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Seasonal Anomalies in Stock Returns: A Study of Developed and Emerging Markets

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ABSTRACT

Seasonal anomalies are reported by researchers for developed as well as emerging stock markets. Day of the week effect is the most talked anomaly. However, due to the increased use of the information technology and on-going stock market reforms in emerging economies, investors might expect the stock markets to be free from such anomalies. This paper is an attempt to examine whether seasonal anomalies still persist in the developed and developing markets. For the study, the Indian and US markets are taken as the representative of emerging and developed markets, respectively. The reference period of the study ranges from January 1998 to December 2007, which is further broken into two sub periods: (i) January 1998 to December 2001, and (ii) January 2002 to December 2007. The study examines five types of anomalies namely, turn of the month effect, semi-monthly effect, monthly effect, Monday effect and Friday effect. The analysis provides the evidence about the presence of the Monday effect only in India but the semi monthly and turn of the month effect are found in both the markets. In contrast, month effect does not exist in any of the two countries. Hence, the stock markets are not yet free from seasonal anomalies despite increased use of information technology and numerous regulatory developments.

KEYWORDS: Seasonal, Monthly, Day, Stock, Stock

JEL CLASSIFICATION: G10, G12, G14

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INTRODUCTION

The present paper strives to identify the existence of market inefficiency, if any, in the form of seasonal anomalies in return offered by stock markets over the last decade. It is well known that, the Stock market efficiency is a grossly researched aspect of investment management both in developed and emerging countries [for instance: *Fama (1965); Jensen and Benington (1970); Rosenberg and Rudd (1982); French and Roll (1986); Mohanty (2002); and Bodla (2005) etc].* Most of these studies indicate an increased level of stock market efficiency. Accordingly, for those who advocate market efficiency, the opportunity to get extra profit by forecasting the security prices on the basis of past and

publicly available information has almost eliminated in recent years. Increased use of modern information technology and recent reforms in the operating mechanism of financial markets, have resulted in enhancing market efficiency.

Despite frequent claims with reference to market efficiency, literature on the subject shows numerous research works which offer evidence of seasonal/ calendar anomalies both in developed and emerging stock markets. *Rozeff and Kinney (1976)*, were the first to document evidence of anomalies in NYSE stocks. They found evidence of high mean returns in January as compared to other months. *French (1980)*, analyzed daily returns of stocks for the period 1953-1977 which showed a tendency for returns to be negative on Mondays but positive on other days of the week. *Lakonishok and Smidt (1988)*, examined the anomalies in the US stock market and produced the evidence about turn of the month effects. *Cadsby (1989)*, obtained similar results for Canada. In a study of the stock indices of 10 countries over different time periods until the late 1980s, *Cadsby and Ratner (1992)*, concluded that turn of the month effect exist in US, Canada, Switzerland, West Germany, UK and Australia but not in Japan, Hong Kong, Italy and France. *Aggarwal and Tandon (1994)*, found significantly negative returns on Monday in nine countries and on Tuesday in eight countries out of the 18 countries taken for his study. *Dubois & Louvel (1996)*, examined the day of the week effect for the French stock market along with other markets such as the US, UK, German, Japanese, Australian and Swiss markets and concluded that Wednesday presented the highest return. But Monday was found as the day with the lowest return.

Steeley (2001), has shown that the weekend effect in the UK had disappeared in the 1990s. *Kok Kim (2002)*, examined the monthly effect of stock returns in some Asia Pacific stock markets. The study revealed that turn of the month effect was strong in all stock exchanges but the half month effect was weak and unstable. *Thomas Hellstorm (2002)*, had studied the calendar effects in stock returns covering 207 stocks on the Swedish stock market for the time period 1987-96 and concluded that the market had a very weak trend. On the basis of a survey, Philip S Russel and Violet M Torbey concluded that efficient market hypothesis exists in the capital market but the results were inconsistent. *I M Pandey (2002)*, plugged the seasonal patterns in Malaysian stock market using the monthly return data of the Kula Lumpur stock exchange's (two indices – Composite Index and EMAS Index) and concluded that the return of December was positive and statistically significant in comparison to returns of the rest of the months. *Sales and Caro (2006)*, analyzed the day of the week effect on the major European stock markets using GARCH and T-ARCH models. Their findings indicated absence of abnormal behaviour in the returns of these stock markets.

