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Calendar Anomalies, reality or an illusion? KSE-Pakistan

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This paper investigates the calendar anomalies in Karachi Stock Exchange (KSE) of Pakistan, during 2002-04 periods. The data for this study was taken from KSE 100, involving the daily stock exchange and were tested for turn of the month and time of the month effects. The results, regarding mean returns showed the presence of both effects. Results after regression analysis didn't show the presence of Turn of the Month (TOM) effect in KSE. Slight evidence was witnessed regarding the time of the month effect in KSE, which confirmed the presence of anomalies and proved the market inefficiency. Limitations to this study are the time period, which was short. Future studies may consider a longer period of time for testing KSE, regarding the calendar anomalies.

Key words: Turn of the Month (TOM), Karachi Stock Exchange (KSE), Calendar Anomalies, Pakistan, KSE-100 index, Investor's psychology in Pakistan.

INTRODUCTION

Efficient market hypothesis postulates that all information should be correctly reflected in the prices of securities and if the markets are efficient abnormal profits are not possible. According to the hypothesis, prices of securities cannot be predicted as they follow random walk pattern (Malkiel, 2003). If there are opportunities to make abnormal profit in the equity markets, it refers to the market inefficiency and existence of some anomalies in the market because the concept of efficient market was established on the idea that no individual has the ability to have or gain profits by beating the market and in excess of market. Anomaly refers to any deviation from efficient market hypothesis. A variety of anomalies may be witnessed in the stock market. Calendar anomalies refer to the existence of any irregularities, fluctuations, or the specific pattern, occurring in a recurring manner during a definite time within a year. These types of anomalies prove out to be a severe threat to the market efficiency as the patterns become predictable making the abnormal profits possible.

Calendar anomaly may have different effects such as weekend effect, day of the week effect, time of the month effect, turn of the month effect and January effect. In turn of the month effect, average returns on securities are

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higher on last and first three days of a month due to the investor's behaviors. In the same way, in time of the month effect, returns are different at some points in time during a month (Chandra, 2009). Due to these patterns of average returns, prices are predictable which reflect the market inefficiency and reveal some pattern in security prices which may be exploited by the investors to make abnormal returns.

Therefore, the concept of calendar anomalies explains the fluctuations in the stock prices, based on a specific trend. This concept of calendar anomalies goes against the concept of the efficiency of market where prices cannot be predicted due to the incorporation of all relevant information. There has been evidence for the existence of calendar anomalies in different stock markets of the world. Initial studies include the study of Ariel (1987), who found out the existence of anomalies in the end and beginning of month, with his research study involving US stock prices. Therefore, this study aims at exploring the efficiency of Karachi Stock exchange (KSE) by testing the effect of two calendar anomalies including Turn of the Month (TOM) effect and time of the month effect. The rest of the paper is organized as explained. Literature review summarizes the relevant literature, methodology and results explain the models and the results from the test and then conclusion is given at the end.

LITERATURE REVIEW

Calendar anomalies have been tested in the literature to test the efficient market hypothesis in different stock markets of the world. Different studies have tried to explain the anomalies and have found the existence of these anomalies in real world stock prices. Haugen and Jorion (1996), consider the calendar effects, as short timed, or short lived, because the members of market might learn from past experiences. Similarly, the calendar effect, i.e. the weekend effect was witnessed and supported by Cross (1973), in his studies. Other studies, for calendar anomalies, included the, Day of Week effect (DOW), by Gibbons et al. (1981), whereby they proved the inconsistency in returns. DOW effect was also studied by Poshakwale (1996), involving the Indian stock market.

One reason for the existence of anomalies is that, the returns especially of positive nature, in the beginning of month, generate a positive effect in market. Thus, positive news of this nature brings up certain and positive returns, especially in first part of month (Penman, 1987). One such example is TOM.

Anomaly of TOM explains the pattern observed in the prices during the specific time period (-1, +4), the last working day of the preceding month and similarly the first 4 working days of current month (Ariel, 1987). His studies supported the concept, by proving the elevated returns in the specific period. Whereas, other researchers, Lakoniskok and Smidt (1998), came up with the idea that the working days event window, should be as (-1, +3), the final working day of previous month and similarly, the first 3 working days of the current month. Later on, the studies conducted by Hansel & Ziemba (1996), came up with idea of using five days for event window, i.e. (-2, +3), which meant the last two working days from the preceding month, and similarly 3 working days from the recent month. Their results proved significant and supported their event window, in their study of US stock market.

