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THE EFFECT OF INFORMATION FEEDBACK FREQUENCY AND INVESTMENT FLEXIBILITY ON MYOPIC LOSS AVERSION

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ABSTRACT

The prospect theory proposed by (Kahneman and Tversky, 1979) stated that people are risk-averse when faced with profits and risk-loving when faced with loss. Benartzi and Thaler (1995) combined the Myopic Loss Aversion and Mental Accounting in explaining the equity premium puzzle. Gneezy and Potters (1997) found that the betting amount under high-frequency information feedback is higher than that under low-frequency information feedback. Haigh and List (2005) verified that the professional futures traders have higher tendency towards MLA than the students. Bellemare et al. (2005) also designed similar experiment to compare the betting behavior under the information feedback frequency and investment flexibility. According to the previous experiment design, this study provides an experiment named "colored balls guess" on 54 subjects (including 18 general people, 18 MBA students and 18 professional financial workers, respectively). Examined on the different information feedback frequency levels and investment flexibility, the main findings are as follows. First, the level of the information feedback frequency will affect the size of the bet. Second, the adjustment of investment flexibility is not obviously correlative to betting amounts. Third, the professional financial workers show comparatively less tendency towards Myopic Loss Aversion. Finally, compared to women, men have significant tendency towards Myopic Loss Aversion.

Keywords: Prospect theory, Myopic loss aversion, Mental accounting

JEL classification: G11; G17

INTRODUCTION

Kahneman and Tversky (1979) proposed the Prospect Theory to explain the behaviors of an individual's risk strategy, brought about the rise of Behavioral Financial Study, also induced high degree of interests by other researchers on this study. Myopic Loss Aversion Theory was first proposed by Benartzi and Thaler (1995), this theory was built on the two Behavioral Financial Theories of Prospect Theory and Mental Accounting, which explained the Loss Aversion and Myopic these two types of investors' behavioral features, also explained the Equity Premium Puzzle of US Stock Market. Benartzi and Thaler highlighted that "Holding Period" and "Evaluation Period" of investors are two significant factors affecting investment decisions, if the loss averse investors were not frequent on evaluating their investment performances, they would be more willing to take risks; in other words, if the evaluation period was longer, then the holding period of risky assets would be even longer, the risk premium would be lower.

Benartzi and Thaler put forward the MLA theory which gave rise to extreme interest; many researchers proceeded with their studies on this theme. For example, Barber and Odean (2000) pointed out the tendency of overconfidence of general investors, as being overconfident on the accuracy of information that resulted in their frequent movements in stock market. Barber and Odean (2000) made use of statistics on stocks turnover rate to make inference, highlighted on the behaviors of investments, males were 45% more than females in terms of number of transactions, males were comparatively much more overconfident than females. Bliss and Potter (2002) pointed out that female fund managers as opposed to male fund managers were more inclined to risk averse, and less likely to have overconfident behaviors. On the investment performances, they were also better off than the males fund managers. Overconfidence model of Gervais and Odean (2001) highlighted that when there was high returns in overall investment environment, it would cause some investors to be overconfident on the accuracy of their own information, often fallaciously believed that themselves to have excellent capability on stock selections and good sense of timing. Gneezy and Potters (1997) designed a betting experiment, revealed that bet amount under high-frequency information feedback was lower than bet amount under low-frequency. Haigh and List (2005) conducted a betting experiment on population of professional traders and college students under the hypothesis of Myopic Loss Aversion and information feedback frequency, to amazingly discover that the magnitude of loss aversion on professional traders was more than that of the college students.

