Month Effect in the Bombay Stock Market

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Abstract

A number of calendar 'anomalies' have been observed in the stock markets and month of the year effect is one of the most significant of those anomalies. This paper examines the month of the year effect in the Bombay Stock Market by analysing the BSE Sensex logarithmic monthly returns for a period of twenty years. The series has been subjected to various robustness checks and tests for examining stationarity and identifying autoregressive and moving average components. The month effect has been examined using the non-parametric Kruskal-Wallis test for equality of means and the ordinary least squares (OLS) regression using the dummy variables to study the January and April effect in the BSE sensex. The results of Kruskal-Wallis test indicate no significant difference in the average returns across the months over the period of study. The regression results indicate no significant difference between the returns of January vis-à-vis each of the remaining months of the year over the period of study. Taking into consideration that the financial year ends in March in India, the regression was applied to find out the difference between the returns of April vis-à-vis each of the remaining months of the year and the April effect is absent. Overall, based on findings it can be concluded that there is no month of the year effect in the Bombay stock market.

Key words: *calendar anomalies, efficient market hypothesis, January effect, month-of-the year effect, stationarity.*

1. Introduction

Fama (1965, 1970) formulated the efficient market hypothesis stating that in an informational efficient market, prices follow random pattern. On account of this, it is not possible to identify any patterns or trends and exploit them to earn supernormal profits. However, over a period of time a number of anomalies have been identified in the stock markets which can be identified and exploited to earn extra profits. Observing these anomalies Fama (1998) stressed on the need to have new theories of asset pricing in order to explain the presence of anomalies. An anomaly means the behaviour of the stock returns which contradicts the efficient market hypothesis or some identified patterns in returns which are not predicted by central paradigm or theory in finance. The significant anomalies include the value effect, the size effect, momentum effect, calendar effect. The calendar anomalies include the day-of-the week effect, month-of-the year effect, weekday-of-the month effect, turn-of-the month effect, and year-end effect and holiday effects. Of these calendar anomalies, month-of-the-year effect is one of the significant anomalies observed and reported in a number of studies of the developed world. Month-of-the year effect or popularly known as January effect is a phenomenon wherein the returns in the month of January are much higher as compared to the returns in the other months. The returns of the developed markets have visibly indicated this pattern and it is found to be more present in equally weighted indices of small firms rather than value weighted indices (Morquering, 2002).

This paper examines whether the month of the year effect is present in the Bombay stock market or not. Since the financial year ends in March in India, the hypothesis supporting the month-of-the year effect may not be present in January and may be present in the month of April as the financial year begins from April. Therefore, the study after applying robust checks for the procedures examines the January as well as April effect. The observation of such anomalies has significant implication for the policy makers, mutual fund managers, institutional and retail investors. The paper is organised as follows: part 2 deals with review of literature, part 3 contains data and methodology, part 4 has findings discussion on the results and the conclusion summarises the findings of the paper.

2. Review of literature

While the literature on stock markets of developed countries is extensive, the same is scant for the emerging markets. The paper has briefly reviewed important findings on the month of the year effect in the stock markets after 2001. Schwert (2002) evidenced the existence of January effect. Pandey (2002) found seasonal effect in the Indian stock market and found that the returns were significant in March, July and October. Anderson *et al.* (2003) found the returns in January were much higher as compared to the other months. Van (2003) found that the returns were very high in Netherlands in the second fortnight of December. China *et al.* (2004) found January effect to be present in low capitalisation firms. Gao and Kling (2005) studied the monthly effects in the two stock markets of China and found that highest returns are observable in March and April as the year closing is in February in China. Alagidede and Panagiotidis (2006) found that the Ghana stock market did not have January effect but had April effect. Moosa (2007) examined monthly effect in U.S. stock market over a period of 1970 to 2005 and found significant January effect to be present in the market. Wong *et al.* (2007) examined Malaysian stock market and found that the January and February effect were present in the sub-periods, but the month effect was missing for the entire period. Chakrabarthi and Sen (2007) found that at market level the November effect was present. Parikh (2009) found that the returns in December are abnormal as compared to the returns in the other months. The study using GARCH and EGARCH model found evidence of seasonality in the Nifty return series. Zafar *et al.* (2010) investigated the monthly effect in the Karachi Stock exchange covering a period from 1991 to 2002. The

results showed that month effect is present in the markets and the returns were negative in the month of May. This study adds to the existing literature on calendar anomalies in the emerging markets.

