# Empirical study on disposition effect of Bangladeshi investors

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（Abstract）

This research investigates the tendency of emerging market investors to hold losers too long and sell winners too soon. I calculate 125 individual investors' daily transactions using a large brokerage account database between 2011 and 2016 in Bangladesh. The results demonstrate that investors at aggregate level as well as individual level in Bangladesh have a historical preference for realizing their winning investments more than their losing ones. Individual investors realize their gains 1.6 times more than their losses. This study also tests the disposition effect of traders on the basis of frequency, gender and average rate of return and then judges the role of investors' personal characteristics on trading behavior. Bangladeshi investors are highly suffering from disposition effect, making poor trading decisions and their tendency towards disposition effect is not motivated by influencing factor like portfolio rebalance.

Keywords: individual investor; disposition effect; investors' characteristics; sophistication.

## 1. Introduction

Traditional or standard finance has assumed that investors always behave rationally. Traditional expectation considers investor as a rational economic agent whose financial decisions reflect all rational concepts, tools and available information. In contrast, behavioral finance throws light on investor's psychology and behavior towards investment. Recent research has shown that during financial decision, human are not always being rational. Individual investors trade too much even though trading is hazardous to their wealth (Barber and Odean, 2000). Investors have a tendency to invest on stocks that are closer to their locality even though the investments appear lower return (Grinblatt and Keloharju, 2001). The prime concern of financial market is to minimize loss and maximize return. To fulfill this goal, many investors behave irrationally, use mental shortcuts rather than long analytical process. These mental shortcuts cause bias which is well established in behavioral science. In this paper, I focus on disposition effect which is one of the most robust documented bias in trading behavior.

### 1.1. The Disposition Effect (DE)

The tendency of investors to hold losers (previously purchased stocks that have lowered in price) too long and to sell winners (previously purchased stocks that have increased

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in price) too soon has been described as the disposition effect (DE) by Shefrin and Statman (1985). Including USA, disposition effect has been appeared on average but of different magnitude across the countries and investors (Shapira and Venezia, 2001 for Israel, Grinblatt and Keloharju, 2001 for Finland, Nofsinger et al., 2004 for China, Shu et al., 2005 for Taiwan, and Brown et al., 2006 for Australia). The most common explanation for disposition effect is the prospect theory, which was developed by Tversky and Kahneman (1979). According to this theory, investors evaluate gains and losses with respect to a reference point; the purchase price is the most commonly used reference point. When a stock price is higher than the buying price, the investor shows the risk averse behavior. He may sell the stock if the expected return is perceived as too low. After a price drop, the investor keeps the stock because he becomes risk seeking rather than realizing a sure loss. This leads to disposition effect.

Recently researchers are interested in finding the reasons and the factors provoking the magnitudes of this behavior across the countries. These inquiries are important from many aspects. DE may cause harm to individual investors by paying more capital gain taxes or by increasing inferior performance. Even the market may be affected by similar behavior of many investors, through changing market price and influencing trading volume that ultimately might cause market crash.

Market inefficiency is the major drawbacks for developing countries like Bangladesh. Investors in emerging market are less experienced about investing as compared to investors from more capitalistic oriented societies. The regulatory system and information transparency are not certainly proficient to get the confidence of the investors and to provide the sufficient basis for analyzing the data without anomalies.

In this study, I investigate the propensity of DE of individual investors at the aggregate level[1] as well as individual level[2] using a data set obtained from a Bangladeshi brokerage house. Then I analyze the DE on the basis of trading frequency and gender differences. For better understanding of the consequence of DE, I calculate the average return. I examine the DE whereas it is motivated or not by the desire of portfolio rebalancing. In this study, I demonstrate individual characteristics (inherent and acquired) such as account age, account value and investor's age. By the regression analysis of investor characteristics, I analyze the relationship between DE and investor's characters.

## 1.2. Previous Study

Several previous researches find empirical support for DE. Odean (1998) showed that investors realized their gains more readily than their losses. He was the first who studied the decision process of individuals on an important database of 10,000 USA accounts between 1987 and 1993. He found that the proportion of realized gains was significantly higher than the proportion of realized losses (except in December), which provided an evidence of a disposition effect in individual investors' behavior.

Rational beliefs argue that the disposition effect may be due to the desire of portfolios re-balancing or to avoid excessive transactions costs on low-priced assets[3]. However, it has been demonstrated in Odean (1998) and Brown (2006) works that after controlling for rebalancing and stock prices, the DE is still observed.

