Seasonality in Stock Return: Evidence from Dhaka Stock Exchange

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ABSTRACT

Seasonality in return from capital market has been put forward as most compelling evidence controverting the Efficient Market Hypothesis. Existence of seasonality provides opportunity to gain abnormal return by deploying dynamic trading strategies at the same time it also pushes policymakers to rethink about structural flaws that may have developed within the market mechanism. This study aims to identify seasonality in return from Dhaka Stock Exchange – the premier bourse of Bangladesh. The study tested for existence of Month-of-the-Year Effect and Day-of-the-Week Effect on return of the broad market index of Dhaka Stock Exchange from 2009 to 2018. Through multivariate regression analysis, it was found that index return in the month of June is significantly higher than the other months. Empirical evidence of existence of significant positive return on Tuesday and Thursday and negative return on Thursday have also been found in the study. However, such month specific return pattern and weekday impact of return were found to be non-stationary though weekday impact was more time persistent than month impact. The findings of this study can be stepping stone for further in-depth study in this aspect using specific company return or sectoral index return.

Key words: Day-of-the-Week Effect, Dhaka Stock Exchange, Month-of-the-Year Effect, Seasonality, Stock Return

1 INTRODUCTION

1.1 Background

Capital markets act as conduit of funds from surplus units of the economy to the deficit units. Success of capital market in efficient allocation of funds to the worthiest units depends on the efficiency of the market. Capital markets' efficiency has been a favorite subject of empirical studies since theoretical underpinnings of efficiency of capital market was introduced in 1970s by Fama. Fama laid the foundation of one of the most talked about theories of financial economics - the Efficient Market Hypothesis (Fama, 1970). The fundamental tenet of the theory renders active asset management useless by declaring that it is not possible to gain abnormal return through incorporation of any type of information. This theoretical underpinning has intrigued both academicians and investment management professionals alike, however, for different purposes. Numerous empirical studies have been conducted both supporting and contradicting the proposition of this theory based on different capital markets around the world using data from different time periods.

In Bangladesh, however, there is a lack of definitive empirical study on this matter in recent times. This study aims to fill that void through identification of existence or absence of anomalies in the efficient functioning of premier bourse of Bangladesh – Dhaka Stock Exchange (DSE). Identification of anomalies in capital market will offer investment management professionals to design trading strategies to exploit the inefficiencies of the market and obtain abnormal return. The findings will also help future research in this subject matter. It will also be valuable to the policymakers and regulators for identifying the future course of action to improve efficiency of capital market.

The study is centered around the broad objective of finding the seasonal anomalies of stock returns in Dhaka Stock Exchange. In specific term the study aims to identify existence of month-of-the-year effect and day-of-the week effect in Dhaka Stock Exchange. The study will also explore the time persistence of these two effects in market return.

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2   METHODOLOGY

To test for the presence of month of the year effect over ten years period daily index value has been used to calculate daily logarithmic return. Regression model is then developed using the calculated return to test for equality of impact of each month on index return. The regression model used is as follows:

$$R_t = \sum_{i=1}^{12} \alpha_i D_{i,t} + \varepsilon_t$$

Here R_t is the index return for each period and D_i is the dummy variable that takes value = {1 for January, 2 for February ……. 12 for December}, α are parameters to be estimated and ε is the error term.

For each of the twelve months one α will be generated by regression model. The null hypothesis to be tested is:

$$H_0: \alpha_1 = \alpha_2 = \alpha_3 = \alpha_4 = \alpha_5 = \alpha_6 = \alpha_7 = \alpha_8 = \alpha_9 = \alpha_{10} = \alpha_{11} = \alpha_{12} = 0$$

The null hypothesis will be tested against the alternative hypothesis that all α are not equal to zero. Rejection of null hypothesis will establish the existence of Month of the Year Effect on stock return

Similarly, to test for the Day of the Week effect the following model is used

$$R_t = \sum_{i=1}^{5} \alpha_i D_{i,t} + \varepsilon_t$$

Here, R_t is the index return for each period and D_i is the dummy variable that takes value = {1 for Sunday, 2 for Monday ……. 5 for Thursday}, α are parameters to be estimated and ε is the error term. The null hypothesis to be tested is:

$$H_0: \alpha_1 = \alpha_2 = \alpha_3 = \alpha_4 = \alpha_5 = 0$$

The null hypothesis will be tested against the alternative hypothesis that not all α are equal to zero. Rejection of null hypothesis will establish the existence of Day of the Week Effect on stock return.