Due to many years of professional training and trading experiences, whether investment behaviors of professional financial officers would have fewer tendencies of Myopic Loss Aversion phenomena than most people? Haigh and List (2005) from Chicago Board of Trade recruited 54 members of traders and 64 college students from Madrid, copied the 9 rounds of gambling experimental design (divided into Frequent and Infrequent), making 50% of traders and college

students to participate in the Frequent Betting Experiment, another 50% to participate in the Infrequent Betting Experiment. The gambling is to make guesses of red, blue and white gamble, 1/3 probability (right guess) to win a 2.5 times of bet amount, 2/3 probability to loss the bet. The panel of frequent information feedback was to participate in a 9 consecutive rounds of gambling, results were announced at each round and one bet per round; the panel of infrequent information feedback was to participate in gambling of betting at every 3 rounds (that was to bet at every 3 rounds for the same amount of bet), results were announced at every 3 rounds and followed by betting of next 3 rounds. The empirical results revealed that average amount of bet 45.59 (standard deviation 32.69) for traders of panel of frequent information feedback, college students on average betted 50.89 (standard deviation 30.48). The average amount of bet is 74.29 (standard deviation 25.49) for traders of panel of infrequent information feedback, college students on average betted 62.5 (standard deviation 26.56). The empirical results corresponded to assertion by Gneezy and Potters (1997) whereby average amount of bet of low-frequency information feedback was higher than high-frequency information feedback (67.4 and 50.5). This experiment pointed out that investment behaviors by traders and students were all in line with MLA, however, the extent of the traders' tendency to exhibit MLA was stronger than that of the college students. In the early days of these two experiments, "Information Feedback Frequency" and "Investment Flexibility" were being treated as proxy variables for "Myopic". The former experienced the impact of information on Myopic, whereas the latter experienced the impact of investment adjustment behaviors on Myopic. Bellemare *et al.* (2005) also conducted similar experiment to compare of the betting behaviors under information feedback frequency and investment flexibility. They looked for 135 college students to participate in a 9-round computer betting experiment, equally 1/3 probability (right guess) to win a 2.5 times of bet amount, 2/3 probability to loss the bet. And the tests were divided into three treatments of H (44 students), L (44 students) and M (47 students) as follows.

Treatment H: High Information Feedback, High Flexibility Disposal (Betting) Method. After betting at each round, the computer would reveal the results, a total of 9 rounds of betting, one at another for a consecutive of 9 rounds. Treatment L: Low Information Feedback, Low Flexibility Disposal (Betting) Method. Betting for 3 rounds at each time, the computer would reveal results of 3 rounds at each time, a total of 3 betting. Treatment M: High Information Feedback, Low Flexibility Disposal (Betting) Method. Betting for 3 rounds at each time, computer would reveal result of 1 round at each time. The experimenters were compelled to watch the results of the gambling for 9 rounds in 9 times, a total of 3 betting.

Empirical results revealed that the average amount of bet of treatment M was higher than that of treatment H, while the highest bet amount was from treatment L. Using Mann-Whitney analysis to discover the significant differences between treatment M and treatment L, however, the differences between treatment M and treatment H were not so significant. This experiment indicated that the major factors affecting the consistency with the hypothesis of MLA were dependent on evaluation

period and information feedback frequency. This result was consistent with the relevant experiments of preceding literatures. Fellner and Sutter (2009) examined the causes, consequences of myopic loss aversion for investment behavior by experiment. Longer investment horizons and less frequent feedback lead to higher investments.

Blavatskyy and Pogrebna (2010) analyzed individual rather than aggregate choice to reexamine the previous empirical findings. The behavior of the majority of subjects is inconsistent with the hypothesis of MLA. Several alternative explanations of their finding were discussed, including the Fechner model of random errors and the financial asset pricing model. The objective of this study was to verify through psychological experiments that the investment behaviors of Taiwan investors are related to the tendency of Myopic Loss Aversion suggested in the Finance study. This study made references to the past betting experiments of relevant literatures of Myopic Loss Aversion (MLA), and based on the level of information feedback frequency and different degree of investment flexibility to differentiate into three types: Treatment H, L and M experimental model; further differentiated the participants by their occupations: General Public, MBA Students and Financial Officers; finally, differentiated by gender to further analyze the loss aversion and investment behaviors of participants. Therefore, the three objectives of this study were collated as follows: 1.The impact of the level of information feedback frequency and investment flexibility on the behaviors of investment strategic decision-making? 2. Whether the differences in the occupations of General Public, MBA Students and Financial Officers result in significant differences on the tendency of Myopic Loss Aversion? 3. Whether males are more inclined to Myopic Loss Aversion on investment strategic decision-making than females?