Dhar and Zhu (2006) analyzed the DE on US investors between 1991 and 1996 using the same dataset of Odean (1998). They found that investor characteristics corresponding to sophistication such as investor income, profession and trading experience lessened the magnitude of the DE. Barber et al. (2007) reported the DE on Taiwan stock exchange between 1995 and 1999. They interpreted their findings by the fact that Taiwanese traders exhibited a stronger DE on belief in mean reversion[4] than U.S traders. Shu et al. (2005) investigated the DE and stock characteristics among Taiwanese investors from 1998 to 2001. They showed that elder female nonprofessional investors were more inclined to DE whereas investors with margin trading were less. The DE was also reported in the Australian IPO market from 1995-2000, though frequent traders are less prone to the DE (Brown et al., 2006). Boolell-Gunesh et al. (2009) studied the more realization of gains on French discount brokerage house between 1999 and 2006. They showed that with the advancement of years, investors showed less DE, but sophistication could not eliminate the DE.

The DE also appears to be positive on average but of different magnitude across countries and investors. Grinblatt and Keloharju (2001) examined the preference for selling winners using the trading records for five types of Finnish investors during 1995 and 1996. For all type of investors, selling of loser stocks were half compared to winners. Chen et al. (2007) investigated behavioral biases among the 46,969 Chinese investors from 1998 to 2002 and showed that Chinese individual investors were more inclined to DE than institutional investors due to regret aversion and prospect theory. Shapira and Venezia's (2001) reported that self-managed investors were more prone to realize gains than professionally managed accounts in Israel. They argued that professional managers were well informed and experienced, which reduced judgmental biases.

The contribution of this study is to understand the DE of Bangladeshi investor by analyzing all trades of 125 investors (from a large brokerage firm). This research is able to document that investors show preference for selling the winners even controlling the rational motivation like portfolio rebalancing. Long time period analysis shows valid evidence that both the individual and the aggregate investors are reluctant to realize losses.

## 2. Data

The sample period for study is from July 1, 2011 to June 30, 2016. The data set is provided by a brokerage firm in Bangladesh[5]. This brokerage house randomly selected 400 individual accounts. For calculation I used the trades files consisting of the records of all trades made in

125 accounts and Dhaka Stock Exchange & Chittagong Stock Exchange daily stock file. Other accounts were discarded due to lack of continuation of trading. I discarded the sales of stocks that were bought before July, 2011 which purchase price were not available. I also discarded the files of traders who executed only buying trades or only selling trades within my sample period[6]. Each record consisting with account code, investor age, sex, account age, the location, the trade date, and the brokerage house internal number for the security traded, a buy-sell indicator, the quantity of trade, the selling price, the commission paid, and the principal amount. I discarded the accounts which had no transaction within two consecutive years.

The capital market of Bangladesh, comprised of Dhaka Stock Exchange (DSE) and Chittagong Stock Exchange (CSE) established in 1954 and 1995 (respectively), are regulated by The Bangladesh Securities and Exchange Commission (BSEC). There are 563 companies listed on DSE and CSE; dual listing is permitted. Total market capitalization was about $41.74 billion in June, 2015 (Annual Report of DSE- 2015).

### 2.1. Descriptive statistics on investors

Table 1 contains results based on 18,766 trades (9,459 purchases and 9,307 sales) for 125 active accounts from July, 2011- June, 2016. Active accounts are those with at least one transaction over 2 years (consecutive or not). "Account Age" is considered on 01/01/2011 from the account opening date. In my study, minimum account age is 1 year and maximum account age is 12 years. Average stock account has been opened for 6 years 4 months. "Age" of the investors is also computed on the 01/01/2011. Average investor age is 39 years old. Younger investors of 25 years old as well as older investors of 62 years old are also observed. "Trading Activity from 2011-2016" is the total number of trades (Sales and Purchases). "Account value" means average equity value of investor in Bangladeshi taka. The currency exchange rate during this time was approximately 77 taka (TK.) to $1.

Table 1  Descriptive Statistics

|  | Number | Minimum | Maximum | Mean | Std. Deviation |
|---|---|---|---|---|---|
| Account Age (in years) | 125 | 1 | 12 | 6.31 | 2.847 |
| Investor Age (in years) | 125 | 25 | 62 | 39.19 | 9.900 |
| Trading Activity (2011-2016) | 125 | 7 | 1157 | 150.13 | 197.733 |
| Account Value (in taka) | 125 | 11507.78 | 3694979.97 | 559740.62 | 635752.48 |

### 2.2. Summary statistics on investors

Table 2 shows the summary statistics. The percentage of male investors is 5.5 times higher than female investors. The percentage of the accounts that have been opened for 7 years to 10 years is the highest; on the other hand, percentage of accounts older than 10 years is the lowest. Percentage of older aged investors is the lowest among the others. Location means under which stock exchanges (Dhaka and Chittagong) the account holder maintains his

account. Among two cities, Dhaka and the nearer area of Dhaka are more cosmopolitan than Chittagong. Percentage of investors who have the account value below 5, 00,000 TK is the highest.

