and the non-parametric Mann-Whitney test were run on the BSE 500 monthly return data.

The Null and alternate hypothesis were as follows:

(Null Hypothesis) Ho: Monthly return of Group 1 is similar to Group 2, i.e. there is no statistically significant difference between the monthly returns of the two groups.

(Alternate Hypothesis) H1: The monthly returns of the two groups are not similar i.e. there is statistically significant difference between the monthly returns of the two groups.

Table 3	NOVEMBER-DECEMBER PATTERN					
BSE 500	T TEST		Mann-Whitney Test		Mean Monthly Return	
	T-Value	Sig.	Z-Value	Sig.	NOV-DEC	Other 10 Months
	1.983	0.049	-2.168	0.030	4.24	1.28

Table 4	APRIL-AUGUST-NOVEMBER-DECEMBER PATTERN					
BSE 500	T TEST		Mann-Whitney Test		Mean Monthly Return	
	T-Value	Sig.	Z-Value	Sig.	APR-AUG-NOV-DEC	Other 8 Months
	2.135	0.034	-2.083	0.037	3.29	0.28

Results -

1. For the November-December pattern (refer Table 3) – Group 1 comprised of the monthly returns for the months of November and December and Group 2 comprised of the monthly returns of the other 10 months of the year. Both the T-test and the Mann-Whitney test rejected the null hypothesis by giving a significance value of less than 0.05. Thus, both the tests confirmed that the November-December group statistically significantly generated a substantially higher mean return (4.24%) as compared to the mean return of the other 10 months of the year (1.28%).

2. For the April-August-November-December pattern (refer Table 4) – Group 1 comprised of the monthly returns for the months of April, August, November and December, and Group 2 comprised of the monthly returns of the other 8 months of the year. Both the T-test and the Mann-Whitney test rejected the null hypothesis by giving a significance value of less than 0.05 and established that the April-August-November-December group statistically significantly generated substantially higher mean return (3.29%) as compared to the mean return of the other 8 months (0.28%) of the year.

The statistical significance of pattern two is even higher than that of pattern one.

Next, We have examined the existence of these two high return patterns found in BSE 500 in the various sectoral indices of the BSE i.e. whether these patterns showed a similar result of substantially greater mean return as compared to the remaining months of the year or not and if yes, then in which sectors were these patterns most prominent and statistically significant.

Like before, the monthly returns were calculated for each sectoral index. The Independent samples T-test and the Mann-Whitney test were run for 11 sectoral indices of the BSE for both the patterns thus giving a total of 22 cases. The results were as follows:

Table 5	NOVEMBER-DECEMBER PATTERN					
INDEX	**T TEST**		**Mann-Whitney Test**		**Mean Monthly Return**	
	T-Value	**Sig.**	**Z-Value**	**Sig.**	**NOV-DEC**	**Other 10 Months**
BSE AUTO	1.720	0.088	-1.973	0.048	4.55	1.25
BSE BANKEX	0.972	0.333	-1.148	0.251	4.42	2.14
BSE CONSUMER DURABLES	2.537	0.012	-2.487	0.013	6.81	0.70
BSE CAPITAL GOODS	0.867	0.387	-1.103	0.270	3.67	1.68
BSE FMCG	2.073	0.040	-1.788	0.074	3.64	0.81
BSE Healthcare	2.733	0.007	-2.482	0.013	4.43	0.45
BSE IT	1.937	0.055	-2.092	0.036	4.87	0.12
BSE PSU	1.765	0.079	-2.192	0.028	4.54	0.91
BSE METAL	1.671	0.097	-2.202	0.028	5.70	1.97
BSE OIL&GAS	0.913	0.363	-1.327	0.185	3.08	1.27
BSE TECK	2.124	0.036	-2.082	0.037	4.34	0.65

Table 6	APRIL-AUGUST-NOVEMBER-DECEMBER PATTERN					
INDEX	*T TEST*		*Mann-Whitney Test*		*Mean Monthly Return*	
	T-Value	*Sig.*	*Z-Value*	*Sig.*	*APR-AUG-NOV-DEC*	*Other 8 Months*
BSE AUTO	2.330	0.021	-2.335	0.020	3.86	0.77
BSE BANKEX	0.750	0.454	-0.681	0.496	3.45	2.06
BSE CONSUMER DURABLES	3.203	0.002	-3.493	0.000	5.73	-0.28
BSE CAPITAL GOODS	1.608	0.110	-1.496	0.135	3.72	1.16
BSE FMCG	2.236	0.027	-1.966	0.049	2.75	0.55
BSE Healthcare	2.856	0.005	-2.654	0.008	3.30	0.02
BSE IT	1.631	0.105	-1.955	0.051	3.03	-0.14
BSE PSU	1.645	0.102	-1.842	0.065	3.30	0.62
BSE METAL	1.568	0.119	-1.767	0.077	4.19	0.86
BSE OIL&GAS	1.293	0.198	-1.274	0.203	2.92	0.90
BSE TECK	1.879	0.062	-1.912	0.056	2.99	0.40

Both the patterns – 'November-December' and 'April-August-November-December' – were giving substantially higher mean returns as compared to the mean return of the remaining months of the year in all the 11 indices i.e. for all the 22 cases. However, the statistical significance of the two patterns could not be established in all the cases.