Other sections of this paper are as follows. Section II is the Experimental Design, to elaborate on the experimental subjects and experiment analysis methods in explaining the analysis method on our data. Section III is the empirical results and analysis, to disclose "Whether flexibility of investment behaviors and level of information feedback frequency result in differences in betting?" and "Whether betting by different identity categories result in differences in betting?" Section IV is the conclusion.

EXPERIMENTAL DESIGN

Experimental Subjects and Experiment Methods

In order to study whether the trading behaviors exhibited by General Public, MBA Students and Financial Officers corresponded to the speculations by MLA, we made references to Haigh and List (2005) and divided into panels in accordance to different experimental subjects. Experimental subjects in this study were displayed by using a simple, concise 3x3 experimental subjects table, as shown in Table 1. We recruited 54 members of adults over age of 20 to participate in this experiment, including generic public experienced in investments, graduate students of Ping Tung

Technology University School of Business and bank officers serving at financial institutions (respectively as buyers of financial products, learners of financial products and sellers of financial products). In these three populations, we picked 18 individuals as our experimental subjects, half of each gender. On the experimental panels, we made reference to Bellemare *et al.* (2005) to differentiate into three treatments of H, L and M as follows:

Treatment H: High Frequency Information Feedback, High Flexibility Disposal (Betting) Method

Treatment L: Low Frequency Information Feedback, Low Flexibility Disposal (Betting) Method

Treatment M: High Frequency Information Feedback, Low Flexibility Disposal (Betting) Method

We wanted to distinguish and experiment these three different ethnic panels and gender of subjects in response to different information feedback frequencies and investment flexibilities, in order to compare the results of past literatures and validate whether there were really significant differences among them (Table 2: Experimental Design of Bellemare *et al.* (2005) and Haigh and List (2005). We did an overview for the experiment. Each experimenter only participates in an experiment. There were 6 people in every experiment panel. The experiment venue for General Public and Financial Officers were Shin Kong Bank, Ping Tung Branch and Tung Yuan Branch residence. Experiment venue for MBA Students was at room 307 of Ping Tung University of Science and Technology, School of Management. Each experimenter was seated at some distance apart from each other, and was unable to communicate, in order to ensure the impartiality of the experiment. Before each experiment, we first told the experimenters that this was a true test of betting; immediately after the end of the betting (Table 2) to settle the gains or losses by cash, so that the experimenters had the feelings of gains and losses of their betting, in order to ensure the authenticity of the experimental data. At the end of the experiment, we compensated every experimenter with complimentary cash vouchers in acknowledgement for their participations in this test. Each experimenter would be issued with a betting table (Table 3, indicated the identity, panel and gender) and a pen, to participate in a ball colors guessing experiment.

Within an opaque golden lottery box (Size approximately 35cm×21cm×21cm), there were 12 red, 12 blue and 12 green plastic balls respectively (Weight, size and texture were the same). At every lottery, the assistants took out a colored ball from the lottery balls container, then, put it back again to ensure the same probability for the next round. The experimenter first recorded down the amount of bet and the color of the ball for the betting, the probability for making the right guess for the color of the ball was 1/3, and the probability for making the wrong guess for the color of the ball was 2/3. At each round, the person who made the right guess for the color of the ball (Ball color betted matched with the ball color picked) would win an amount for 2.5 times of the bet amount; the person who made the wrong guess would loss off the bet. Finally, each experimenter computed his or her own individual personal precise gains and losses of the betting based on the betting table.