Table 2  Summary statistics

| Account Quality | Mean | | Number | Percentage |
|---|---|---|---|---|
| Gender of Investor | | Male | 106 | 84.8 |
| | | Female | 19 | 15.2 |
| Time From Opening Account/ Account Age (in years) | 6.31 | Above 10 7-10 4-6 Below 4 | 5 62 32 26 | 4 49.6 25.6 20.8 |
| Investor Age (in year) | 39.19 | Above 50 41-50 31-40 Below 31 | 19 34 42 30 | 15.2 27.2 33.6 24 |
| Account Location | | Dhaka | 80 | 64 |
| | | Chittagong | 45 | 36 |
| Account Value (in taka) | 5,59,741 | Below 500001 500001-1000000 Above 1000000 | 76 28 21 | 60.8 22.4 16.8 |

## 3. Methodology

My research tests whether investors are disposed to sell their winning stocks more readily than loosing stocks. For examining the disposition effect I followed the methodology of Odean (1998).

1. From the trading records of each account, I built up a portfolio of securities for each selling date. The purchase date and prices of those securities were known[7]. The one day portfolio is the part of investor's total portfolio.

2. If a sale took place in a portfolio, I compared the selling price of the stock to its average purchase price[8] to determine whether stock was sold for a gain or for a loss.

3. Each stock that was in that portfolio at the beginning of that day but was not sold, calculated as a paper (unrealized) gain or loss. Whether the holding stock was a paper gain or loss was examined by comparing it's high and low price for that day to its average buying price.

4. For daily stock price (upper and lower), I obtained data from daily stock file of data archive of DSE & CSE. I preferred the stocks for which the daily stock prices were available.

5. If both its daily high and low price were above its average buying price, it was considered as a paper gain; if they both were below its average buying price it was considered as a paper loss; if its average buying price laid between the high and the low, neither a gain nor loss was counted[9].

6. On days if there was no sale in an account, no gains or losses (realized or paper) were counted.

7. After counting the real gain, real loss, paper gain and paper loss, proportion of gain realized (PGR) and proportion of losses realized (PLR) were computed as follows:

$$\frac{\text{Number of Realized Gains}}{\text{Number of Realized Gains +Numbr of Paper Gains}} = \text{Proportion of Gains Realized} \cdots\cdots\cdots (1)$$

$$\frac{\text{Number of Realized Losses}}{\text{Number of Realized Losses +Number of Paper Losses}} = \text{Proportion of Losses Realized} \cdots\cdots\cdots (2)$$

In my study, difference of this proportion is defined as the disposition effect (DE).

$$\text{DE} = \text{PGR} - \text{PLR} \cdots\cdots\cdots (3)$$

Table – 3

| IND 1 | Portfolios | Purchase price | Daily High price | Daily Low price | DAY 1 | |
|---|---|---|---|---|---|---|
| | A | 10 | 17 | 13 | SOLD | Real Gain |
| | B | 10 | 16 | 14 | HOLD | Paper Gain |
| | C | 10 | 7 | 3 | SOLD | Real Loss |
| | D | 10 | 9 | 7 | HOLD | Paper Loss |
| | E | 10 | 12 | 8 | HOLD | No count |
| | | | | | DAY 2 | |
| IND 2 | F | 10 | 18 | 16 | SOLD | Real Gain |
| | G | 10 | 7 | 6 | HOLD | Paper Loss |
| | H | 10 | 11 | 9 | HOLD | No count |

For example, table 3 shows two individual's (IND 1 and IND 2) two date's portfolios. IND 1 has 5 stocks in his portfolio, A, B, C, D and E on day 1. He sells stock A for real gain and stock C is for real loss. B is held as paper gain and D is as paper loss. Purchase price of stock E lies between the highest and lowest daily price, so no paper gain or loss is counted. IND 2 has 3 stocks in his portfolio, F, G and H on day 2. He sells stock F for real gain. G is held as paper loss and H is same as stock E. On these two dates for two investors, there are 2 real gains, 1 real loss, 1 paper gain and 2 paper losses. Thus, PGR = 2/ (2+1) = .67, PLR = 1/ (1+2) = .33 and DE = .34. If the differences between PGR and PLR for all transactions show positive value, it indicates that investors are more reluctant to realize their losses.