3. Data and methodology

The data consists of the monthly closing values of BSE sensex which is computed using free float market capitalisation methodology from January 1991 to December 2010 covering a period of twenty years. The sensex consists of the thirty scraps and represents 41.29% of the total market capitalisation in the year 2011.

Hypotheses

H_o There is no significant difference in the average returns across different months over the period of study.

H_o There is no significant difference between the average returns of the month of January vis-à-vis each of the remaining months of the year over the period of study.

H_o There is no significant difference between the average returns of the month of April vis-à-vis each of the other remaining months of the year over the period of study.

Methodology

i) Logarithmic returns have been calculated as

$$R_t = Ln\left(\frac{P_t}{\square}\right) Ln(P_{t-1})$$

ii) The series has been formally tested for stationarity (Augmented Dickey-Fuller test).

iii) Graphical figures, ACF, PCF plots, have been applied to identify time series components and autocorrelation. (Results are intentionally omitted from paper as these are standard procedures for the time series).

(iv) To test hypothesis, (i) One Way ANOVA has been applied and Kruskal-Wallis test statistic has been computed.

(v) To test hypothesis (ii) and (iii), Ordinary Least Squares (OLS) regression has been applied with dummy variables as used by Zafar *et al.* (2010), Bahadur and Joshi (2005), Pandey (2002).

4. Results and discussion

The monthly BSE sensex returns are examined to investigate the monthly effect in the Bombay stock market. The descriptive statistics for the entire series are provided in Table 4.1 with mean return being 1.27 and standard deviation of 9.12. The descriptive statistics for the various months are provided in Table 4.2 which shows that average returns in the month of March, May and October are negative. The mean returns are highest in the month of December followed by February.

Table 4.1: Descriptive Statistics of Returns

Mean	1.27
Median	1.75
Maximum	43.16
Minimum	-30.06
Std. Dev.	9.12
Skewness	0.03
Kurtosis	4.98
Jarque-Bera	39.17
Probability	0.00

Table 4.2: Descriptive Statistics of Monthly Series

Values	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Mean	1.01	4.23	-0.93	0.29	-0.29	0.76	2.22	3.26	1.26	-3.18	2.01	4.69
Median	2.22	2.79	-2.14	0.13	-0.38	1.86	2.67	2.24	4.28	-1.96	2.94	4.26
Maximum	18.51	19.10	43.16	16.06	27.22	12.53	22.96	16.32	13.21	14.73	18.47	16.99
Minimum	-16.67	-9.05	-23.49	-19.15	-24.77	-21.12	-10.72	10.03	-15.64	-30.06	-12.48	-5.01
Std. Dev.	9.28	7.89	13.87	9.19	11.96	7.98	7.81	6.71	8.42	9.09	8.46	5.20
Skewness	0.12	0.36	1.38	-0.33	0.11	-1.14	0.45	-0.04	-0.64	-0.95	-0.04	0.62
Kurtosis	2.51	2.24	6.28	2.58	3.24	4.40	3.84	2.53	2.18	5.37	2.07	3.61
Jarq-Bera	0.23	0.91	15.39	0.51	0.09	6.01	1.27	0.18	1.95	7.71	0.71	1.62
Prob.	0.88	0.63	0.00	0.77	0.95	0.04	0.52	0.91	0.37	0.021	0.69	0.44

Before applying the regression it is necessary to test the hypothesis whether the series has a unit root or not. If the series has a unit root and it is non-stationary the results are invalid. Graphically, the stationarity can be examined by looking at ACF and PCF plots and the plots in the case of BSE sensex series indicated that the series is stationary. For testing the hypothesis that the return has a unit root, the augmented Dickey-Fuller test has been applied in various ways with level only, with first difference with level trend and intercept and the results are presented in Table 4.3. As the computed‘t’ value is greater than the critical value at 5% level of significance in all the three options it can be concluded that the series is stationary and the regression procedures can be applied to the series.