Table-1. Experimental Subjects

Subject Type	Treatment H	Treatment L	Treatment M
General Public	6	6	6
MBA Students	6	6	6
Financial Officers	6	6	6

Treatment H: High frequency information feedback, high flexibility disposal method. Treatment L: Low frequency information feedback, low flexibility disposal method. Treatment M: High frequency information feedback, low frequency of information feedback. Number of experimenter for each panel is 6 persons, taking up half of each gender.

Table-2. Experimental Design of Bellemare *et al.* (2005) and (Haigh and List, 2005)

	Bellemare *et al.* (2005)	Haigh and List (2005)	Experimental Design of this study
Experimental Subject	135 College Students	54 Traders and 64 College Students	18 Individuals in each panel of General Public, MBA Students and Financial Officers
Experimental Panel	Into panels of three: Treatment H, L and M	Into panels of two: Frequent and Infrequent	Into panels of three: Treatment H, L and M

Table-3. Betting Table

By Occupation		By Experimental Panel			
General Public	□	Treatment H	□	Name:	
MBA Students	□	Treatment L	□	Gender:	
Financial Officers	□	Treatment M	□		
	Ball Color Bet	Bet Amount		Result	Gain/Loss
Round 1	Red/ Blue/Green			Win/Lose	
Round 2	Red/ Blue/Green			Win/Lose	
Round 3	Red/ Blue/Green			Win/Lose	
Round 4	Red/ Blue/Green			Win/Lose	
Round 5	Red/ Blue/Green			Win/Lose	
Round 6	Red/ Blue/Green			Win/Lose	
Round 7	Red/ Blue/Green			Win/Lose	
Round 8	Red/ Blue/Green			Win/Lose	
Round 9	Red/ Blue/Green			Win/Lose	
Average amount of bet				Total Gain/Loss	

Remark: Inside the lottery box, there were red, blue and green balls, 12 balls of each color respectively (Weight, size and texture were the same). At every lottery, the assistants took out a colored ball from the lottery balls container, then, put it back again to ensure the same probability for the next round. The probability for making the right guess for the color of the ball was 1/3, and the probability for making the wrong guess for the color of the ball was 2/3. At each round, the person who made the right guess for the color of the ball (Ball color betted matched with the ball color picked) would win an amount for 2.5 times of the bet amount; the person who made the wrong guess would loss off the bet (There was $100 of bet amount for each round. Experimenter can decide any amount of bet from the range of $0 to $100).

Illustration on the Experimental Panels

We made references to experiments by Bellemare *et al.* (2005) and did an illustration on our experimental panels. In the panel of Treatment H, experimenters faced a consecutive of 9 rounds of ball colors guessing game. First, they wrote down the ball color they wanted to bet and the bet amount, then, the assistants randomly picked from the lottery box a colored ball as the result of the

lottery. In the betting experiment of flexibility, at each round of 9 rounds, they would have $100 of bet per round and they could decide any amount of bet from the range of $0 to $100 to gamble on a 1/3 probability of winning a return of 2.5 times of the bet amount, or 2/3 probability of losing the bet. At each round, results were announced immediately right after all experimenters made their betting, one round after another for 9 rounds. They knew that the worst situation of each round was to lose off $100, and the best situation was to get back $350 including 2.5 times of the lottery prize. They frequently made estimations of the results of each round whether it was gain or loss, and accumulated the gains or losses of previous rounds; therefore, they received frequent information feedback. Finally, the experimenters based on their betting tables to compute gains or losses in anticipation of the amount of lottery prize we needed to pay them. In the panel of Treatment L, we copied the panel of Treatment H. The only difference was the constraint on the flexibility of experimenters on their betting method such that experimenters of panel of Treatment L were to bet for identical amounts (from $0 to $100) at once for every three rounds on the betting table. After betting at every three rounds, the assistants would announce the results of first, second and third rounds; then, put down the bets again, then, announced the results of fourth, fifth and sixth rounds; subsequently, put down the bets around, then, announced the results of seventh, eighth and ninth rounds. Something to be aware of was that in the panel of Treatment L, we announced the lottery results for three rounds at one go, rather than restricting the experimenters to observe the assistants on picking up the colored balls from the lottery box one round after another for the results. Finally, experimenters computed the gains or losses based on the betting table.