**Hypothesis:**

There is one hypothesis to be tested. The hypothesis is that investors tend to sell their winners and hold their losers. That means proportion of gains realized (PGR) should be greater than proportion of losses realized (PLR). In equation it is stated as:

PGR > PLR (For the entire period).

The null hypothesis in this case is PGR ≤ PLR.

# 4. Empirical results

## 4.1. PGR and PLR for the entire data set

### Table – 4

Note: This table contains results based on 9,307 sales across all accounts over July, 2011- June, 2016. NGR expresses the number of realized gains; NPG, the number of paper gains; NLR, the number of realized losses and NPL, the number of paper losses. PGR (proportion of realized gains) is the number of realized gains divided by number of realized gains plus number of paper gains and PLR (proportion of realized losses) is the number of realized losses divided by number of realized losses plus number of paper losses, conforming to Odean (1998). Disposition effect (DE) is defined as PGR – PLR. The t-statistics test the null hypotheses that the differences in proportions are equal to zero assuming that all realized gains, paper gains, realized losses, and paper losses result from independent decisions. ***, ** and * denotes the statistical significance at 1%, 5 % and 10% levels.

|  | Entire Sample | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|---|---|
| NGR | 2723 | 365 | 530 | 735 | 391 | 457 | 244 |
| NLR | 2703 | 327 | 565 | 765 | 420 | 424 | 202 |
| NPG | 3430 | 597 | 922 | 751 | 427 | 493 | 240 |
| NPL | 11029 | 1641 | 3496 | 2658 | 1418 | 1314 | 503 |
| PGR | 0.44 | 0.38 | 0.37 | 0.49 | 0.48 | 0.48 | 0.50 |
| PLR | 0.20 | 0.17 | 0.14 | 0.22 | 0.23 | 0.24 | 0.29 |
| PGR/PLR | 2.25 | 2.28 | 2.62 | 2.21 | 2.09 | 1.97 | 1.76 |
| DE | 0.24 | 0.21 | 0.23 | 0.27 | 0.25 | 0.24 | 0.22 |
| t Statistics | 6.79*** | 2.7*** | 2.4*** | 2.9*** | 2.4** | 2.70** | 1.40** |

Table 4 compares the PGR and the PLR based on aggregating trades of all investors for the entire year. Each sale for a gain (or loss), paper gain (or loss) on the stock that is not sold on the day of sale are separate independent observations. These observations are accumulated across investors. From the entire sample, we see that the difference between PGR and PLR (DE) is statistically significant. That means investors prefer to sell a greater proportions of their winners than of their losers. In one-tailed test, null hypothesis (PGR $\leq$ PLR) is rejected with a t statistic 6.79[10].

### Table - 5

| Individual investors | Mean | Median | Minimum | Maximum | Std. Deviation |
|---|---|---|---|---|---|
| PGR | 0.56 | 0.55 | 0.0000 | 1.0000 | .2693119 |
| PLR | 0.34 | 0.28 | 0.0000 | 1.0000 | .2414747 |
| Difference (DE) | 0.22 | 0.21 | -0.6000 | .9388 | .2710852 |
| Number of trades | 150 | 71 | 7 | 1157 | 17.68578 |

Next I studied the existence of the disposition effect for each of the 125 investors and the report of the result is in table 5. The average account PGR is 0.56, the average account PLR is 0.34, the average of PGR - PLR is 0.22, so, the null hypothesis that the mean of PGR - PLR is less than or equal to zero is rejected with a *t*-statistic of 5. The proportion of investors who realize gains is 1.6 times that of those realizing losses. This ratio indicates that investors realize

gains 60 percent more than losses. The proportion is around 1.5 in Odean (1998) and in Weber and Camerer (1995) in experimental study on disposition effect. Brown et al. (2006) and Chen et al. (2007) get 1.6 and Boolell-Gunesh et al. (2009) get 1.7. Aggregate measurement of DE (.24) is greater than individual measurement of DE (.22). This difference indicates that relative to the position they hold, large investors tend to trade more actively than small investors. This differs from the previous researches. It is predicted that frequent traders are anticipated to have a lower DE, thus reduce the total magnitude of the effect. In my study, the number of frequent traders is very small, thus infrequent traders assigns more weight to aggregation across all investors. There are also some abnormal infrequent[11] traders who possess negative DE. Thus they reduce the magnitude of average DE. However, DE showed by Bangladeshi investors is of much higher magnitude than USA investors and a little similar magnitude of China (Chen et al., 2007) and Taiwan (Shu et al., 2005).