Baek and Kim (2008), investigated the effect of earnings forecast announcement on the level of information asymmetry, which is an indicator of stock market efficiency. They found no significant change in information asymmetry between pre and post announcement periods of a good news forecast whereas on account of a previously declared bad news forecast a firm experienced a decrease in information asymmetry.

Ricky, Venus and Syed (2008), examined the day-of-the-week effects such as Monday effect, Friday effect in the Taiwan, Singapore, Hong Kong and South Korea stock markets by using data from January 2000 to December 2006. Analysis showed that only Friday effect in Taiwan is sustainable since all other effects disappeared completely after accounting for equity risks. In contrast to the aforementioned studies some researchers and analysts believe that some of the markets inefficiencies are caused by institutional factors such as ex-dividend, tax, liquidity effect etc and as such they are temporary phenomenon. Hence one's belief regarding the true market anomalies would be strengthened if it is known to occur in capital markets of emerging countries such as India. Among the so-called emerging stock markets, the Indian stock market has been one of the most rapidly growing one. A number of studies relating to stock market anomalies have been carried out in India also. But the results are still contradictory about emerging markets. To quote a few, *I M Pandey (2002)*, concluded

that the monthly effects exist in Indian stock market and investor can time their share investments to earn abnormal returns. *Kiran Rotkar, Rishikesh Patel & Ashvin Patil (2002)*, using the data from January 1995 to December 1999 concluded that the stock returns are high on Wednesday and Monday while they are lowest on Friday. The study of *Karmakar and Chakraborty (2003)*, indicates the presence of Friday effect, the monthly effect, the turn of the month effect and holiday effect in Indian stock market. *Nath and Dalvi (2004)*, examined the day of the week effect anomaly in the Indian equity market for the period from 1999 to 2003 using S&P CNX NIFTY. Their study indicates that before introduction of rolling settlement in January 2002, Monday and Friday were insignificant days. However, after the introduction of the rolling settlement, Friday, being the last day of the week has become significant. Monday seems to have higher standard deviation followed by Friday. *Deepa Mangla and R K Mittal (2005)*, who investigated the semi-monthly effect in 150 NSE listed stocks using data from Jan 1997 to March 2003 strongly support the existence of semi-monthly effect in Indian stock market. *Bodla and Kiran (2006)*, examined anomalies in Indian stock markets by using S&P CNX Nifty from January 1998 to August 2005 and found turn of the month effect as well as semi-monthly effect in the Indian market. *Sah and Omkarnath (2007)*, employed the GARCH model to test the efficiency of stock market in India from January 1996 to March 2005 and suggested that there was a period of efficiency in its weak form followed by inefficiency particularly after the introduction of derivatives in Indian stock market. The review of existing studies thus indicates that despite numerous works on the subject concerned one fails to get conclusive evidence regarding persistence of seasonal anomalies in both emerging and developed markets. During last fifteen years the government of India has initiated a number of steps to make the market more efficient. All these steps have led to a spectacular growth of the markets in terms of the market capitalization, turnover and number of deals. However, the process of growth has been accompanied by major scams and a number of cases of price rigging and insider trading leading to extreme volatility of the market. The current study would contribute significantly to the existing literature by considering the impact of capital reforms, especially rolling settlement effect on market efficiency in India. US market being the benchmark for the emerging economies, also needs to be examined afresh for its efficiency. Obviously, the present study is an improvement over the existing studies because of the following: First, the current study covers a very recent time period and provides comparative analysis of different sub-periods as well. Second, the present study covers longer time period as compared to the previous studies. Third, the previous studies used the data related to either only developed markets or only of developing market. Fourth, the methodology used herein is relatively easier to understand and can be applied in the future researches on the subject. Finally, the study would also comment on the impact of more important reforms brought into operations of emerging markets like rolling settlement on the efficiency of stock market. The paper has been divided into four sections. First section gives introduction and review of previous studies. The second section describes the data and methodology used to investigate the seasonal anomalies. While the third section contains the results of the study, final section gives the conclusions and policy implications.