In the panel of Treatment M, we copied the constraint of flexibility of betting method of the experimenters similar to Treatment L, including the same bet amount (from $0 to $100) for three rounds at once on the betting table. Except for the similarity with Treatment H, for every three rounds, the assistants was asked to pick up the colored balls from the lottery box one round after another for the results in front of the experimenters. The experimenters were compelled to observe the lottery results at each round; they could then compute and accumulate the gains and losses one round after another. Therefore, they received frequent information feedback similar to panel H. Finally, experimenters computed the gains or losses based on the betting table. At the end, betting tables (Total of 54 copies) of every panel was all registered and collected by the assistants. For panels of Treatment H and Treatment M, the time spent for each panel on the experiment was around 30 minutes to 40 minutes; whereas, the time spent for panel of Treatment L was merely 20 minutes.

Prior to this, many researchers put in efforts to explore and design the changes of betting behaviors on people. Like the betting experiment designed by Gneezy and Potters (1997), which invited the Dutch College students as the experiment population found out that the percentage of bet amount for high frequency of information feedback was lower than the percentage of bet amount for low frequency of information feedback (50.5% versus 67.4%). Haigh and List (2005) copied the

experimental design by Gneezy and Potters (1997) and applied it on the College students and traders to amazingly discover that professional traders under the condition of frequent information feedback revealed a more obvious phenomenon of Myopic Loss Aversion than in the case for College students! Bellemare *et al.* (2005) pointed out that MLA could be completely explained by the frequency of information feedback, in relatively to frequent information feedback and higher flexibility of investment behavior, a lesser information feedback and lower investment flexibility investment behavior would increase the investment on risky assets.

Method of Data Analysis

We applied the SPSS 14.0 for Window package software to conduct statistical and data analysis on the samples of experimental data collected by this study to explore the relationship between variables. Other than computing the mean and standard deviation of bet amount by each panel, this study referred to the approach by Bellemare *et al.* (2005) by applying Mann-Whitney method on analyzing whether there were significant differences in bet amount of each panel? That is this study would apply the Mann-Whitney test to compare whether there were significant differences due to differences in population of different identity categories (General Public, College Business School Students and Financial Officers and of different gender), having different information feedback and flexibility on disposal (betting) method?

Mann-Whitney test is used to examine whether the distribution of two populations (or medians) is identical, and both apply the level of random samples for the test. The test procedures are as follows:

Step 1: Extract Sample 1 from Population 1, and mix with Sample 2 extracted from Population 2. Assemble them in ascending order from minimum to maximum, compute the levels of w_1 and w_2.

Step 2: Compute the two statistics of U_1 and U_2 as follows:

$$\begin{cases} U_1 = n_1 n_2 + n_1(n_1+1)/2 - w_1 \\ U_2 = n_1 n_2 + n_2(n_2+1)/2 - w_2 \end{cases} \quad (1)$$

Of which, $n_1 n_2 + n_1(n_1+1)/2$ is the maximum level of w_1, $n_1 n_2 + n_2(n_2+1)/2$ is the maximum level of w_2, and $U_2 = n_1 n_2 - U_1$.

Step 3: Two-tailed test statistics $U = \min(U_1, U_2)$.

Step 4: Make use of Mann-Whitney test Statistical Probability Table to compute *p* value.