There are few specific reasons for the presence of TOM, such as at the ending time of the month, cash is required for interest or dividends, therefore the money is taken out from market, by the investors. Whereas, when the subsequent month begins, the investors restart and buy the stocks, giving a boost to the stock prices (Bahadur and Joshi, 2005; Ogden and Joseph, 1990).

Research studies conducted, testing the TOM, in different setups, i.e. US, Canada, UK and few other states, supported the concept and verified the presence of this effect (Cadsby and Ratner, 1992), whereas, no support has been witnessed in studies involving Japan, Hong Kong, Italy and even France.

Evidence for the occurrence of time of the month effect has also been found in the literature. Initial studies regarding this effect include Kohers and Patel (1999), who tested this effect. Their results supported the effect, as significant differences were noticed in the first segment and the other two segments taken from the month's time. Similarly, time of the month effect was also witnessed in studies involving Australia, Hong Kong and few other states, i.e. Malaysia, Singapore (Lian, 2002).

Thus, the literature reveals the existence of calendar anomalies and market inefficiency in the various stock markets of the world; it is worthwhile to study these effects in KSE to test the market efficiency.

METHODOLOGY

The data for this study has been taken from, KSE 100, involving the daily stock index, starting from January 2002, till December 2004, covering up a period of three years. Working days only, were considered for this study, as the public or official holidays were not considered.
Returns were calculated by the formula;

$$R_t = 100^* \text{Ln} (p_t / p_{t-1})$$

where Ln=natural logarithm, p_t and $p_{t-1=}$ KSE 100 index prices at time period t and t-1 respectively.

Turn of the month

Now to calculate for finding out the TOM effect, the last working day from previous month and similarly the first 3 working days from subsequent month have been taken. In this way, the remaining days were considered as Rest of the Month (ROM), based on the

Table 1. Descriptive statistics for the TOM effect from year (2002-04)

Periods	Turn of month	Rest of month
2002		
Mean	0.445	0.244
Median	0.504	0.220
Std. Deviation	1.271	1.651
Observation	45	199
2003		
Mean	0.420	0.158
Median	0.403	0.324
Std. Deviation	1.662	1.604
Observation	47	197
2004		
Mean	0.233	0.108
Median	0.299	0.183
Std. Deviation	0.936	0.944
Observation	47	199

concepts put forward by Lakonishkok and Smidt (1988), by applying the regression equation.

$R_t = \beta_0 + \beta_i d_{it} + €$

Where Rt refers to daily returns, βi refers to coefficient for the means, and d_{it} is basically the dummy variable. Additionally, € is for the error term.

Only one independent dummy variable has been taken, the value assigned to the period for turn of the month is 1, where as, ROM period is assigned a value of zero. The positive value for β_i is for the TOM, effect.

Time of the month

Using the concepts, put forward by Kohers and Patel (1999), the time of the month effect was tested, by splitting the period of a month in 3 segments, whereby the 28th trading day from previous month till 7th trading day in the subsequent month as first period of month, from 8th trading day to 17th as 2nd segment, and finally the last segment as third of the third, starting from 18th trading day till the 27th of the same month. Formula used for regression involved two variables as dummy variables.

$R_t = \beta_0 + \beta_1 d_{1t} + \beta_2 d_{2t} + €_t$

Where R_t refers to mean of stock for period t, d_{1t} refers to dummy variable, $€_t$ captures the error term.

Dummy variables were valued zero and one, depending on the first or second third of the month, d_{2t} explained the dummy variable for the first-third of month. Similarly, for the second-third of the month, the dummy variable is d3t. The coefficient for difference is β_1, regarding the 1st-third of month and the third-third of month. In the same way, β_2, explained the difference of 2nd and third-third of the month. The null hypotheses may be stated as, $H_0 = \beta_1 = \beta_2 = 0$, whereby the empirical analysis was done.