2.1   Data Collection

For conducting the study price data of all stocks included in Dhaka Stock Exchange from December 31, 2008 to December 31, 2018 are collected from DSE. Using the free-float market weight and daily return of each company the composite index was calculated from January 1, 2009 to December 31, 2018. The base for calculation of index was 1000. Then using the daily index level daily logarithmic return of the index was calculated.

3   LITERATURE REVIEW

In literatures examining the efficiency of capital market one common theme is the presence of seasonality of return from investment. In search of seasonality of return studies have been done to find impact of month of the year on stock return as well as the impact day of the week on stock return. The first such report of seasonality was presented in 1942 by an American investment banker name Sydney B. Wachtel. In his study he found that stock returns were significantly higher in the month of January which he termed as "January Effect" (Watchel, 1942). Since then numerous studies have been done to identify January effect in stock return across the world. Haug and Hirchey (2006) conducted a study by analyzing the value-weighted and equal-weighted returns of US equities. The study conducted using broad sample of equities observed significantly higher rates of return on small cap stocks. The study also confirms that such effect was consistent over time (Haug & Hirschey, 2006). Many studies on January effect has also found evidence controverting the existence of "January Effect". Burton Malkiel, former director of Vanguard, argues that seasonal anomalies including "January Effect" are not time persistent and they do not offer opportunities for arbitrage that will enable investors to earn risk adjusted excess return (Malkiel, 2003). Jeremy Seigel (1994) also reports that the "January Effect" does not always materialize and thus does not offer arbitrage opportunity to investors. More recent studies conducted using market data from main international capital markets notes that though "January Effect" was prevalent at certain period of time, its impact has now eroded (Darat, Su, & Liu,

2011). Zhang & Jacobsen (2012) conducted a study for identification of seasonal pattern using 300 years of market data. Their study concluded that presence of seasonality or "January Effect" is sample specific and these anomalies are not time persistent (Zhang & Jacobsen, 2012).

Though the existence or absence of seasonality of stock return in developed economies has been extensively documented, little attention is paid in this matter in case of emerging markets. Docherty et al. (2015) conducted a broad study encompassing nine advanced emerging markets using price data of over two decades denominated in both local currency and USD to account for any abrupt change in economic condition of the countries under review. Their study aimed to identify five key seasonal anomalies of return in stock markets of those nine countries. The study noted significantly higher return in December for emerging economies. The data also reports existence of significantly higher return in 44th week of the year in eight out of nine countries under review. The study also corroborates the presence of day of the week effect in six out of nine markets under review. However, the study could not confirm existence of "January Effect" in those nine markets (Docherty, Shamsuddin, & Seif, 2015).

Another study conducted by Moosa and Al-Saad (2005) using data of Kuwait Stock Exchange reports presence of deterministic seasonality in stock return. However, the study also noted that the seasonality takes the form of "July Effect" instead of "January Effect" found in developed markets (Moosa & Al-Saad, 2005). In Bangladesh Ahsan & Sarkar (2013) tested for existence of "January Effect" using 25 years of data from Dhaka Stock Exchange. Their empirical study contradicted the existence of normal "January Effect" in case of Bangladesh. However, the study reported presence of abnormal return in June (Ahsan & Sarkar, 2013).

One of the few hypotheses put forward as a possible explanation of "January Effect" is tax loss selling hypothesis by Branch (1977). According to this hypothesis, investors realize their losses in December to avail tax opportunity and buy back those shares in January driving returns higher in January (Branch, 1977). This can possibly explain for the non-existence of "January Effect" in some emerging countries where tax year is not same as calendar year like Bangladesh. However, few alternative hypotheses are also put forward by others. Most notable of those are window dressing hypothesis (Lakonishok & Smidt, 1988) and lower participation of institutional investor hypothesis (Voronkova & Bohl, 2005).

