# Is Tax-Loss Selling Hypothesis Valid in Bangladesh?

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*This paper tests the tax-loss selling hypothesis in Dhaka Stock Exchange (DSE) in Bangladesh. This study uses monthly data from DSE All Share Price Index (DSI) for the period of 1987 to 2012. Under the hypothesis rational investors offsets taxable income against the capital losses to realize the losses at the end of the tax year which eventually causes significant positive returns in January or July as the tax selling pressure ends after the fiscal year. Empirical results do not support the tax-loss selling hypothesis as an explanation for the high June return at the end of the tax year in Bangladesh.*

## INTRODUCTION

Over the past few decades "January effect" has been well documented almost all over the world. Researchers have explained the effect as seasonal anomaly of the financial market where stock prices tend to fall towards the end of December and then recuperate quickly in the first month of the New Year which eventually causes abnormal high return in January. To explain the effect a number of hypothesis have been tested including tax-loss selling hypothesis (Slemrod, 1982; Givoly & Ovadia, 1983; Reinganum, 1983; Roll, 1983; Lakonishok & Smidt, 1986; Chan, 1986; Ritter, 1988; Dyl & Maberly, 1992), the window dressing hypothesis (Bildersee & Kahn, 1987; Haugen & Lakonishok, 1987; Lakonishok et al., 1991; Eakins & Sewell, 1994), the insider trading (information release) hypothesis (Brauer and Chang, 1990; Jones & Lee, 1995), statistical bias hypothesis (Roll, 1981; Roll, 1983), risk changing hypothesis (Ritter & Chopra, 1989; Tinic & West, 1984), misspecification of systematic risk hypothesis (Chan et al., 1985; Chan & Chen, 1988) and the investor overreaction hypothesis (Chopra, Lakonishok & Ritter, 1992; Debondt & Thaler, 1985 & 1987).

Among all this hypothesises none has generated as much attention as the tax-loss selling hypothesis (D'Mello et al., 2003) and it has been the most frequently cited explanation for the January effect (Starks et al., 2006). Under this hypothesis rational investors offset taxable income against the capital losses to realize the losses at the end of the tax year (e.g., December) which causes significant positive returns in at the beginning of the tax year (e.g., January) as the tax selling pressure ends after the fiscal year. This hypothesis was first proposed by Wachtel in 1942 then later on Rozeff and Kinney (1976), Branch (1977) and Dyl (1977) supported the hypothesis with more evidence and made it a global phenomenon.

In Bangladesh, Tax year begins on July 1$^{st}$ and ends on June 30$^{th}$ of the following year. The main objective of this study is to test whether the tax-loss selling hypothesis can explain the "June effect" in Dhaka Stock Exchange (DSE) in Bangladesh. As the tax year ends in June 30 in Bangladesh our test will provide extensive evidence whether there is any tax motivated sales in DSE towards the end of June and whether that causes any significant price increase in July.

This study uses monthly return data of DSE All Share Price Index (DSI) from 1987 to 2012 and regression model combined with dummy variables to test the validity of the tax-loss selling hypothesis in Bangladesh. Our results failed to identify any July effect which points to the fact that the tax-loss selling hypothesis is not valid in Bangladesh. This paper is organized as follows: Section 2 highlights the previous studies. Section 3 describes data collection and research methodology. Section 4 reveals and discusses results. Lastly, section 5 provides concluding remarks.

## LITERATURE REVIEW

The tax-loss-selling hypothesis was first proposed by Wachtel in 1942. According to the hypothesis rational investors offsets taxable income against the capital losses to reduce their year-end tax liability by selling stocks that have experienced decline in price over the year. Under the existing tax law it help investors to realize the losses and use the losses as tax shield at the end of the tax year. This motivation causes huge selling pressure shortly before year end and causes significant price decline in year-end stocks. Once the selling pressure abates at the beginning of next fiscal year, stocks goes back to their equilibrium price and therefore prices rebound in January and causes positive abnormal return. In 1976, Rozeff and Kinney presented evidence on large January returns and suggested tax-loss selling hypothesis could be the possible explanations of high January returns but the hypothesis became popular after Branch (1977) and Dyl (1977) documented high January returns for securities whose prices reaches a year low at the end of previous tax year.