RESULTS

Descriptive statistics

Descriptive statistics explain the basic characteristics of the data such as mean, median, mode, and standard deviation etc. Statistical results given in Table 1 explain the difference between the mean values of returns for TOM and ROM involving the period from year 2002-04. The mean of returns for TOM is high in all the periods than mean for ROM. The mean of returns for the turn of the month (TOM) in year 2002 was (0.445), more than returns for ROM which was (0.244). Similarly, the mean of returns for TOM, for year 2003 and 2004 were (0.420) and (0.233) respectively, which were slightly more than mean value of returns from ROM, as for 2003, the mean value for ROM, was (0.158) and for 2004 it was (0.108). The difference was witnessed among the mean returns for TOM and ROM period. However, the standard deviation is quite high for ROM during 2002 that is 1.651 than 1.271 of TOM. Whereas, in 2003 standard deviation is high for TOM and again in 2004 standard deviation is high for ROM with a slight difference from TOM as explained in Table 1.

Results for descriptive statistics of the variables of time period effects are given in Table 3. Three time periods have been taken with period 1, period 2 and period 3. Descriptive statistics explains the mean, median and standard deviation for the three time periods during each year separately. Statistical results show that the mean value for the returns from the period 1, were more than the mean values of returns for the other two periods. The mean value for the first-third of the month for the year 2002 was 0.402 and the mean value for the 2nd-third of month was 0.220, whereas, for the third-third of the month the mean value came out to be 0.251, showing a significant difference, as compared to the period 1, of the month. Similarly, mean of returns for the first-third of month was 0.214, for the year 2003, was closer to the value of second-third value of mean of returns as 0.235.Whereas; the mean value of returns of the first period of the three periods of month, was high, 0.245, as compared to the second-third, i.e. 0.109 and the mean for returns for the last period was 0.045 and for the year2004. So, as a whole, a trend has been witnessed, in the mean values, that is the first-third mean values are higher, with a decreasing trend towards the second-third and third-third period.

The standard deviation for the three periods indicates that standard deviation is same during first third and third-third whereas it is high in second third with a slight difference in 2002 which means dispersion in data is high during the second third. In 2003, standard deviation is highest in period 1 at 97, then it is higher in period 3 with 82 and lastly it is 77 in period 2. Highest dispersion

Table 2. Analysis through regression coefficients TOM effect for year (2002-04)

Periods	β0	β1	R^2	F-value
2002	0.248 (2.215)*	0.219 (0.854)	0.029	0.729
2003	0.161 (1.406)	0.259 (0.990)	0.040	0.680
2004	0.110 (1.652)	0.0712 (0.607)	0.012	0.351

β0 =coefficient for ROM
β1= coefficient for (TOM)
* = significant 95% ** = significant 90%
t-values = in parenthesis
Descriptive statistics explaining Time of the month for year (2002-04), KSE- 100 index

Table 3. Descriptive statistics for the year (2002-04), KSE-100 index (time of month)

Time period	Period 1 First-third	Period 2 Second-third	Period 3 Third-third
2002			
Mean	0.402	0.220	0.251
Median	0.506	0.140	0.284
Standard Deviation	1.327	1.575	1.813
No of observations	82	83	82
2003			
Mean	0.214	0.235	0.163
Median	0.310	0.303	0.405
Standard Deviation	1.566	1.492	1.775
No of observations	97	77	82
2004			
Mean	0.245	0.109	0.045
Median	0.289	0.257	0.095
Standard Deviation	0.925	0.867	1.016
No of observations	83	81	84

in data is found in period 3 during 2004 with standard deviation of 84. In rest of the periods it is 83 in period 1 and 81 in period 2. The standard deviations during all the periods show that there are many fluctuations in the prices during the sample period.

Analyses of data

Regression analysis showed that there exists, almost a similar pattern, in the context of turn of the month, with an exception for the year 2002, where the coefficient for rest of the month ROM is significant i.e. *(β=0.248, t-stat = 2.215*)* whereas, the turn of the month (TOM) has been witnessed, to be positively insignificant for the same year (Table 2). For the year 2003 and 2004, no significant evidence has been seen, to exist (TOM), and similar pattern is there. The t-stat value for TOM, throughout the period of time selected for the study, remained insignificant, but positive with values as *(0.854) for* 2002, *(0.990)* for 2003 and (*0.607)* for the year 2004 respectively. This explains that the variable of TOM has been positively insignificant during the all three years in the sample. R^2 explains that how much variation in the dependent variable is being explained by the independent variable. R^2 is highest in 2003 where it is 40%, while in 2002 and 2004 it is 29% and 12% respectively. It means that largest part is being played in the returns by TOM and ROM during 2003. However, as TOM has been found positively insignificant, the results didn't support the findings of Lakoniskok and Smidt (1988), for the TOM effect.