Table 4.3: Results of ADF Test

Alternatives	t-Statistic	Critical value at 5%
With Level Only	-13.73547	-1.942164
With first Difference	-12.70971	-1.942193
With level, trend and Intercept	-13.88689	-3.428819

The results of one way ANOVA and Kruskal Wallis test are presented in Table 4.4. The one way ANOVA enables all classes to be compared with each other simultaneously rather than individually and the computed value is not significant and therefore, it can be concluded there are no significant differences between mean returns of different months. The Kruskal-Wallis is a non-parametric test and is independent of the assumption of normal distribution of the return series and the results are presented in Table 4.5 which indicate that the p value is small and therefore it cannot be concluded that the overall medians differ among the series.

Table 4.4: Results of One way ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1088.277	11	98.934	1.198	.290
Within Groups	18749.949	227	82.599		
Total	19838.225	238			

Table 4.5 Results of Kruskal-Wallis Test

Test Statistics (a, b)

	Return
Chi-Square	14.854
df	11
Asymp. Sig.	.189

a. Kruskal Wallis Test

b. Grouping Variable: month, period 12

For examining the presence of seasonality in BSE sensex returns, dummy variables are used which are categorical or binary variables which can take on the value of 1, which indicates the presence of the attribute or the value of 0 which indicates the absence of an attribute. The regression model specified for January effect is

$$\text{Nifty Returns} = \alpha + \beta_2 DFeb + \beta_3 DMarch + \beta_4 DApril + \beta_5 DMay + \beta_6 DJune + \beta_7 DJuly + \beta_8 DAug + \beta_9 DSept + \beta_{10} DOct + \beta_{11} DNov + \beta_{12} DDec + \varepsilon t \quad (1)$$

For April effect, equation 2 has been used

$$\text{Nifty Returns} = \alpha + \beta_1 DJan + \beta_2 DFeb + \beta_3 DMarch + \beta_4 DMay + \beta_5 DJune + \beta_6 DJuly + \beta_7 DAug + \beta_8 DSept + \beta_9 DOct + \beta_{10} DNov + \beta_{11} DDec + \beta_{12} DDec + \varepsilon t \quad (2)$$

α indicates the mean return for January and April, β_1 to β_{11} represents the average returns across the months and εt represents error term. If the values of β are significant it implies the presence of monthly effect. As the regression is used for examining the monthly effect and not for modelling, the ACF and PCF plots are the main indicators to be examined for the presence or otherwise of autocorrelation. For examining the January effect the regression equation (1) has been estimated and the results are presented in Table 4.6. January is the month with reference to which the significance of the returns of the other month has been compared. The p values are showing that the coefficients of all the months are insignificant and there is no monthly effect in the BSE sensex series. The coefficients for the months of March, April, May, June and October are negative. The ACF and PCF plots indicate absence of autocorrelation in residual series and the Box-Ljung statistics for all lags is non-significant.

Table 4.6: Results of OLS Regression

Variable	Coefficient	t-Statistic	Prob.
C	1.01	0.48	0.62
MONTH=2	3.21	1.10	0.27
MONTH=3	-1.95	-0.67	0.50
MONTH=4	-0.72	-0.24	0.80
MONTH=5	-1.31	-0.45	0.65
MONTH=6	-0.24	-0.08	0.93
MONTH=7	1.21	0.41	0.67
MONTH=8	2.25	0.77	0.43
MONTH=9	0.25	0.08	0.93
MONTH=10	-4.2	-1.4	0.15
MONTH=11	0.99	0.34	0.73
MONTH=12	3.67	1.26	0.20

One of the most popular reasons cited for the presence of the month-of-the year effect is the tax-loss selling hypothesis (Bhabra Dhillon and Ramirez, 1996). As per the tax loss of some countries, the capital losses can be offset against the taxable income of the year. Due to this, those stocks which have experienced price declines are sold off to book losses which are then adjusted against the other taxable income and that are why heavy selling pressure builds up on these stocks in December when the financial year ends. However, the investors tend to buy back these or similar stocks at the beginning of the next year, i.e. January and therefore the returns are relatively high in January as compared to other months. Since the financial year ends in March in India, if the tax-loss selling hypothesis becomes applicable the returns should be high in the month of April. Therefore, to identify the April effect equation (2) has been estimated and the results are presented in Table 4.7 with April being the reference month. The results indicate that none of the coefficients are significant and the ACF and PCF plots are showing absence of autocorrelation. Therefore, it can be inferred that there is no April effect in the Bombay Stock market.