Reinganum (1983), and Givoly and Ovadia (1983) reports the abnormal high trading volume in stocks which have declined in price towards the end of the year is due to tax-loss selling. During 1945 to 1979 Givoly and Ovadia (1983) calculated average monthly rate of return was only 1.17% whereas in January it was 4.36%. D'Mello, Ferris and Hwang (2003) found the tax–loss-selling pressure causes the price to be at the bid and it also depresses the equilibrium price at the end of the year.

Starks, Yong and Zheng (2006) gave evidence in support to the tax-loss selling hypothesis to explain January effect on the municipal bond closed-end funds. Their evidence suggests the year-end tax-loss selling behaviour of investors is the main cause for January effect. Specially, the abnormal returns of the municipal bond closed-end funds in January are positively correlated with the year-end trading volumes and the year-end volumes are negatively related to the current and previous year's returns. Bhabra, Dhillon and Ramirez (1999) established a unique and significant relationship between excess returns and the potential for tax loss selling after the Tax Reform Act (TRA) 1986 period. They concluded their findings "November effect" after TRA period is explained by the tax-loss selling hypothesis. Schultz (1985) and Jones, Lee and Apenbrink (1991) examined the January effect and provided further evidence for tax-loss selling around the introduction of individual taxes in 1917.

In contrast, several arguments have been put forward to counter the tax-loss-selling hypothesis as an explanation for January effect. Reinganum (1983) confirms that the January effect is most pronounced in small firms (Banz, 1981; Roll, 1983; Keim, 1983; Blume and Stambaugh, 1983) and provided evidence that non-declining small firm stocks also have high January returns. Constantinides (1984) dismisses the concept of delaying loss realization until the end of tax year as a concept of optimal tax trading strategy. Jones et al. (1987) gives evidence of high January return before the imposition of income taxes in U.S.

Gultekin and Gultekin (1982) found the evidence of seasonality over 17 countries and concluded "the seasonality seems to be caused by the disproportionately large mean returns in the first month of the tax year in countries where capital gains from security holdings are taxed". Their findings supported the tax-loss-selling hypothesis and attracted attention of international researchers.

In Australia Brown, Keim, Kleidon and Marsh (1983) tested tax-loss hypothesis and argues that, at best, tax-loss hypothesis leads to ambiguous predictions. They raised the question of the importance of tax loss selling as an explanation for December - January and July – August seasonality. Their study reveals that the largest effects occur in January and July and concluded as the Australian tax year ends in

June 30 July effect is explained by the tax-loss hypothesis but the possible explanation of January effect is the arbitrage across capital markets. In Netherlands, Bergh and Wessels (1985) dismiss the tax-loss hypothesis on 61 stocks traded on the Amsterdam Stock exchange during the period 1966 to 1982 and advised to pay attention on the question how the scope of January returns predictions could affect the testing of the theory. In UK, Reinganum and Shapiro (1987) conclude the high April return is explained by tax-loss-selling hypotheses but it cannot solely explain the January effect.

Chen, Jack and Wood (2007) identified the relationship between past losses and both January and April returns is strongest during tax regimes in which the incentives to off-set tax is high and weakest during regimes in which the incentive is low. Arsad and Coutts (1997), Draper and Paudyal (1997) suggest their evidence supports the tax loss selling hypothesis in UK. Tinic, Barone-Adesi and West (1987) tested the tax-loss selling hypothesis with Canadian stock return data from February 1950 to December 1980 and concluded tax induced trading is not the only one reason for seasonality in Canadian stock returns. In India Pandey (2002), Lazar et al. (2005) and Dash, Dutta and Sabharwal (2011) confirmed the seasonality in stock returns is consistent with the tax-loss hypothesis. Pandey (2002) also confirmed the seasonal anomaly in Malaysia cannot be explained by the tax-loss-selling hypothesis.