Table 4. Analysis through regression for the year (2002-04), KSE-100 index (time of month)

Periods	β0	β1	β2	R^2	F-value
2002	0.225 (1.726)*	0.140 (0.518)	0.0298 0.115	0.023	0.286
2003	0.109 (0.699)	0.064 (0.250)	0.127 (0.430)	0.0042	0.101
2004	0.0650 (0.718)	0.149 (1.012)	0.0332 (0.215)	0.075	0.930

β_0 =coefficient for period 3
β_1 and β_2 refers to coefficient for period 2 and period 3 respectively.
* = significant 95%
** = significant 90%
t-values = in parenthesis

Regression analysis has been used to test the time of the month effect in KSE during the sample period. Results after the analysis, showed no significant anomalous behavior, except for the year 2002, where the effect regarding time of month has been witnessed, as third-third of the month effect has been witnessed, with the β_0, giving positive results and *t-stat = (1.726)** confirming the presence of anomaly in the third-third period in the year 2002. Whereas, in the year 2003 and 2004, no significant evidence has been found to enlighten the time of month effect (Table 4). In this context, year 2002 remained an exception as compared to the year 2003 and 2004, regarding the presence of effect of time of the month, in the results. Similarly, results from the study have revealed the presence of time of month effect, in the KSE, in the sample period of three years (2002-04). R^2 of the model also reveal an upward trend and in 2004 it is 75% which means that the explanatory power of the variables is good. The results supported the findings of

Kohers and Patel (1999), but the difference in our results was that of the third-third period of the month, for the year 2002, showed significant results, whereas in their study, they proved the first-third period of the month, as with significant results. Results also supported the findings of Zafar et al. (2009), who proved the existence of anomalies in KSE 100.

Thus, after testing for the calendar anomaly in KSE including two effects time of the month and turn of the month effect it might be extracted that the market is not efficient as it does not follow a random walk model. Although the variable of TOM has been found to be insignificant, there has been evidence for time of the month effect. The occurrence of this anomaly in the market reveals that KSE is not efficient and there are opportunities for investors to earn the abnormal profits. One reason for this market inefficiency may be that the economy is emerging and stock market is on its way of development (Guidi et al., 2010). Moreover the results are consistent with those of Gupta and Yang (2011) who found that stock markets of emerging economies are not efficient.

Conclusion

The primary objective of the study was to check for existence of efficiency of KSE, by studying it for the existence of anomalies. As efficient market hypothesis has attracted the attention of many academicians, practitioners and policy makers, it is worthy to explore the behavior and movements of stock market prices. Existence of efficiency in the stock market is now doubted in the stock markets in the world overall, so is the case with KSE. Therefore, the concept of anomaly has also been tested, as whether the anomalies are real or merely an illusion, by studying the Pakistani stock market. For the purpose, a period of three years (2002-04) was selected for the study, and Karachi Stock Exchange (KSE-100 index) was selected for the analysis. Descriptive statistics results supported the presence of anomalies. The mean returns, showed the presence of both effects. Though the Turn of the month effect was not significantly witnessed in our results after regressing it, but the Time of the month effect was witnessed. These results confirmed the presence of anomalies in the KSE 100. Such type of anomalies proves the market inefficiency, and is largely due to the investor's psychology and investing behavior.

The market inefficiency is in accordance with many stock markets of the world which have been found to be inefficient. It is because of certain biases reflected in investor's behavior. Another reason for inefficiency is that the economy is developing.

The results have implications for the investors as well as policy makers. The investors need to know about the efficiency of market to make profitable decisions for their portfolios (Gupta and Yang, 2011). In the same way, it has implications for policy makers in order to attract investments and development of stock markets. The existence of these anomalies should be checked and proper policies must be devised by the government authorities, to reduce the anomalies by putting forward some effective strategies, for the enhancement of market efficiency.

There are few limitations to the study, which may be considered for future studies. The first limitations are the sample size, regarding the time period selected for the study, which was three years. Secondly, the study involved Pakistani stock market (KSE) only, whereas, future studies may check the existence of anomalies in other stock markets of other countries and nations.

Conflict of Interests

The author(s) have not declared any conflict of interests.

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