Existence of day of the week effect presents another strong contradiction to efficiency of capital market. Abnormal return on specific day of the week implies presence of day of the week seasonality in stock return (Apolinario, Santana, Sales, & Caro, 2006). Cross (1973) reported in his empirical study that average return on Munday in US stock market is significantly lower than average return on other four days of the week. The average return on Friday has been found to be significantly higher than rest of the week (Gibbons & Hess, 1979). Both of these results were corroborated by Kiymaz and Berument (2003) who used Generalized Autoregressive Conditional Heteroscedasticity model on US market data from 1973 to 1997. Outside the USA, most international studies have found evidence of day of the week effect (Docherty, Shamsuddin, & Seif, 2015). However, findings from empirical studies across the world does not produce the same pattern of day of the week impact. In a study of the Asian stock market significant negative return has been reported on Wednesday in Taiwan (Brroks & Persand, 2000). The study by Brooks & Persand (2000) also reported negative return on Tuesday and average positive return on Monday in Malaysia and Thailand.

In a study conducted by Mitra (2016) using stock market data of India from 2000 to 2015 reported no evidence of day of the week effect on the daily return of assets. However, the study reported significant higher volatility on Tuesday. Another study was conducted to test presence of day of the week effect in major stock indices around the world comprising S&P 500 (USA), FTSE 100 (UK) and DAX (Germany) by Alt et al. (2011). They reported that Monday effect was prevalent during the period of 1970s and 1980s. However, Monday effect was absent in all three markets since 2000s.

4   FINDINGS & ANALYSIS

4.1   Description of Data

For the purpose of the study broad market index of Dhaka Stock Exchange from January 1, 2009 to December 31, 2018 has been developed and used for return calculation. From the index generated using the market data we can see that from 2009 the market was in unsustainable rally which peaked in last quarter of 2010. From beginning of 2011 the market experienced steep correction which continued till 2013. From second half of 2013 a smooth bull run commenced which reached peak in January 2018. The market then experienced another small correction. The fact that market experienced almost one complete cycle within the ten years period under study will help to avoid impact caused by cyclical position of the market
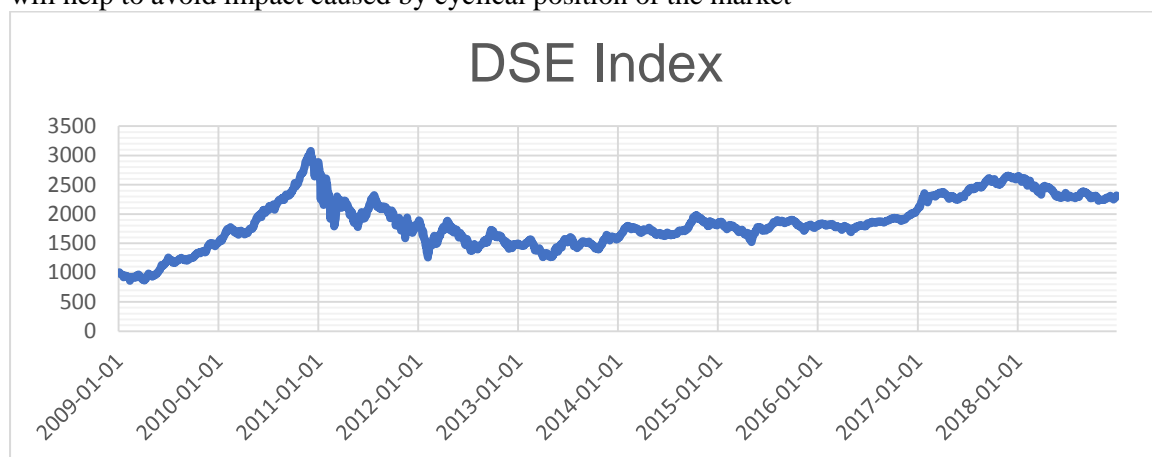

Figure 4-1Dhaka Stock Exchange Broad Index

4.2   Month of the Year Effect

To test for impact of month on return from capital market regression test was run for the time period of ten years from 2009 to 2018 and coefficients of each month was estimated. To evaluate the time persistence (stationarity or non-stationarity) of the month of the year effect regression tests were done for each of the ten years under review and monthly coefficients were estimated. Then estimated coefficients were tested for statistical significance.