Table 4.7: Results of OLS Regression

Variable	Coefficient	t-Statistic	Prob.
C	0.29	0.14	0.88
MONTH=1	0.72	0.24	0.80
MONTH=2	3.93	1.37	0.17
MONTH=3	-1.23	-0.42	0.66
MONTH=5	-0.59	-0.20	0.83
MONTH=6	0.47	0.16	0.86
MONTH=7	1.93	0.67	0.50
MONTH=8	2.97	1.03	0.30
MONTH=9	0.97	0.33	0.73
MONTH=10	-3.48	-1.21	0.22
MONTH=11	1.71	0.59	0.55
MONTH=12	4.39	1.53	0.12

5. Conclusion

The results of both the tests indicate absence of monthly effect in the Indian stock market and it is not possible for investors to improve their returns by timing their investments. Haugen and Jorion (1996) have observed that calendar anomalies exist for short period of time. The participants in the market will devise such strategies that the calendar anomalies are exploited and this in the long run will lead to disappearance of such anomalies from the market. SEBI and other regulatory agencies in India have been framing guidelines and policies which aim at increasing the informational efficiency of the market. However, research needs to carried out to examine the presence or otherwise of other calendar anomalies in the Indian stock markets.

References

Alagidede, P. & Panagiotidis, T. (2006). Calendar anomalies in the Ghana stock exchange, *Working Paper No. 13*, Department of Economics, Loughboorough University.

Anderson, L. R., Gerlach, J. L. & DiTraglia, F. J. (2005). Yes, wall street, there is January effect! Evidence from laboratory auctions. *Working Paper No.15*, College of William and Mary, Department of Economics, Williamsburg.

Bahadur K, Fatta, C. & Joshi, N. K. (2005). The Nepalese stock market: efficiency and calendar anomalies. *Economic Review*, 17, 443-56.

Bhabra, H.S., Dhillon, U. S. & Ramirez, G. (1996). November effect? Revisiting the tax-loss selling hypothesis. *Working Paper*, Salomon Center, New York University.

Chakrabarti, G. & Sen, C. (2007). November effect: an example of calender anomaly in Indian stock market. West Bengal University of Technology, Kolkata Online at: http://ssrn.com/abstract=1121606

Chia-Shang, J, Chu, T. & Rathinasamy, R. S. (2004). Robust test of the January effect in stock markets using Markov-Switching model. *Journal of Financial Management and Analysis*, 17(l), 22-33.

Fama, E. (1965). The behaviour of stock market prices. *Journal of Business,* 38, 34-105.

Fama, E. (1970). Efficient capital markets: A review of theory and empirical work. *Journal of Finance*, 25, 383-417.

Fama, E. (1998). Market efficiency, long-term returns and behavioural finance. *Journal of Financial Economics*, 49, 283-306.

Haugen, R. & Jorion, P. (1996). The January effect: Still there after all these years. *Financial Analysts Journal* 52, 27-31.

Imad, A. M. (2007). The vanishing January effect. *International Research Journal of Finance and Economics*, 7, 92-103.

Lei, G. & Kling G. (2005). Calendar effects in Chinese stock market. *Annals of Economics and Finance*, 6, 75- 88.

Marquering, W. (2002). Seasonal predictability of stock market returns. *Tijdschrift voor Economie en Management*, 47, 557-576.

Nousheen, Z., Syeda, F. U. & Syed, U. F. (2010). Karachi stock exchange: testing month of the year effect. *European Journal of Economics, Finance and Administrative Sciences,* 24, 20-28

Pandey, I. M. (2002). Is there seasonality in the Sensex monthly returns? *Working Paper*, Indian Institute of Management, Ahmedabad.

Parikh, A. (2009). The December phenomenon: month-of-the-year effect in the Indian stock market. National Stock Exchange, Mubai, online at www.nseindia.com

Schwert G. W. (2002). Anomalies and market efficiency. *Working Paper, Oct*, The Bradley Policy Resarch Center, Financial Research and policy, University of Rochester

Van Der Sar, N. (2003). Calendar effects on the Amsterdam stock exchange. *De Economist*, 151, 271–292.

Wong, M. K., Ho, C. M. & Dollery, B. (2007). An empirical analysis of the monthly effect: The case of Malaysian stock market. *Working Paper Series No. 4*, Department of Economics, University of New England