For example, after conducting the experiment, we wanted to find out whether there were significant differences on the betting from round 1 to 9 between College Business School students under

Treatment H and Treatment L by applying Mann-Whitney test? First, we collated the amount of bets in Table 4. Secondly, we established the null hypothesis and alternative hypothesis as follows:

H_0: Average Bet of MBA Students under Treatment H and Treatment L is identical

H_1: Average Bet of MBA Students under Treatment H and Treatment L is not identical According to Table 4, we can obtain

$$\begin{cases} n_H = n_L = 6 \\ w_H = 9+4+1+2+6+3 = 25;\ w_L = 10+11+12+7+5+8 = 53 \\ U_H = 6\times 6+(42/2)-25 = 32;\ U_L = 6\times 6+(42/2)-53 = 4 \end{cases} \quad (2)$$

Therefore, test statistic $U = \min(U_H, U_L) = U_L = 4$, refer to Mann-Whitney Table to obtain p value = $P(U \le 4) = 0.015$. Since p value = 0.015 is smaller than 0.05, we can see that the average bet of MBA students in panels of H and L was significantly different.

Table-4. Amount of Bets by MBA Students under Treatment H and Treatment L

Experimenter	Panel	1	2	3	4	5	6	7	8	9	Average	Ranking
SM01	H	50	50	50	100	100	100	100	100	100	83.3	9
SM02	H	40	50	50	50	50	50	20	10	100	46.7	4
SM03	H	20	10	30	20	30	20	30	20	30	23.3	1
SW01	H	30	40	40	30	40	40	30	30	30	34.4	2
SW02	H	40	40	40	30	30	100	50	50	100	53.3	6
SW03	H	40	40	40	40	40	40	40	40	40	40	3
SM07	L	100	100	100	80	80	80	90	90	90	90	10
SM08	L	100	100	100	80	80	80	100	100	100	93.3	11
SM09	L	100	100	100	100	100	100	100	100	100	100	12
SW07	L	60	60	60	40	40	40	100	100	100	66.7	7
SW08	L	40	40	40	80	80	80	40	40	40	53.3	5
SW09	L	50	50	50	80	80	80	100	100	100	76.7	8

Remark: There are three digits for the experimenter code. First code indicating the identity category (G for General Public, S for College Business School Students, F for Financial Officers), Second code for gender (M for Man, W for Woman), Third code for Experimenter Serial No.

Empirical Results and Analysis

Whether there were differences on the level of information feedback frequency and investment flexibility on betting? After the experiment, we recorded the original data in accordance to General Public, MBA Students and Financial Officers in Appendix I, II and III respectively. This section computed the average amount of bet and standard deviation of rounds 1~3, rounds 4~6, rounds 7~9 and rounds 1~9, and compared whether there were significant differences on average amount of bet in each round by panels of Treatment H, L and M. First, this study takes into account of the betting method on colored ball guessing game by Bellemare *et al.* (2005), of which the results of the experiment were shown in Table 5. Comparing the bet amounts between the three panels of Treatment H, L and M, to uncover that the average amount of bet (71.11) of Treatment L with low information feedback frequency and low flexibility disposal (betting) method in rounds of 1~3 was

higher than that (48.24) of Treatment H with high information feedback frequency and high flexibility disposal (betting) method, and there was significant difference (P=0.001) between these two panels after statistical analysis. From the experimental results of rounds of 4~6, rounds of 7~9 and rounds of 1~9, average amount of bets of Treatment L were higher than average amount of bets of Treatment H, and these differences ($p<0.05$) all reached the statistical consideration for significant difference after comparatively analysis.

Furthermore, we tested and compared Treatment H with high information feedback frequency, high flexibility disposal (betting) method against Treatment M with adjusted high information feedback frequency, low flexibility disposal (betting) method, to identify whether there was significant different in average amount of bet at each round between these two panels. Other than rounds 7~9, experimental results after analyzing data of Treatment H and Treatment M revealed non-profound difference. Finally, we tested whether the level of information feedback frequency had impacts on the amount of bets; which was whether there was any difference between Treatment M with high information feedback frequency, low flexibility disposal (betting) method against Treatment L with low information feedback frequency, low flexibility disposal (betting) method? We discovered in respect to the experimenters, if low flexibility disposal (betting) method associated with high frequency of information feedback, the bet amount was lower than that of low frequency of information feedback, low flexibility disposal (betting) method, however, the difference was not that significant (rounds 4~6, rounds 7~9). Our experimental results implied that if by analyzing and comparing between Treatment M and Treatment L, the level of information feedback frequency did not have much impact on low flexibility of disposal (betting) method.