4.2.1   Overall Month of the Year Effect

A regression model was developed to identify the months which have significant impact on stock return. The purpose of the regression model is not to forecast or predict stock return rather to isolate the months which have significant influence on return. The following table contains the result of regression model conducted for testing Month of the Year effect.

Table 4-1Regression Model for Month of the Year Effect

	Co-efficient	t-Statistic	p-value	Comment
January	-0.000694185	-0.7089	0.47845292	Not Significant
February	-0.000827458	-1.60454	0.108728068	Not Significant
March	-0.000032165	-0.09715	0.922618561	Not Significant
April	-0.000105081	-0.4211	0.673721931	Not Significant
May	0.000287169	1.441995	0.149435049	Not Significant
June	**0.000315179**	**1.899172**	**0.057662293**	**Significant**
July	-0.000002898	-0.01993	0.984104648	Not Significant
August	0.000167525	1.296012	0.195096673	Not Significant
September	0.000102374	0.897957	0.369299101	Not Significant
October	-0.000045184	-0.44036	0.659714521	Not Significant
November	0.000140715	1.520157	0.128603932	Not Significant
December	0.000033327	0.392768	0.694526024	Not Significant

From the regression result table, it can be seen that January, February, March, April, July and October has negative coefficients. However, none of these are statistically significant as evident from their respective p-values that is the coefficients are not statistically different from zero. The remaining months have positive co-efficient. Among them only coefficient of June is statistically significant at 90% confidence level. Thus, the null hypothesis that all coefficients are equal to zero is rejected at 10% significance level. This proves the existence of Month of the Year effect for the period under review from 2009 to 2018 in index return of DSE. Therefore, from the above model conclusion can be draw that there is statistically significant opportunity to gain abnormal return from DSE in the month of June.

4.2.2   Stationarity of Month of the Year Effect

Regression model developed in the previous section shows opportunity for abnormal return in the month of June. However, that result does not proves whether the same trend is found in each of the ten years under review. To test for stationarity of month of the year effect regression model was developed for each of the ten years under review. The models generated coefficients and their associated p-values. The p-values of the models for twelve months of each of ten years is presented in Table 5-2.

Table 4-2 Year-Wise p-Value of Each Month

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
January	0.206	**0.016**	0.418	**0.018**	0.953	**0.001**	0.426	0.795	**0.001**	0.350
February	0.576	0.816	**0.005**	0.180	0.541	0.893	0.830	0.978	0.296	0.184
March	0.496	0.993	0.182	0.572	**0.056**	0.116	0.279	0.173	0.456	0.239
April	0.147	0.441	0.692	0.841	0.533	0.583	0.003	**0.072**	0.186	0.448
May	**0.082**	**0.023**	0.693	0.469	**0.033**	0.322	**0.000**	**0.003**	0.807	**0.055**
June	**0.001**	0.465	0.656	0.693	0.297	0.797	0.960	0.192	**0.061**	0.661
July	0.551	0.513	0.605	0.325	0.506	0.638	0.111	0.855	0.176	0.543
August	0.833	0.253	0.726	0.315	0.376	0.355	0.962	0.808	0.307	0.112
September	0.435	0.182	0.699	0.568	0.485	**0.003**	0.597	**0.033**	0.624	0.150
October	0.144	**0.040**	0.258	0.815	0.949	0.328	**0.077**	0.187	0.632	0.470
November	**0.069**	**0.043**	0.633	0.448	0.209	**0.016**	0.874	**0.010**	**0.064**	0.408
December	0.680	0.598	0.980	0.958	0.900	0.595	0.819	**0.009**	0.726	0.601

From the Table 5.2 it can be seen that no month has effect on stock return consistently over the ten years period. Thus, absence of clear trend or pattern shows that month-of-the-year effect in stock return is non-persistent and changes with time. Such non-stationarity of month of the year effect on market return can be attributed to changing psychology of market participants, change in regulatory framework and year specific political and macroeconomic events.