DATA & METHODOLOGY

Amongst various emerging economies, India is a fit case for this study as it is a fast growing market and has more depth in comparison to other such countries. For achieving the objective of bringing out seasonal anomalies in India's stock market returns, SENSEX (a broad based index of BSE Ltd.) has been taken as a proxy to its market. SENSEX comprises thirty most liquid individual stocks listed at Bombay Stock Exchange Ltd. (BSE). It is also considered as an indicator of the performance of whole economy. On the other hand, S&P 500 has been used as a proxy of the developed markets. The daily closing prices of both of the above mentioned indices were collected from the websites of BSE and Yahoo for the period ranging from January 1998 to December 2007. We have not incorporated years 2008 and 2009 in our study. It is a

period with extreme fluctuations and turmoil in world markets (following the subprime crisis and world recession) and would have resulted in lopsided and extreme results. In order to make inferences for the short as well as the long run, the whole data set was divided into three groups: January 1998 to December 2001, January 2002 to December 2007 and January 2008 to July 2009.

In order to avoid the influences of extreme index values the stock returns has been measured in terms of the continuously compounded daily percentage change in the concerned share price index,. Symbolically,

$$R_t = \ln\left(\frac{P_t}{P_{t-1}}\right) * 100\ \%$$

Where

R_t is the return in the period t;

P_t is the daily closing share price index of a market at a particular time t;

P_{t-1} is the closing share price index for the preceding period;

ln is natural logarithm.

The authors have made an effort to investigate the existence of five types of seasonal anomalies. These include (i) turn of the month effect, (ii) semi-monthly effect, (iii) monthly effect, (iv) Monday effect and (v) Friday effect. For the *turn of the month effect*, the mean daily return of last trading day of the month and the first three trading days of the month has been compared with the mean return for the rest of the days in the month. In the case of the *semi-monthly effect*, the mean return of the first half month (i.e. return on the 30th, 31st calendar days of the preceding month and 1 to 14th calendars days of the current month) are compared with the average return of the rest of the days. In order to analyze the *Monday effect*, the mean return of Monday of the each week is compared with the average return of rest of the days. Similarly, return of the Friday is compared with the mean return of the rest of the days to identify the *Friday effect*. The significance of the difference between average returns was verified with the help of t-test by stating the following hypothesis:

$$H_0: \quad \mu_1 = \mu_2$$
$$H_1: \quad \mu_1 \neq \mu_2$$

Where H_0 is null hypothesis which state that there is no difference between the return of the first period and the second period, H_1 is alternate hypothesis, μ_1 is the mean return of first segment and μ_2 is the mean of second segment. The level of significance is taken at 5 percent at which the critical region is -1.96<t<1.96. The t- test has been applied by using the following formulae.

Where S^2_p is pooled variance, n_1 is number of observations in population 1 and n_2 is number of observations in population 2, $(\mu_1-\mu_2)$ is the difference between two population means and (X_1-X_2) is the difference between sample means.

In order to measure the significant difference between the monthly returns, one-way ANOVA (Analysis of Variance) technique has been used. Analysis of variance is used to test the hypothesis that several means are equal. This technique is an extension of the two-sample t test. For the one to one comparison between months, 'Post- Hoc Test' is used. The *post-hoc test* examines the difference between each pair of means, and yield a matrix where asterisks indicate significantly different group means at an alpha level of .05. Some previous studies have also used non-parametric tests such as Kruskal-Wallis test to measure significance of variation between the return of two sets of data (e.g. Monday and rest of the days). This test was also tried in the present study, but the same yielded results similar to the parametric test used herein (i.e. t-test).

RESULTS OF DATA ANALYSIS

The results obtained from the analysis of data regarding the existence of stock market anomalies in the sample stock markets are presented through Tables 1 to 8. These are described as follows:

Friday Effect: It is argued that as the Friday is the last trading day of the week and most of the results of the companies are made public on this day, it brings enthusiasm in the market resulting in a bulk buying by

the investors. Hence, the mean return on Friday will be higher than the other days of the week *[Cross (1973), Gibbons and Hess (1981), Harris (1986), Board and Stucliffe (1988) etc]*. The results of the present study showing return of Friday and the rest of the days as given in Table 1 reveal that for the period 1998-01, Friday's return is negative and for the rest of the days it is positive insofar India's stock market is concerned. The difference between the two is statistically significant. In contrast to the above, the return on Friday is positive and higher than the other days in case of the period 2002-07. The difference turns statistically significant at 5 percent level. For the third data set (1998-07), Friday's return is lower than the rest of the days return but the difference is not statistically significant. In US market, the differences between the returns of the Friday and rest of the days of week are not significant for all the three periods. The above analysis implies that Friday effect does not occur in the long run in a sock market irrespective of its stage of development