Besides tax-loss-selling hypothesis researchers also put forward several other hypotheses to explain the January effect. Chopra, Lakonishok and Ritter (1992) argued that the January effect is caused by the investor overreaction. Debondt and Thaler (1985, 1987) also supported this investor overreaction phenomenon. Haugen and Lakonishok (1987), Lakonishok et al. (1991), Eakins and Sewell (1994) argued that the institutional window dressing hypotheses coincide with the patterns in returns predicted by the tax-loss-selling hypotheses. Some other hypotheses are changes in information (Seyhun, 1988; Jones and Lee, 1995), misspecification of systematic risk (Chan et al., 1985), changes in risk (Ritter and Chopra, 1989) and statistical biases (Roll, 1981 and 1983).

In Bangladesh, few researchers tried to detect the seasonality (Islam & Gomes, 1999; Hossain, 2007; Chowdhury, Shimon and Alam, 2008; Rahman, 2009; Bepari and Mollik, 2009; Rahman et al. 2010; Chowdhury and Sharmin, 2012) but not a single paper is developed to provide proper evidence of the underlying causes. Most of the researchers detected seasonality but only two of them (Chowdhury, Shimon and Alam, 2008; Bepari & Mollik, 2009) mentioned tax-loss-selling is not the cause of seasonality in DSE. This paper will provide proper evidence whether the tax-loss-selling is a cause of seasonality in Bangladesh or not.

## DATA AND RESEARCH METHODOLOGY

### Data

Monthly observations, for the period January, 1987, through November, 2012, of DSE All Share Price Index (DSI) are used to investigate the turn of the year effect in Dhaka Stock Exchange (DSE) in Bangladesh. DSI is a value-weighted index which includes all the stocks listed on the DSE. All the index data has been collected from the Dhaka Stock Exchange library.

### Methodology

Monthly return of DSI Index is calculated as the natural log of [today's Index Value / previous day's Index Value]:

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

Where, $R_t$= Monthly return of DSI Index;
$P_t$= Closing value of DSI Index at time t; and
$P_{t-1}$= Closing value of DSI Index at time t-1.

The reasons to choose logarithm returns over general return are justified by both theoretically and empirically. Theoretically, logarithmic returns are analytically more tractable when linking together sub-period returns to form returns over longer intervals. Empirically, logarithmic returns are more likely to be normally distributed which is prior condition of standard statistical techniques (Strong, 1992).

$$R_t = \alpha + \beta_1 D_{Jan} + \beta_2 D_{Feb} + \beta_3 D_{Mar} + \beta_4 D_{Apr} + \beta_5 D_{May} + \beta_6 D_{Jun} + \beta_8 D_{Aug} + \beta_9 D_{Sep} + + \beta_{10} D_{Oct} + \beta_{11} D_{Nov} + \beta_{12} D_{Dec} + \mu_t$$

Where, $R_t$ is the monthly return and $D_i$ is a dummy variable that takes the value of 1 in month $i$ and zero otherwise. For instance, $D_{Jan}$ = 1 if the return is on January and 0 otherwise; $D_{Feb}$ = 1 if the return is on February and 0 otherwise; $D_{Dec}$ = 1 if the return is on December and 0 otherwise and so on. The OLS coefficients $\beta_1$ to $\beta_{12}$ are the mean returns for January to December respectively. The stochastic disturbance term is denoted by $\mu_t$.