In figure 1, I observe that DE has significantly presented over the years in different magnitudes. Over the 6 years, PGR is larger than PLR. However, trends of DE, PGR and PLR do not show uniform tendency over time. For example DE values also increase gradually from 2011 to 2012, peak in 2013 and then is declining from 2014. In table 4, PGR/PLR values gradually increase from 2011 to 2012 and then are declining from 2013. PGR/PLR ratio is defined as the rate at which individual investor sell their winner rather than loser.

Figure 1. Aggregate level of DE / year of trading
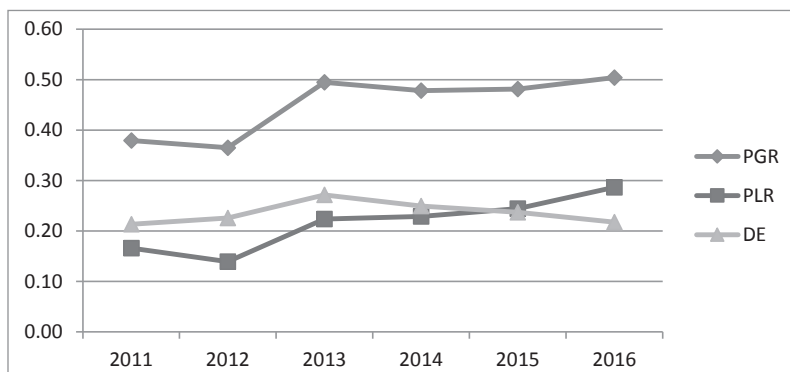


### 4.2. PGR and PLR partitioned by sex and trading activity

Men are more confident, risk seeking, trade more excessively and have lower net returns, whereas women are more risk averse and trade less than men (Barber and Odean 2001). Does gender difference play any role in the disposition effect? Usually men are active in trading than women; therefore, they try to adjust their reference points (the average purchase price) more quickly than women and decrease the rate of DE (Weber and Camerer, 1998).

PGR and PLR depend on average portfolio size and trading frequency. As frequent traders trade excessively and posses larger portfolio, both of the proportions become smaller than

infrequent traders (Odean, 1998). Frequent traders realize more losses as well as gains, thus the disposition effect becomes smaller than those who trade less frequently. Mechanical relationship[12] between PGR/PLR ratio and trading intensity is another explanation of lower DE in frequent traders (Shu, 2005). If the PGR/PLR ratio is expected to be greater than 1, it will decrease when denominator (PGR and PLR) increase by the same magnitude (Odean, 1998). Above explanations are applicable for both frequent and infrequent traders.

### Table - 6

Note: This table measures the aggregate proportion of gains realized (PGR) and proportion of losses realized (PLR) on the basis of investor's sex and trading frequency. Frequency was based on the trading activity. Here I consider 10 percent of accounts as frequent traders that trade most frequently and 90 percent of accounts as infrequent traders that trade less frequently.

|  | Male Traders | Female Traders | Frequent Traders | Infrequent Traders |
|---|---|---|---|---|
| NGR | 2415 | 308 | 1218 | 1505 |
| NLR | 2328 | 376 | 1114 | 1590 |
| NPG | 3098 | 333 | 1821 | 1611 |
| NPL | 9722 | 1307 | 4567 | 6462 |
| PGR | 0.43 | 0.48 | 0.40 | 0.48 |
| PLR | 0.19 | 0.22 | 0.20 | 0.20 |
| DE | 0.24 | 0.26 | 0.20 | 0.29 |
| PGR/PLR | 2.26 | 2.18 | 2 | 2.4 |
| T Statistics | 4.58*** | 3.16*** | 2** | 6.4*** |

To test the robustness of my result, I partitioned the data into four groups of traders: male traders, female traders, top 10 percent frequent traders and 90 percent infrequent traders. In my data set, frequent 10 percent of the investor's account trades for 44 percent of all trading. Of 125 individual investors 19 (15.2%) are women and 106 (84.8%) are men. In contrast, 51% of Bangladeshi population between the ages of 25-54 is female. Thus the number of female who invest in share market is very low.

In table 6, DE of all four groups of traders is reliably different from zero at the 5 % significance level. But, difference of proportions is greater in case of female and infrequent traders. That means females are more risk averse over gains and risk seeking over losses which is similar to Shu (2005). Thus they realize their gains more than the male traders in Bangladesh.

Table 6 also reports that females realize their gains at a faster rate than males (PGR is greater than males). This explanation is also applicable for infrequent traders as their PGR is greater than frequent traders which are similar to Odean (1998), Dhar and Zhu (2006), Brown et al. (2006) and Chen et al. (2007). This concludes that frequency can minimize the DE because losses are realized more in frequent trading. In regression analysis in 4.5 (see table 9), we will also see that traders with higher trading activities are more inclined to realize losses and show less DE. This study is the initial research on DE of Bangladeshi investors. For more confirmation, a wide range of sample size and extended research should be needed for the effect of gender differences and trading frequency on DE in Bangladesh.