4.3   Day of the Week Effect

To determine the Day of the Week effect of the regression model was developed using index return of ten years period extending from 2009 to 2018 with each of the weekday as independent variable. The estimated coefficients were tested for statistical significance. Moreover, to assess time stationarity of Day of the Week effect regression tests were done for each of the ten years under review.

4.3.1   Overall Day of the Week Effect

The regression model developed for day of the week effect generated negative coefficients for Sunday and Monday and positive coefficients for Tuesday, Wednesday and Thursday. This implies that Sunday and Monday negatively impacted the index return and Tuesday, Wednesday and Thursday positively impacted return. However, from the associated p-values it can be seen that coefficients for Monday and Wednesday are not statistically different from zero. However, the coefficients of Sunday, Tuesday and Thursday are statistically significant at 99% confidence level. Thus, null hypothesis that all the coefficients are equal to zero is rejected establishing the Day of the Week effect on index return of Dhaka Stock Exchange.

Table 4-3 Regression Model for Day of the Week Effect

	Co-efficient	t-Statistic	p-value	Comment
Sunday	-0.00274	-4.21861	0.000025	**Significant**
Monday	-0.00048	-1.49382	0.135354	Not Significant
Tuesday	0.000991	4.591181	0.000004	**Significant**
Wednesday	0.000116	0.718986	0.47222	Not Significant
Thursday	0.000399	3.080216	0.002092	**Significant**

4.3.2   Stationarity of Day of the Week Effect

Regression model developed in the previous section shows opportunity for abnormal return on Tuesday and Thursday. However, that result does not draw any conclusion about the stationarity of abnormal return in each of the ten years under review. To test for stationarity of day of the week effect regression model was developed for each of the ten years under review. The models generated coefficients and their associated p-values. The p-values of the models for twelve months of each of ten years is presented in Table 5-4.

Table 4-4 P-values of Weekday Coefficients Across Ten Years

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Sunday	0.188	0.772	**0.003**	0.322	**0.008**	**0.008**	0.102	**0.069**	0.102	**0.077**
Monday	0.906	0.363	0.201	**0.036**	0.191	0.915	0.789	0.755	0.170	**0.002**
Tuesday	0.164	**0.027**	0.130	0.124	**0.093**	**0.044**	**0.076**	**0.024**	**0.000**	0.621
Wednesday	0.920	**0.094**	0.876	0.369	0.681	**0.043**	0.571	0.545	0.396	0.573
Thursday	**0.027**	**0.002**	0.675	0.250	0.924	0.102	0.627	**0.002**	0.170	0.328

From Table 5-4 we can see that in 2009 Thursday had statistically significant impact on index return. In 2010 Tuesday, Wednesday and Thursday had significant influence on stock return. In 2011 Sunday and in 2012 Monday impacted index return. In 2013 Sunday and Tuesday and in 2014 Sunday, Tuesday and Wednesday had significant influence on return. In 2015 Tuesday, in 2016 Sunday, Tuesday and Thursday and in 2017 Tuesday had considerable impact on stock return. In 2018 Sunday and Monday impacted stock return. Thus, within the ten years period under review Sunday impacted stock return significantly in five years, Tuesday impacted in six years and Thursday impacted in three years. Thus, it can be concluded that Day of the Week effect shows slight degree of stationarity in Dhaka Stock Exchange.

5   CONCLUSION

The paper investigated the key anomalies that are exhibited in the capital market of Bangladesh. The anomalies that were tested in this paper are Month of the Year Effect and Day of the Week effect on the return of the broad index of premier bourse of Bangladesh – Dhaka Stock Exchange. The study also tested for time persistence these two effects. The study found evidence of the presence of Month of the year effect. The data suggests abnormal positive return in the month of June. However, the study did not find concrete evidence of stationarity of the Month of the Year effect across ten years period under review. Non-stationarity of the effect suggests changing investors' psychology and preferences. The study found evidence of existence of Day of the Week effect on return from Dhaka Stock Exchange. The study observed that Tuesday and Thursday offer opportunity for excess return whereas Sunday provides unusually lower return than expected. Investors can formulate their trading strategies keeping in mind the pattern of return across the week. The study found stationarity of Day of the Week effect to be stronger than stationarity of Month of the Year Effect suggesting greater opportunity in gaining excess return using Day of the Week strategy.