Table 1: Friday Effect (Bombay Stock Exchange)

Statistics	Before Rolling		After Rolling		Total	
	Friday	Other Days	Friday	Other Days	Friday	Other Days
Mean	-.293	.0629	.2196	.1099	.0163	.0913
S.D.	1.9697	.7698	1.3504	.6371	1.6419	.6924
Variance	3.88	.593	1.82	.406	2.6958	.4794
N	192	797	292	1188	484	1985
T-Test	-3.58877		2.379979		-1.59043	
Df	987		1478		2467	
Critical Region	-1.96<t<1.96		-1.96<t<1.96		-1.96<t<1.96	

Table 1a: Friday Effect (US Market)

Statistics	Before Rolling		After Rolling		Total	
	Friday	Other Days	Friday	Other Days	Friday	Other Days
Mean	0.034705	0.025434	-0.00302	0.029697	0.012844	0.024861
S.D.	1.356376	1.290545	0.917093	1.01086	1.121778	1.134467
Variance	0.018398	0.016655	0.008411	0.010218	0.012584	0.01287
N	201	808	268	1570	469	2378
T-Test		.069061		-0.49742		-.018544
Df		1007		1836		2845
Critical Region		-1.96<t<1.96		-1.96<t<1.96		-1.96<t<1.96

Monday Effect: The research study by *Gibbons and Hess (1981)*, has shown that the return of Monday is significantly different from the return of other days and it is usually negative. The same is concluded by *Harris (1986)*. The most satisfactory explanation given for the negative return is that usually most unfavorable news appears during weekends. This unfavorable news disappoint the market resulting in a distress selling on the following Monday. In order to examine whether this type of anomaly exists in India's and US stock markets, the null hypothesis that the return of Monday and other days are same was taken. The results obtained in this regard are shown in Table 2 in case of former market and in Table 2A in case of the latter one. It is obvious that in Indian stock market, the average return on Monday is negative where as the returns on other days are quite positive for the first period. The difference in return is statistically significant. For the period 2002-07, the return on Monday is lower than the average return of the rest of the days. But the difference is not statistically significant which indicates, the absence of Monday effect. However, the data set for the whole period has shown that the return of Monday is not only negative but significantly lower than the rest of the days. In case of US market, the Monday return as well as the return of rest of the days are positive for each sub-period and for the total period data sets. Moreover, the difference between the two is not statistically significant. It means, Monday effect exists in Indian stock market but not in the US.

Table 2: Monday Effect (Bombay Stock Exchange)

Statistics	Before Rolling		After Rolling		Total	
	Monday	Other Days	Monday	Other Days	Monday	Other Days
Mean	-.30195	.0991	.07	.1148	-.041	.1101
S.D.	1.9087	.936629	1.5474	.7476	1.6699	.8076
Variance	3.643	.87725	2.39	.559	.0279	.652
N	199	790	295	1185	494	1975
T-Test	-3.4723		-.71992		-2.7122	
Df	987		1478		2467	
Critical Region	-1.96<t<1.96		-1.96<t<1.96		-1.96<t<1.96	

Table 2a: Monday Effect (US Market)

Statistics	Before Rolling		After Rolling		Total	
	Monday	Other Days	Monday	Other Days	Monday	Other Days
Mean	0.04013	0.024262	0.012493	0.025465	0.024444	0.022556
S.D.	1.282442	1.308841	1.061705	0.976529	1.161015	1.127021
Variance	0.016447	0.017131	0.011272	0.009536	0.01348	0.012711
N	192	817	252	1586	444	2403
T-Test	.116152		-0.19551		.02848	
Df	1007		1836		2845	
Critical Region	-1.96<t<1.96		-1.96<t<1.96		-1.96<t<1.96	

Semi-Monthly Effect : The paper also verifies the presence of semi-monthly or half month effect. For an empirical test of the above, a comparison of the average return of first half month (taken as return on 30th, 31st calendar days of preceding month and 1 to 14 calendar days of current month) and return for the rest of the days was made. The results are given in Table 3 and 3A. The former Table indicates that, in Bombay Stock Exchange Ltd. the return of the first half-month is found higher than the second half month during each period of the study. The difference between the two halves return is also statistically significant. In contrast, the return for second half month is found significantly higher than that of the first half month in the US stock market during 1998-2001. But during 2002-07 and aggregated period, the return for first half month is found higher than that of second half. Hence, semi-monthly effect is present in both the markets for the period of reference of the study.