## 4.3. Disposition effect when the entire position in a stock is sold

In portfolio rebalancing, investors follow some methods like asset allocation. During buying and selling stocks, investors normally sell some shares of winning stocks rather than losers and buy another new stock (Lakonishok and Smidt, 1986). According to Odean (1998), investors, who have a desire to rebalance their portfolio, will sell a portion of shares of holding stock for asset allocation. Investors, who sell the entire position of a stock, do not have a desire to rebalance the portfolio. Thus the DE becomes lower when the entire position in a stock is sold.

### Table – 7

Note: This table shows the aggregate proportion of realized gains (PGR) and the aggregate proportion of realized losses (PLR). Realized gains, paper gains, realized loss and paper loss are counted over the period of 2011 – 2016 and across all investors. There are 1928 realized gains, 1834 realized losses, 1621 paper gains and 5424 paper losses. The t-statistics test the null hypotheses that the differences in proportions are equal to zero assuming that all realized gains, paper gains, realized losses, and paper losses result from independent decisions. ***, ** and * denotes the statistical significance at 1%, 5 % and 10% levels.

|  | Entire Year |
| --- | --- |
| PGR | 0.543 |
| PLR | 0.253 |
| Difference (DE) | 0.291 |
| t-statistics | 6.59*** |

To confirm the prediction, I analyzed the data with discarding the selling for which the entire position had not been cleared. For the test, I calculated realized gains and realized losses on those sales for which the entire position in a stock was sold. Paper gains and losses of another stock in the portfolio were also counted on those selling dates. If DE is motivated by the portfolio rebalancing, discarding the partial sells will tremendously reduce the magnitude of DE. In table 7, for the entire year, I find that after removal of partial selling, DE is still significantly observed. My result is similar to Shu (2005), Boolell-Gunesh (2009) and Odean (1998). Thus the preference for selling winner more readily than losers is not the result of portfolio rebalancing.

## 4.4. Average returns

### Table – 8

Note: This table reports the mean return realized on stocks sold for a gain (loss). It also reports mean return on stocks that could be realized (but were not sold) on days that other stocks in the same portfolio were sold. These stocks were classified as paper gains and paper losses. For all accounts over the entire year, there are 2723 realized gains, 3430 paper gains, 2703 realized losses, and 11029 paper losses.

|  | Entire Year |
| --- | --- |
| Return on realized gains | 0.157703 |
| Return on paper gains | 0.587589 |
| Return on realized losses | -0.17433 |
| Return on paper losses | -0.35108 |

Table 8 represents the average returns from the day of purchase for both realized and paper gains and losses for the entire sample to understand the attitude of the investors. Disposed investors sell the winner stocks too early than the losers. If they do the opposite, they can increase their returns from price appreciated stock and decrease their losses from price depreciated stocks. Prospect theory (Tversky and Kahneman, 1979) supports my empirical result. Returns on gains that are realized are much smaller than those not realized. On the other hand, returns on paper losses are twofold greater than those on realized losses which is consistent with Odean (1998) and Boolell-Gunesh (2009). Followed by Odean (1998), these results give a basis of confirmation that investors are more likely to realize smaller gains and losses. Thus the consequence of DE lowers the return of the investors.

### 4.5. Investor characteristics and the disposition effect

In order to test the influence of investor's sophistication on DE, I went through a regression analysis followed by Chen et al. (2007). Table 9, Panel A reports the mean PGR, PLR, the difference between PGR and PLR for all transactions. From Panel A, we see that the PGR for individual investors, at 0.558, is 0.220 larger than the PLR for individual investors, at 0.337. The difference is statistically significant at the 1% level which rejects the null hypothesis. To search the multivariate effects of individual investors' personal characteristics, we estimate regression (4), where the dependent variable is PGR, PLR, or the difference (PGR–PLR).

$$\text{PGR (or PLR or PGR-PLR)} = \alpha + \beta1(\text{Account Age}) + \beta2(\text{Investor Age}) + \beta3 \text{ (High Trade Freq Dummy)} + \beta4(\text{Account Value}) + \beta5(\text{Dhaka Dummy}) \cdots\cdots\cdots (4)$$