**Kruskal-Wallis Test**

The t-tests may cause problems when applied to non-normal distributions such as the ones under review. In this case, Kruskal-Wallis test, a non-parametric test, is used in order to confirm the above indication of increased January volatility. The Kruskal-Wallis technique tests the null hypothesis that the k samples come from the same population. If the computed value is significant, "it indicates that at least one of the groups is different from at least one of the others. It does not tell the researcher which ones are different, nor does it tell the researcher how many of the groups are different from each other" (Siegel & Castellan, Jr., 1988). The Kruskal-Wallis test is defined as below:

$$H = \frac{12}{n(n+1)} \sum_{i=1}^{k} \frac{R_i^2}{n_i} - 3(n+1)$$

Where, $n$ is the number of observations, i.e., in this case 310, $k$ is the number of groups (in our case twelve), $R_i$ is the sum of rankings obtained for each group, and $n_i$ is the number of observations within the particular group. The statistic is Chi-squared distributed with k-1 degrees of freedom. The observations of monthly log returns modulus were ranked, assigning a value of 1 to the lowest return, and a value of 310 to the highest one. The ranks were then classified into the twelve groups. For each of the twelve groups, the sum and the count of ranks was calculated.

## ANALYSIS OF DATA AND RESULTS

**Kruskal-Wallis Test**

The Kruskal-Wallis test yielded an H-statistic of 33.79. Table 3 presents the results for monthly Kruskal-Wallis statistics test. With k - 1 degrees of freedom and as long as the number of samples in each group is at least 5, Test statistic H is very nearly distributed as the Chi-Square Distribution. Comparing this to the Chi-squared critical value with 2 degrees of freedom, allows us to reject the null hypothesis that the returns are the same across groups at the 99% level of confidence.

**Augmented Dickey-Fuller (ADF) Test**

In order to avoid the problem of spurious regression, classical time series analysis requires the data being used to be stationary. This is done employing the augmented Dickey-Fuller (ADF) test for unit roots, which involves regressing the first difference of the DSE All Share Price Index (DSI) return series against a constant term, a time trend, the series lagged one period, and the differenced series at n lag lengths (Elliot et al, 1996); symbolically: $\Delta\gamma_t = \mu_t + \varphi\gamma_{t-1} + \sum_{i=1}^{p} {}^{\mathrm{y}}{}_i \Delta\gamma_{t-i} + \epsilon_t$. If the coefficient φ is statistically significantly and negative, then the hypothesis that $\gamma_t$ is non-stationary is rejected.

In Table 1, results of the ADF tests have been presented. The results of the ADF test showed a significant negative coefficient of $\gamma_{t-1}$, indicating rejection of the hypothesis of a unit root, so that the monthly DSE returns series can be taken to be stationary.

Table 2 presents summary statistics for the whole sample period. The maximum return during in the whole sample period is ≈56.93 percent which took place in October 1996, right before the epic market crash on the same year. Even though there were two massive market crashes in Bangladesh in 1996 and 2010, the average monthly return for the entire period from 1987 to 2012 is 0.7996 percent. Market, on average, experiences negative return from December to April. While February suffers lowest return, June observes the highest return in stock market in Bangladesh. Returns exhibit negative skewness (i.e., data are skewed to the left) for four months and positive skewness (i.e., data are skewed to the right) for eight months. Five months have kurtosis greater than three which represents leptokurtic distribution, i.e., flatter tails than the normal distribution.

Table 2 also exhibits Jarque-Bera statistic (JB) which has a $Chi^2$ distribution with 2 degrees of freedom (one for skewness, one for kurtosis). From $Chi^2$ distribution tables critical value at 1% level for 2 degrees of freedom is 9.21. If JB> $\chi^2$ critical, reject the null hypothesis that the return data are normally distributed.

The regression model is run for three different sample periods: 1987-1996, 1987-2006 and 1987-2012. Fiscal year in Bangladesh starts on July 1 and ends on June 30 of the following year. If tax-loss hypothesis is valid for Bangladesh, we should notice significant July effect in Dhaka Stock Exchange. Table 3 shows regression results for the partial sample period February, 1987 to December, 1996. The mean return in July is negative and no significant July effect is visible during the sample period. However, a strong positive stock return is also observed on October.

Table 4 exhibits regression results for the partial sample period February, 1987 to December, 2006. Even in this sample period, the average July return is negative. However, significant June effect is observed in this sample period. Table 5 presents regression results for the whole sample period, i.e., February, 1987 to November, 2012. The coefficients for all the dummy variables, except June, are statistically insignificant. However, significant June effect is observed in this sample period. Also, the R-squared is comparatively low.