Table 3: Semi-Month Effect (Bombay Stock Exchange)

Statistics	Before Rolling		After Rolling		Total	
	First Half	Second Half	First Half	Second Half	First Half	Second Half
Mean	.0734	-.117	.1821	.0823	.1392	.000367
S.D.	.6632	.7012	.3967	.4605	.5187	.5734
Variance	.4398	.492	.157	.212	.269	.329
N	492	497	743	737	1235	1234
T-Test	6.4118		10.3971		11.5271	
Df	987		1478		2467	
Critical Region	-1.96<t<1.96		-1.96<t<1.96		-1.96<t<1.96	

Table 3a: Semi-Month Effect (US Market)

Statistics	Before Rolling		After Rolling		Total	
	First Half	Second Half	First Half	Second Half	First Half	Second Half
Mean	0.010502	0.0347711	0.039972	0.0068298	0.027605	0.0185552
S.D.	0.33552	0.4232707	0.214712	0.2242252	0.27101	0.3215992
Variance	0.001126	0.0017916	0.000461	0.0005028	0.000734	0.0010343
N	506	503	927	909	1433	1412
T-Test		-2.6395		14.72419		2.73053
Df		1007		1836		2845
Critical Region	-1.96<t<1.96		-1.96<t<1.96		-1.96<t<1.96	

Turn of the Month Effect: Turn of the month effect refers that the returns on last few days of the previous month and first few days of the current month are significantly different from the returns for rest of the days in the current month. To analyze this, the present study has made a comparison of return on last trading day of the previous month and first three days of the current month with the return on rest of the days of the current month. The findings of the studies are given in Table 4 and 4A. The former Table shows that during first period (1998-01), the turn of the month effect does not exist in the Indian stock market. But during second period (2002-07) and total duration, the average return for the turn of the month is larger than that of the average of the rest of the days and the difference is found significant at five percent level. It means that the turn of the month effect is found in the Indian stock market. Interestingly, like semi-monthly effect, this effect is also observed significant in US stock market because the return for turn of the month is significantly larger than return of the rest of the days in the month.

Table 4: Turn of The Month Effect (Bombay Stock Exchange)

Statistics	Before Rolling		After Rolling		Total	
	First Half	Second Half	First Half	Second Half	First Half	Second Half
Mean	-0.017	.000603	0.3595	0.079	0.2109	0.0502
S.D.	1.0734	0.414	0.7376	0.335	0.9003	0.3683
Variance	1.152	.1714	.5441	.1123	.8105	.1356
N	192	797	271	1209	463	2006
T-Test	-.60398		21.7829		11.8793	
Df	987		1478		2467	
Critical Region	-1.96<t<1.96		-1.96<t<1.96		-1.96<t<1.96	

Table 4a: Turn of The Month Effect (US Market)

Statistics	Before Rolling		After Rolling		Total	
	First Half	Second Half	First Half	Second Half	First Half	Second Half
Mean	-0.017	.000603	0.3595	0.079	0.2109	0.0502
S.D.	1.0734	0.414	0.7376	0.335	0.9003	0.3683
Variance	1.152	.1714	.5441	.1123	.8105	.1356
N	192	797	271	1209	463	2006
T-Test	-.60398		21.7829		11.8793	
Df	987		1478		2467	
Critical Region	-1.96<t<1.96		-1.96<t<1.96		-1.96<t<1.96	

Month Effect: When the return in any of the month is higher than the return in other months, this anomaly is called as month effect. It is evidenced from the analysis that monthly effect exists in US and some other developed countries *(Ariel, 1987)*. In these markets, the return in December month is generally lower and in January month higher, as compared to return for other months. The reason being December is a tax month. And investors tend to sell the loss making shares towards the end of the year, so as to reduce their tax burden. This behavior of the investors exerts downward pressure on the stock prices. In January, they again start buying the shares. This puts upward pressure on stock prices and it results in higher return in January month. But in case of India, March is a tax month. Therefore, if this type of anomaly exists in India's stock market, it must have an impact on the return for March and April months. For examining this anomaly, we have compared the returns in all months using One Way ANOVA. Here, the null hypothesis is that there are no variances between the returns of the various months. The results are shown in tables 5A, 5B, and 5AB for BSE and 6A, 6B and 6AB for Standard and Poor index.