### Table- 9

Note: I report the difference between PGR and PLR in Panel A, along with a t-statistic indicating statistical significance. Panel B presents parameter coefficients of the regression model. Account Age is the number of years the account has been opened, Investor's Age is the number of years on 01.01.2011, Frequent Trading Dummy is a dummy variable that indicates when the account was in the top 10% with regards to trading activity, was assumed as 1, if not then 0. Account Value is the equity value of the brokerage account, and Dhaka is a dummy variable that indicates when the accounts are located in the cosmopolitan city, it values 1, if not then it values 0. T-statistics are reported in brackets. ***, ** and * denote statistical significance at the 1, 5 and 10 percent levels, respectively.

| Panel A: Univariate Regression | | | |
|---|---|---|---|
| | PGR | PLR | Difference |
| All Account | .558 | .337 | .220 |
| | | | (9.09)*** |
| Panel B: Regression Analysis | | | |
| | PGR | PLR | Difference |
| Intercept | .769 | .039 | .729 |
| | (8.072)*** | -.458 | (10.113)*** |
| Account Age | -.352 | .352 | -.662 |
| | (-3.610)*** | (3.579)*** | (-9.046)*** |
| Age | -.005 | .101 | -.095 |
| | (-0.064) | -1.231 | (-1.556)* |
| Trading Activity | .016 | .221 | -.181 |

|  |  |  |  |
|---|---|---|---|
|  | -.181 | (2.548)*** | (-2.807)*** |
| Account Value | -.245 | -.326 | .047 |
|  | (-2.885)*** | (-3.804)*** | (-.738) |
| Dhaka | .170 | .184 | .005 |
|  | (2.178)** | (2.341)** | (-.077) |
| Adjusted R² | .278 | .263 | .593 |

Panel B of Table 9 reports the coefficient estimates. The first column of results, where PGR is the dependent variable, shows that individuals with older account age and larger account value are less inclined to realize gains, whereas individuals living in cosmopolitan cities are more inclined to realize gains.

The second column of results, where dependent variable of interest is PLR, shows that individuals with larger account value are less inclined to realize losses, whereas investors with older account age and investors living in cosmopolitan cities, who trade often, are more inclined to realize losses. In third regression, difference of the proportions (DE) is the dependent variable. The regression result suggests that investors with older account age who trade often and aged investors suffer less from a DE. However, wealthier investors less realize both gaining and losing stocks. So account value has no significant effect on disposition in Bangladeshi investors. This explanation is same for the investors of cosmopolitan cities as they realize more both the gainers and losers. Both the proportions are significantly larger for the investors from cosmopolitan cities (first and second column of results). So they show no significance for DE.

In this study, I consider account age, account value and trading activity (the frequency of trades) as the acquired experience and gender and investor's age as inherent experience. From above discussion it can be assumed that acquired experience (sophistication) can reduce the tendency of DE. Trading frequency may help investors lower the DE as they gather knowledge from repetitive trading. My result is consistent with Dhar and Zhu (2006) and Chen et al. (2007) who both found that lack of sophistication related to investor's characteristics may cause large DE. Among the U.S. individual investors, wealthier, frequent-traders and professional individual investors exhibit less DE (Dhar and Zhu, 2006). However, sophisticated Taiwanese investors (i.e. more trading frequency and trading experience) fail to minimize the realization of gains (Shu et al. (2005)). Grinblatt and Keloharju (2001) found that investors from financial institutions showed less disposition effect in the analysis by using a regression method. Investors from financial institutions were the most sophisticated of all investors in their study.

Inherent experience like investor age can also mitigate the DE. But gender difference is very much related to DE as female investors are more prone to disposition effect. Shu et al. (2005) provided empirical support that gender and age show more individual disposition effect.

The statistics are significant for account age and little significant for trading activity. Overall, we see that Bangladeshi investors exhibit higher magnitude of DE than the other

Western countries and some East Asian countries. Cultural differences may be one of the reason in Bangladesh because individual decision is very much motivated by his or her surroundings. Collectivism and whimsical behavior are more prominent in Bangladesh than individualism. Now women have become self dependent economically. Thus from my analysis, investor sophistication or experience can mitigate individual investor's net DE, depending on the measure of sophistication or experience.

## 5. Conclusion

This is the first research on disposition effect towards realization of their losses in Bangladesh context at the aggregate and individual level. This study also investigated the relationship among the disposition effect and investor's personal characteristics. The study exhibited significant disposition effect (PGR/PLR=2.25) among investors for all time periods than US investors (PGR/PLR=1.5, Odean, 1998). The female and infrequent investors showed more willingness to realize their gains than male and frequent investors. Regression analysis demonstrated that investor's characteristics and experience influenced their behavior and trading performances. This study also investigated role of behavioral biasness on sophisticated investor's motivation. The result showed that investor's personal characteristics such as age, wealth and investor's location were related to disposition effect. This paper provides more positive contributions to the previous studies on the disposition effect.