The following are the Sectoral Indices for which both the T-test and Mann-Whitney test gave a significance value of less than 0.05, rejecting the Null hypothesis and establishing the statistical significance of the higher mean monthly returns of the two patterns. The following table also ranks these sectoral indices in the order of Investment preference based on their mean monthly returns and statistical significance-

Table 7 NOVEMBER-DECEMBER PATTERN

RANKING Investment point of view	T TEST		Mann-Whitney Test		Mean Monthly Return	
	T-Value	Sig.	Z-Value	Sig.	NOV-DEC	Other 10 Months
1.BSE CONSUMER DURABLES	2.537	0.012	-2.487	0.013	6.81	0.70
2.BSE Healthcare	2.733	0.007	-2.482	0.013	4.43	0.45
3.BSE TECk	2.124	0.036	-2.082	0.037	4.34	0.65

Table 8 APRIL-AUGUST-NOVEMBER-DECEMBER PATTERN

RANKING Investment point of view	T TEST		Mann-Whitney Test	Mean Monthly Return		
	T-Value	Sig.	Z-Value	Sig.	APR-AUG-NOV-DEC	Other 8 Months
1.BSE CONSUMER DURABLES	3.203	0.002	-3.493	0.000	5.73	-0.28
2.BSE Healthcare	2.856	0.005	-2.654	0.008	3.30	0.02
3.BSE AUTO	2.330	0.021	-2.335	0.020	3.86	0.77
4.BSE FMCG	2.236	0.027	-1.966	0.049	2.75	0.55

Of all the Indices, BSE Consumer Durables and BSE Healthcare showed statistically significant results for both the patterns. Between the two patterns, higher mean monthly returns were obtained for the 'November-December' pattern (6.81% in BSE Consumer Durables and 4.43% in BSE Healthcare) as against the 'April-August-November-December' pattern (5.73% in BSE Consumer Durables and 3.30% in BSE Healthcare). However, the 'April-August-November-December' pattern had a better statistical significance and thus a better probability of giving higher mean monthly returns in the future. Thus, we see the two patterns having a trade-off where one pattern offers higher returns than the other while the other pattern having a better statistical significance of giving high returns.

Next in preference for the November-December pattern we have the BSE TECk Index with mean monthly return of 4.34% and for the April-August-November-December pattern, we have BSE Auto (3.86%) and then finally BSE FMCG (2.75%).

SUMMARY & CONCLUSION

This study was undertaken to detect the presence of calendar effects in the Indian stock market and to identify broad monthly investment patterns that can be strategically used by investors to make above average returns. Two broad monthly patterns were detected in the market index of BSE 500 which generated substantially higher mean monthly return as compared to the remaining months of the year. First was the 'November-December' pattern, which has also been detected in earlier studies by researchers and second was the 'April-August-November-December' pattern, which is a whole new pattern that hasn't been detected before. The existence of these patterns was then checked for several BSE Sectoral Indices. The indices that showed statistically significant results for the existence of these high return patterns by both the parametric Independent Samples T-test and the non-parametric Mann-Whitney test included – BSE Consumer Durables, BSE Healthcare & BSE TECk for the 'November-December' pattern and BSE Consumer Durables, BSE Healthcare, BSE Auto & BSE FMCG for the 'April-August-November-December' pattern. Finally the various indices were assigned ranks from the point of view of investors, assigning a higher rank to the Index which showed higher mean monthly return and a better statistical significance for the two patterns. We believe this study provides valuable insights for investors to form trading strategies to better time their investments and the duration of their investments in the Indian stock markets to earn higher returns. However, there are certain limitations to this study as the causes or the reasons for the occurrence of these patterns could not be ascertained and as to why even when these patterns are present in the broad market index of BSE 500, their presence was detected in only a few of the many sectoral indices. Though, as claimed by earlier researches, the November-December effect could be attributed to the festive season like 'Ganesh Chaturthi', 'Dussera' and 'Diwali', which sees a huge increase in the level of economic activity in the country, and people generally having access to more cash and better liquidty. There is also expectation that the Government might take some steps to further accelerate economic activity before the budget and thus this leads to a pre-budget rally. In India, the budget is announced at the end of February. However, the 'April-August-November-December' pattern is a totally

unstudied pattern and thus, we believe this study provides a huge scope for further research in this field.

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