Table 5a: Month Effect in Bombay Stock Exchange (Before Rolling Settlements)

Month	Jan.	Feb.	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	0.1292	0.1814	-0.083	-0.223	0.0809	0.0185	-0.065	-0.023	-0.209	-0.218	0.1999	0.189
S.D.	0.4972	0.2959	0.574	0.295	0.4577	0.4549	0.388	0.3562	0.4524	0.3742	0.2663	0.2656
Variance	0.000247	.000087	0.000329	8.7E-05	0.000209	0.0002	0.000151	0.000127	0.000205	0.00014	7.09E-05	7.06E-05
F-Test							0.643					
Df							11, 36					
P-Value							0.78					

Table 5b: Month Effect in Bombay Stock Exchange (After Rolling Settlements)

Month	Jan.	Feb.	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	0.028524	0.04122	-0.03954	0.054533	-0.11263	0.23998	0.134591	0.245392	0.275399	0.14817	0.284147	0.325134
S.D.	0.158937	0.27709	0.252147	0.272504	0.512478	0.21373	0.255045	0.213051	0.313931	0.38509	0.278593	0.204915
Variance	0.000253	0.00076	0.000636	0.000743	0.002626	0.00045	0.00065	0.000454	0.000986	0.00148	0.000776	0.00042
F-Test						1.404						
Df						11, 60						
P-Value						0.195						

Table 5ab: Month Effect in Bombay Stock Exchange (Total Period Data)

Month	Jan.	Feb.	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	0.068776	0.09731	-0.05709	-0.0563	-0.03521	0.15140	0.054912	0.137932	0.081667	0.00170	0.250448	0.270688
S.D.	0.31488	0.27763	0.381647	0.301233	0.475107	0.32779	0.311304	0.294545	0.430736	0.40598	0.262024	0.227564
Variance	0.000991	0.00077	0.001457	0.000907	0.002257	0.00107	0.000969	0.000868	0.001855	0.00164	0.000687	0.000518
F-Test						1.026						
Df						11, 108						
P-Value						0.429						

Table 6a: Month Effect in US Market (Before Rolling Settlements)

Month	Jan.	Feb.	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	0.050657	-0.0998	0.131766	0.118899	-0.06787	0.10566	-0.08024	-0.19365	-0.15872	0.18455	0.086492	0.147644
S.D.	0.210726	0.35543	0.297036	0.22427	0.065799	0.15822	0.049548	0.419037	0.357401	0.17597	0.335937	0.126865
Variance	0.000444	0.00126	0.000882	0.000503	4.33E-05	0.00025	2.46E-05	0.001756	0.001277	0.00031	0.001129	0.000161
F-Test						1.02						
Df						11, 36						
P-Value)						0.449						

Table 6b: Month Effect in US Market (After Rolling Settlements)

Month	Jan.	Feb.	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	-0.00473	-0.0215	0.030722	0.033983	0.070347	-0.0431	-0.04374	0.037755	-0.08273	0.15027	0.151174	0.028797
S.D.	0.113328	0.09166	0.098333	0.236862	0.137964	0.18449	0.206969	0.057625	0.276217	0.17511	0.097029	0.198221
Variance	0.000128	8.4E-06	9.67E-05	0.000561	0.00019	0.00034	0.000428	3.32E-05	0.000763	0.00030	9.41E-05	0.000393
F-Test						0.965						
Df						11, 53						
P-Value						0.489						

Table 6ab: Month Effect in US Market (Total Period Data)

Month	Jan.	Feb.	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	0.017423	-0.0528	0.07114	0.067949	0.015061	0.02296	-0.05996	-0.06509	-0.11651	0.16550	0.122426	0.081618
S.D.	0.150848	0.22003	0.193662	0.223287	0.130812	0.18045	0.150694	0.287022	0.296062	0.16514	0.219521	0.172061
Variance	0.000228	0.00048	0.000375	0.000499	0.000171	0.00032	0.000227	0.000824	0.000877	0.00027	0.000482	0.000296
F-Test						1.547						
Df						11, 101						
P-Value						0.127						

A glance through the above mentioned tables provides that the differences between mean returns for various months are insignificant for all the three periods in both of the markets. Hence, the month effect is absent in both.