The findings of disposition effect will have regulatory and welfare implications. By utilizing the research output, the professional advisor or manager can offer good suggestion to their clients. Thus the relationship benefits both the rational advisor and the less experienced irrational investors. The research findings stress on sophistication process to reduce the disposition effect on Bangladeshi investors by the following guidelines. Firstly, brokerage firm or organization should focus on training of the new or less experienced investors highlighting the importance of behavioral biasness towards realization of stock gain or losses. Thus, by reducing investor's loss and increasing return, brokerage house also can improve their reputation. Secondly, professional manager should advice their clients at early stage of this tendency. By making a better awareness of this heuristic process, they can protect investors from a big loss. Thus research on the mitigation process by analyzing the factors that affect the disposition effect will be the object of future analysis.

## Note

[1] Aggregate level means cumulative numbers of investors of the sample.

[2] Individual level means each investor of the sample.

[3] Lakonishok and Smidt (1986) and Ferris, Haugen and Makhija (1988) showed a correlation between price change and volume on the NYSE and the AMEX. Investors with lack of information may respond to large price increase by selling a proportion of price appreciated stock to rebalance their portfolio.

[4] It means that investors believe poorer-performing stocks will better perform tomorrow and that better-performing stocks will down in price and return will reverse to mean (Shu et al. (2005), Weber and Camerer (1998)). Lakonishok and Smidt (1986) show that investors who purchase stocks on favorable information may sell if price get high rationally believing that that price fully now reflects this information, and may continue to hold if the price falls, rationally believing that their information is not yet incorporated into price.

[5] The sample collection is supported by Modern Exchange House in Bangladesh.

[6] Selection procedures of investors may be affected by selection bias in favor of more successful investors. But excluding of extremely infrequent traders should not bias our concern as these inactive investors have no significant impact on DE.

[7] Though investor's selling date portfolio is the part of each investor's total portfolio, selection process will bias these partial portfolios toward stocks for which investor's have unusual preferences for realizing gains or losses followed by Odean (1998).

[8] Individual investors may have purchased the stock at different times and prices. Thus purchase prices are adjusted to average purchase price. Average purchase price is commonly used term in stock market and also used in previous researches. In equation it can be showed by the following way.

Average purchase price $= \frac{\sum_{t=1}^{N}(Number\ of\ shares\ purchased\ \times\ purchase\ price/share)_t}{\sum_{t=1}^{N}Number\ of\ shares\ purchased_t}$

Here, t is the day of purchasing the stock. N is the numbers of purchasing date of a specific stock. I like to explain it with an example. For example, investor "i" purchases 10 shares of stock "k" at 5$ per share in day 1. In day 2, "i" purchases again 5 shares of stock "k" at 4$ per share. Thus the average purchase price for stock "i" will be ((10 x 5) + (5 x 4))/ (10+5) or 4.67 $.

[9] For simplicity, we did not consider commission when counting gains or losses. Commission should not have particular impact on Individuals' realized winner or loser stocks (Odean 1998).

[10] In comparison, Odean's (1998) results for US investors report PGR 0.148, PLR 0.098 and difference in proportions is 0.050 at aggregate level.

[11] Odean (1998) shows that tax motivated selling lead to lower DE during December. However, Bangladeshi investors are free from capital gains taxes. Thus, the yearend tax is a less important issue. My findings show that even for the entire period from January through December, there is a significant number of investors who exhibit negative or no disposition effect. It seems that these investors (more than 9% of all individual investors) never realize any price appreciated stocks within my sample period. These investors are very much infrequent and their portfolio sizes are very small. I find that frequency lowers the DE which is contradictory with these investors. The reason of this contradiction is the rigid abnormality of these 9 percent investors. They only purchased 7 or 8 stocks and sold 5/6 in a year. These investors did not receive the market information. Their all sold were for loss. Thus the PGR becomes 0, PLR is $\geq$0 and DE results negative value.

[12] Mechanical relationship means trading intensity is mechanically related to the DE rather than to prove its universality. For example, if the realized gains, paper gains, realized losses, and paper losses for infrequent are 3, 2, 2, and 2, respectively. The corresponding PGR, PLR, and PGR/PLR ratio will be 3:5, 2:4, and 12:10 (or 1.2). We assume that frequent traders trade more excessively and have realized gains, paper gains, realized losses, and paper losses of 4, 3, 3, and 3, respectively. Their corresponding PGR, PLR, and PGR/PLR ratio would be 4:7, 3:6, and 24:21 (or 1.14) (Shu, 2005).

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