The empirical analysis results we obtained on average amount of bets of three panels of Treatment H, L and M, when compared with Bellemare *et al.* (2005) were almost similar except for some minor differences. That was to say that the greatest factor affecting an individual's investment decision during the period of investment was information feedback frequency, and not flexibility of investment. Diagram 6 takes into consideration of the experimental designs by Gneezy and Potters (1997) and Haigh and List (2005), simply by comparing the levels of information feedback frequency to reveal that the average amount of bets of Treatment H were really the smallest, that is the lower the information feedback frequency, the greater the average amount of bets. This illustrated that under a consecutive 9 rounds of betting experiment, if people could reduce the number of rounds on observing the results of colored balls (more ignorance on the information feedback), less on computing the gains or losses (tentative investment gains or losses) of each gambling round, then, people would reduce the chance of lowering down the bet amounts (more willing to hold risky assets).

Table-5. Average amount of bet by Treatment Panel

	Treatment			Mann–Whitney z		
	H	L	M	H vs. L	H vs. M	M vs. L
Rounds 1–3	48.24 (14.12)	71.11 (21.59)	57.22 (21.64)	-3.17 [0.001]	-1.36 [0.181]	-1.83 [0.068]
Rounds 4–6	55.09 (17.71)	69.44 (15.61)	64.44 (22.74)	-2.62 [0.008]	-1.14 [0.265]	-0.70 [0.501]
Rounds 7–9	57.59 (19.13)	76.11 (19.82)	75.28 (17.94)	-2.54 [0.011]	-2.57 [0.010]	-0.14 [0.888]
Rounds 1–9	53.64 (14.65)	72.22 (15.34)	65.65 (17.81)	-3.15 [0.001]	-1.79 [0.074]	-1.22 [0.226]

Remark: Values in each column of Treatment represent average amount of bets, and their corresponding standard deviations are within the small brackets; Values in each column of Mann-Whitney represent the *z* values of two-tailed test, and their corresponding *p* values are within the medium brackets.

Whether there were differences by different identity categories on betting? Anticipations by past literatures on MLA revealed that the lower the information feedback frequency, the higher the bet amount. Gneezy and Potters (1997) in the past only compared the reactions of students on frequent and infrequent information feedbacks, of which the bet amounts were 50.5% against 67.4%. Haigh and List (2005) also conducted similar experiment on College students and professional future traders, where the ratios of students panel were 50.89 versus 62.5 (a difference of 11), and for the panels of traders were 45 versus 75 (a difference of nearly 30); indicating that both the students and traders were consistent with MLA phenomenon, however, the traders had a greater tendency of Myopic Loss Aversion than the students.

From the empirical results of average amount of bets obtained in regards to different identity category, we were pleased that they were all consistent with the anticipations by past literatures. Merely looking at the average amount of bets, among the three categories of identity, the average amount of bets of Treatment H were the smallest. However, it was worth noticing that there were extreme obvious gaps (47 versus 80 versus 63) between the bet amounts by panel of MBA students under Treatment H, Treatment L and Treatment M; these gaps were more prominent than the other two categories. This result was violated from the result by Haigh and List (2005) which pointed out that the gaps of traders in panels of frequent information feedback and infrequent information feedback were more obvious than the students. Then, we noticed that the average amount of bets under Treatment M and L for panels of General Public and MBA Students were consistent with Treatment M < L (65 versus 71 versus 80), however, the average amount of bets for panel of Financial Officers was Treatment M > L (69 versus 66).