In order to make the one-to-one comparison of returns in various months, the Post-hoc test has also been applied. The statistics relating to one-to-one comparison of monthly returns for the period 1998-2007 are given in Table 7 in case of India and Table 8 in case of US.

The results of the test indicate that there is no significant difference between the returns even on the basis of one-to-one comparison. Results of the post hoc analysis for the period 1998-2001 and 2002-2007 for both of the market are almost same as the result of total time period. The result of these two periods have not been given here just because of unduly lengthy tables of the post-hoc test, but the authors would make these available to readers on demand.

Table 7: Result of One to One Comparison (Post Hoc Analysis) of Indian Market (1998-2007)

Month	Jan.	Feb.	Mar.	Apr.	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Jan.												
Feb	-.000285											
	(1.00)											
Mar	.0012603	.00154										
	(1.00)	(1.00)										
Apr	.00125	.000154	-.0000078									
	(1.00)	(1.00)	(1.00)									
May	.000104	.00033	-.000219	-.000211								
	(1.00)	(1.00)	(1.00)	(1.00)								
Jun	-.000826	-.000541	-.00208	-.00208	-.00187							
	(1.00)	(1.00)	(.999)	(.999)	(1.00)							
Jul	.000139	.000424	-.00112	-.00111	-.000901	.000965						
	(1.00)	(1.00)	(1.00)	(1.00)	(1.00)	(1.00)						
Aug	-.000285	-.000406	-.00195	-.00194	-.00173	.000135	.000830					
	(1.00)	(1.00)	(.999)	(.999)	(1.00)	(1.00)	(1.00)					
Sep	-.000129	.000156	-.00139	-.00138	-.00117	.000697	-.000268	.000563				
	(1.00)	(1.00)	(1.00)	(1.00)	(1.00)	(1.00)	(1.00)	(1.00)				
Oct	.000671	.000956	-.000588	-.000580	-.000369	.00150	.000532	.00136	.0008			
	(1.00)	(1.00)	(1.00)	(1.00)	(1.00)	(1.00)	(1.00)	(1.00)	(1.00)			
Nov	-.000182	-.00153	-.00308	-.00307	-.00286	-.000990	-.00196	-.00113	-.00169	-.00249		
	(1.00)	(1.00)	(.966)	(.966)	(.981)	(1.00)	(.999)	(1.00)	(1.00)	(.994)		
Dec	-.00202	-.00173	-.00328	-.00327	-.00306	-.00119	-.00216	-.00133	-.00189	-.00269	-.000202	
	(.999)	(1.00)	(.945)	(.946)	(.967)	(1.00)	(.998)	(1.00)	(1.00)	(.988)	(1.00)	

Note: the values in the () are P-values

Table 8: Result of One to One Comparison (Post Hoc Analysis) of US Market (1998-2007)

Month	Jan.	Feb.	Mar.	Apr.	May	Jun	Jil	Aug	Sep	Oct	Nov	Dec
Jan.												
Feb	.000703 (1.00)											
Mar	-.000537 (1.00)	-.00124 (.999)										
Apr	-.000505 (1.00)	-.00121 (.999)	.00003195 (1.00)									
May	.0000236 (1.00)	-.000679 (1.00)	.000561 (1.00)	.000529 (1.00)								
Jun	-.000155 (1.00)	-.000858 (1.00)	.000382 (1.00)	.000350 (1.00)	-.000179 (1.00)							
Jil	.000514 (1.00)	-.000189 (1.00)	.00105 (1.00)	.00102 (1.00)	.000490 (1.00)	.000669 (1.00)						
Aug	.000725 (1.00)	.0000220 (1.00)	`.00126 (.999)	.00123 (.999)	.000701 (1.00)	.000880 (1.00)	.000211 (1.00)					
Sep	.000622 (1.00)	-.0000806 (1.00)	.00116 (1.00)	.00113 (1.00)	.000599 (1.00)	.000778 (1.00)	.000108 (1.00)	-.000103 (1.00)				
Oct	-.000198 (.964)	-.00268 (.749)	-.00144 (.997)	-.00147 (.997)	-.002 (.960)	-.00182 (.981)	-.00249 (.831)	-.00270 (.738)	-.00260 (.786)			
Nov	-.000737 (1.00)	-.00144 (.977)	-.000199 (1.00)	-.000231 (1.00)	-.00076 (1.00)	-.000581 (1.00)	-.00125 (.999)	-.00146 (.997)	-.00136 (.998)	.000124 (.999)		
Dec	-.000898 (1.00)	-.00160 (.993)	-.000361 (1.00)	-.000393 (1.00)	-.000921 (1.00)	-.000742 (1.00)	-.00141 (.998)	-.00162 (.993)	-.00152 (.996)	.00108 (1.00)	-.000161 (1.00)	