In all the sample periods, July, first month of the fiscal year in Bangladesh, delivers negative return which raises serious question against validity of tax-loss selling hypothesis in Dhaka Stock Exchange.

## CONCLUSION

This study has tested the tax-loss selling hypothesis in Dhaka Stock Exchange (DSE) in Bangladesh. If tax-loss selling hypothesis were valid, July effect should have been observed. Since July effect is not evident in Dhaka Stock Exchange, it is logical to conclude that tax loss selling hypothesis is not valid in Bangladesh.

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**TABLE 1**
**AUGMENTED DICKEY-FULLER (ADF) TEST RESULTS**

| **ADF with constant** | | **ADF without constant** | |
|---|---|---|---|
| 1 lag | -11.6882<br>(5.229e-024) | 1 lag | -11.7343<br>(7.683e-025) |
| 5 lag | -7.38915<br>(1.826e-012) | 5 lag | -7.46633<br>(1.71e-011) |
| 10 lag | -4.93985<br>(9.961e-007) | 10 lag | -5.02877<br>(1.782e-005) |

Figures in the parentheses show *p*-values. *** indicates significant at 1 percent level

**TABLE 2**
**SUMMARY STATISTICS FOR 1987-2012**

| | Mean | Minimum | Maximum | Kurtosis | Skewness | Jarque-Bera | N |
|---|---|---|---|---|---|---|---|
| **January** | -0.0196 | -0.2283 | 0.3576 | 4.2594 | 1.2512 | 16.57 | 25 |
| **February** | -0.0213 | -0.3616 | 0.1183 | 11.2397 | -2.8137 | 117.56 | 26 |
| **March** | -0.0031 | -0.3893 | 0.3233 | 1.8952 | -0.0844 | 1.94 | 26 |
| **April** | -0.0035 | -0.2333 | 0.2238 | 1.7653 | -0.2885 | 1.94 | 26 |
| **May** | 0.0163 | -0.0931 | 0.2396 | 2.3908 | 1.0748 | 7.69 | 26 |
| **June** | 0.0509 | -0.0904 | 0.2879 | 1.4775 | 1.0064 | 4.94 | 26 |
| **July** | -0.0081 | -0.1330 | 0.1869 | 0.3974 | 0.6904 | 1.84 | 26 |
| **August** | 0.0109 | -0.1666 | 0.1696 | 1.7085 | 0.0160 | 1.50 | 26 |
| **September** | 0.0251 | -0.0588 | 0.3279 | 10.1880 | 2.7519 | 100.32 | 26 |
| **October** | 0.0322 | -0.1621 | 0.5692 | 12.9692 | 2.9903 | 151.14 | 26 |
| **November** | 0.0191 | -0.1814 | 0.2545 | 0.4085 | 0.6453 | 1.61 | 26 |
| **December** | -0.0046 | -0.2871 | 0.1239 | 11.4431 | -2.6359 | 110.81 | 25 |

**TABLE 3**
**REGRESSION ANALYSIS FOR PERIOD 1987 – 1996 DEPENDENT VARIABLE: LOGARITHMIC RETURN**

| | *Coefficient* | *Std. Error* | *t-ratio* | *p-value* |
|---|---|---|---|---|
| constant | -0.00141889 | 0.0317181 | -0.0447 | 0.96440 |
| $D_{Jan}$ | 0.0320936 | 0.0460854 | 0.6964 | 0.48769 |
| $D_{Feb}$ | -0.00239903 | 0.0448562 | -0.0535 | 0.95745 |
| $D_{Mar}$ | 0.0533275 | 0.0448562 | 1.1889 | 0.23713 |
| $D_{Apr}$ | 0.0287938 | 0.0448562 | 0.6419 | 0.52230 |
| $D_{May}$ | -0.0172615 | 0.0448562 | -0.3848 | 0.70114 |
| $D_{Jun}$ | 0.0546126 | 0.0448562 | 1.2175 | 0.22609 |
| $D_{Aug}$ | 0.00783347 | 0.0448562 | 0.1746 | 0.86170 |
| $D_{Sep}$ | 0.0318615 | 0.0448562 | 0.7103 | 0.47906 |
| $D_{Oct}$ | 0.0791802 | 0.0448562 | 1.7652 | 0.08038 (*) |
| $D_{Nov}$ | -0.00892261 | 0.0448562 | -0.1989 | 0.84271 |
| $D_{Dec}$ | -0.0348251 | 0.0448562 | -0.7764 | 0.43924 |
| R-squared | 0.103421 | | Adjusted R-squared | 0.011250 |