The study found evidence of existence of Month of the Year effect and Day of the Week effect on the return from Dhaka Stock Index. However, the study does not suggest engagement in stock trading solely based on the findings of the study as the past pattern of return does not guarantee future trend. The findings of the study can be helpful to market participants about understanding of its dynamics. Moreover, stock specific in-depth study can be conducted based on the findings

of the study with integration of other trade related data like – turnover, number of trades and volume. The integration of such non-return data will give holistic picture about performance of the market as well as help to develop better trading strategies. The study will also help policymakers to design their investigation and observation of day to day market operation more efficiently and help to further improve efficiency of market.

REFERENCES

Ahsan, A. M., & Sarkar, A. (2013). Does January Effect Exist in Bangladesh? . *International Journal of Business and Management*, 82-89.

Alt, R., Fortin, I., & Weinberger, S. (2011). The Monday effect revisited: an alternative testing approach. *Journal of Empirical Finance, 18*(3`), 447-460.

Apolinario, R. M., Santana, O. M., Sales, L. J., & Caro, A. R. (2006). Day of the week effect on European stock markets. *International Research Journal of Finance and Economics,, 2*, 53-70.

Bley, J., & Saad, M. (2010). Cross-cultural differences in seasonality. *International Review of Financial Analysis, 19*(4), 306-312.

Branch, B. (1977). A tax loss trading rule. *The Journal of Business, 50*(7), 198-207.

Brroks, C., & Persand, G. (2000). Seasonality in Southeast Asian stock markets: some new evidence on day-of-the-week effects. *Applied Economics Letters, 8*(3), 155-158.

Chowdhury, S. S., Rahman, A., & Shibley, S. (2001). Capital market seasonality: The case of Dhaka Stock Exchange (DSE) returns. *South Asian Journal of Management*, 1-8.

Cross, F. (1973). The behavior of stock prices on Fridays and Mondays. *Financial Analysts Journal, 29*(6), 67-69.

Darat, A. F., Su, J. J., & Liu, B. (2011). A fresh look at seasonal anomalies: An international perspective. *International Journal of Business and Economics*, 93-116.

Docherty, P., Shamsuddin, A., & Seif, M. (2015, August 20). Seasonality in Stock Returns: Evidence from advanced emerging stock markets. Newcastle, New South Wales, Australia.

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

Gibbons, M. R., & Hess, P. (1979). Day of the week effects and asset returns. *Journal of Business, 54*(4), 579-596.

Haug, M., & Hirschey, M. (2006). January Effect. *Financial Analysts Journal*, 78-88.

Kiyamaz, H., & Berument, H. (2003). The day of the week effect on stock market volatility and volume: International evidence. *Review of Financial Economics, 12*(4), 363-380.

Lakonishok, J., & Smidt, S. (1988). Are seasonal anomalies real? A ninety-year perspective. *Review of Financial Studies, 1*(4), 403-425.

Malkiel, B. (2003). Efficient Market Hypothesis and Its Critics. *The Journal of Economic Perspectives* , 59-82.

Mitra, P. (2016). Day-of-the-Week Effect on Stock Market Return and Volatility: Evidence from Indian Stock Market. *Journal of Economics and Finance, 7*(4), 99=107.

Moosa, I. A., & Al-Saad, K. (2005). Seasonality in stock returns: evidence from an emerging market. *Applied Financial Economics*, 63-71.

Seigel, J. J. (1994). *Stocks for the Long Run* . Irwin: McGraw-Hill.

Voronkova, S., & Bohl, M. K. (2005). Institutional traders' behavior in an emerging stock market: Empirical evidence on polish pension fund investors. *Journal of Business Finance & Accounting, 32*(7-8), 1637-1560.

Watchel, S. B. (1942). Certain Observations on Seasonal Movements in Stock Prices. *Journal of Business*, 184-193.

Wilson, J. W., & Jones, C. P. (1993). Comparison of seasonal anomalies across major equity markets:a note. *Financial Review, 28*(1), 107-115.

Zhang, C. Y., & Jacobsen, B. (2012). Are Monthly Seasonals Real? A Three Century Perspective. *Review of Finance*, 1743-1785.