Note: the values in the () are P-values.

CONCLUSION AND POLICY IMPLICATIONS

This study has been undertaken to examine whether seasonal anomalies exist in the developed and emerging markets. US and India are selected to represent the former and latter types of markets respectively. The results of this study have shown that the day effect and month effect don't exist in the US market. However, the turn of the month effect and the semi month effect, both exist in the US market as the stock returns during the first half of the month and turn of the month are significantly higher than the return for the rest of the days in the month. The above behavior of the US stocks is true also in case of Indian stock market. Turn of the month effect and semi month effect are prevalent in the Indian stock market.

In Indian market the stock return on Friday has been seen lower than that for the rest of days for the first period i.e. 1998-2001. During 2002-2007, however, the return of Friday has been observed significantly higher than that of rest of the days. On Monday, in contrast, the return is negative and significantly lesser than other days of the week during first period. However, Monday effect has disappeared during the recent period in Indian stock market. Regarding semi-month effect it is found that the stock returns for first

half of the month as well as turn of the month are higher than the return of second half in Indian stock market. However, no significant variation is found amongst the return across various months in case of both the markets.

As far as impact of rolling settlement on stock market efficiency is concerned, the return of Friday which was negative in pre-reform period turned positive and turned significantly higher than the return of the rest five days of the week after the introduction of the rolling settlement mechanism. Monday effect has disappeared after introducing rolling settlement in India. The implementation of the rolling settlement has no impact on semi month effect, as semi month effect was in existence in both the periods. In case of Turn of the month effect, after the introduction of rolling settlement the return of the first half turned positive from negative in case of pre-reform period. Month effect is found absent in both pre and post rolling settlement period periods. So it can be concluded that rolling settlement has not had much impact on the level of efficiency in India's stock market.

From the findings, thus it is obvious that some kind of seasonal anomalies are persistent in the markets of both advance and emerging countries. Hence, despite the use of sophisticated information technology and after introducing many reforms, the stock markets are not fully efficient. The policy implications of the findings are as follows:

The existence of anomalies may provide opportunities to formulate profitable trading strategies so as to earn the increased return that is not commensurate with the risk. As turn of the month and semi month effect persist in both the markets, investors can go for a trading strategy of buying stocks in the second half of the month and selling during the first half of the month. The study shows that the return of the Monday has been lower in comparison to the return of the rest five days of the week. Accordingly, the investors might purchase the securities on Monday and sell them on other days. The above strategy would improve the performance of portfolios maintained by both individuals and institutional investors. However, the usefulness of the strategies remains questionable as the transaction costs and information costs of operating in stock markets have not been considered in the paper. Moreover, if such anomalies persist today and investors formulate their trading strategies accordingly, this would result in profit making only in the short run. In the long run, countervailing arbitrage and forces of demand and supply will exploit the excess return leaving no future scope for such anomalies and the same would pave the way to make the market efficient. Still, the above strategy may be helpful in altering the timing of already scheduled purchase and sales transactions in both the stock markets under study.

Another implication of the study arises because the efficiency of the stock markets is closely related to the allocation of scarce capital resources. The allocation of capital resources to their most productive use can only be achieved in the presence of an efficient pricing mechanism, which requires an efficient dissemination of the information. The presence of anomalies indicate, stock market inefficiency and therefore, SEBI as a regulator of India's stock market and Security Exchange Commission in US need to take steps in order to increase the informational efficiency of the stock markets.

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