*** indicates significant at 1 percent level ** indicates significant at 5 percent level
* indicates significant at 10 percent level

**TABLE 4**
**REGRESSION ANALYSIS FOR PERIOD 1987 – 2006 DEPENDENT VARIABLE: LOGARITHMIC RETURN**

| | *Coefficient* | *Std. Error* | *t-ratio* | *p-value* |
|---|---|---|---|---|
| constant | -0.00873924 | 0.0216995 | -0.4027 | 0.68752 |
| $D_{Jan}$ | -0.000372806 | 0.0310889 | -0.0120 | 0.99044 |
| $D_{Feb}$ | -0.00792992 | 0.0306877 | -0.2584 | 0.79633 |
| $D_{Mar}$ | -0.00770481 | 0.0306877 | -0.2511 | 0.80199 |
| $D_{Apr}$ | 0.00199538 | 0.0306877 | 0.0650 | 0.94821 |
| $D_{May}$ | 0.0238518 | 0.0306877 | 0.7772 | 0.43783 |
| $D_{Jun}$ | 0.0635118 | 0.0306877 | 2.0696 | 0.03962 (**) |
| $D_{Aug}$ | 0.0146549 | 0.0306877 | 0.4775 | 0.63343 |
| $D_{Sep}$ | 0.0336382 | 0.0306877 | 1.0961 | 0.27418 |
| $D_{Oct}$ | 0.0475107 | 0.0306877 | 1.5482 | 0.12297 |
| $D_{Nov}$ | 0.0130826 | 0.0306877 | 0.4263 | 0.67028 |
| $D_{Dec}$ | -0.00343695 | 0.0306877 | -0.1120 | 0.91092 |
| R-squared | 0.051804 | | Adjusted R-squared | 0.005856 |

**TABLE 5**
**REGRESSION ANALYSIS FOR PERIOD 1987 – 2012 DEPENDENT VARIABLE: LOGARITHMIC RETURN**

| | *Coefficient* | *Std. Error* | *t-ratio* | *p-value* |
|---|---|---|---|---|
| const | -0.00814493 | 0.0189967 | -0.4288 | 0.66841 |
| $D_{Jan}$ | -0.0114164 | 0.0271327 | -0.4208 | 0.67423 |
| $D_{Feb}$ | -0.0131172 | 0.0268654 | -0.4883 | 0.62573 |
| $D_{Mar}$ | 0.00508159 | 0.0268654 | 0.1891 | 0.85010 |
| $D_{Apr}$ | 0.00468881 | 0.0268654 | 0.1745 | 0.86157 |
| $D_{May}$ | 0.0244727 | 0.0268654 | 0.9109 | 0.36306 |
| $D_{Jun}$ | 0.0590874 | 0.0268654 | 2.1994 | 0.02862 (**) |
| $D_{Aug}$ | 0.0190487 | 0.0268654 | 0.7090 | 0.47885 |
| $D_{Sep}$ | 0.03322 | 0.0268654 | 1.2365 | 0.21723 |
| $D_{Oct}$ | 0.040309 | 0.0268654 | 1.5004 | 0.13457 |
| $D_{Nov}$ | 0.0271983 | 0.0268654 | 1.0124 | 0.31217 |
| $D_{Dec}$ | 0.00357745 | 0.0271327 | 0.1318 | 0.89519 |
| R-squared | 0.045889 | | Adjusted R-squared | 0.010670 |