In order to evaluate the differences on the patterns of betting of these statistics, we replicated the analysis model of the literatures. Average individual bet amounts by three identity categories, three disposal (betting) methods were shown under Table 6. We added up the average amount of bets and their standard deviations of rounds 1~3, rounds 4~6, rounds 7~9 and rounds 1~9. The results revealed that the average amount of bet of panel of General Public under Treatment H in rounds

1~3 was 50.56 (Standard Deviation 17.44), whereas the average amount of bet of the same line under Treatment M was 60.00 (Standard Deviation 10.49). From Mann-Whitney statistical test, we discovered there was no significant difference between the bet amount in rounds 1~3 of panel of General Public under Treatment H and Treatment M. Secondly, there was no special data in Tables 2~4 indicating which identity category panels was in particular more inclined to MLA phenomenon. In respect to the panel of General Public, except for the minor difference ($z=-1.93$; $p=0.065$) in rounds 1~9 under Treatment H and Treatment L, none of the other data was able to exhibit significant differences on betting for the General Public resulted from differences on the level of information feedback frequency (Unable to subvert M≠L), or degree of flexibility on disposal (betting) methods. Additionally, for the panel of MBA Students, while comparing the results under Treatment H and Treatment L, there were significant differences in the standard deviations ($p<0.05$) of the betting for rounds 1~3 ($z=-2.40$; $p=0.015$) and rounds 1~9 ($z=-2.33$; $p=0.015$), except for minor differences for the rest of rounds 7~9, other statistical data was unable to validate Treatment H ≠ Treatment M and Treatment M ≠ Treatment L. Finally, for the panel of Financial Officers, from 12 set of analytical figures, there was no obvious statistical numbers that enabled us to point out the differences between Treatment H, L and M. With this result, we believed that most of the professional financial officers were graduated with degrees of business related studies, had many years of experiences on investments of stocks, mutual funds and foreign exchanges, exposed and acquired more information on finance area in their working environment than most people. While comparing with the other two kinds of identity categories, perhaps the level of general information feedback frequency in the experiment was not very seriously treated; and therefore, on the flexibility of investment disposal (betting) method would not be significantly different. With the differences in gender, we analyze only by panels of different gender. In Table 7, we can clearly see that the average amount of bets under Treatment H of higher information feedback frequency was still the lowest, and the split between males and females was 59 to 48. However, the panel with the highest average amount of bets was always Treatment L, and the split between males and females was 81 to 64. Even though from the data we obtained revealed that the average amount of bets under Treatment M was lower than Treatment L, this however, was consistent with the empirical results by past literatures of Bellemare *et al.* (2005). The average amount of bets by males in each panel were in general higher than that by the females, and the differences in average amount of bets among males within the same panel were also more profound than that of the females (Males under Treatment H and L differed by 22; Females under Treatment H and L differed by 16). This finding was in line with the phenomenon observed by the literatures indicating that males as opposed to females were prone to exhibit over-confident behaviors, and males comparatively to females had higher tendency of Myopic Loss Aversion. Similarly, Table 7 applied the Mann-Whitney test to examine whether there was significant difference on betting by variation on gender. In respect to panels of males, while comparing the results under Treatment H and Treatment L, there were significant differences in the betting for rounds 1~3 ($z=-3.27$; $p=0.000$) and rounds 1~9 ($z=-2.52$; $p=0.011$), other statistical data was unable to validate

Treatment H ≠ Treatment M and Treatment M ≠ Treatment L. In respect to panels of females, while comparing the results under Treatment H and Treatment L, there were significant differences in the betting for rounds 4~6 (z=-1.96; p=0.05) and rounds 1~9 (z=-2.33; p=0.024), other statistical data was identical to that of panels of males which was unable to validate Treatment H ≠ Treatment M and Treatment M ≠ Treatment L.

This was a frequent colored balls betting experiment conducted by many prestigious Economists in the past. We authentically replicated the processes of their experiments, and performed statistical analysis by differences in occupations and gender; our statistical findings merely reflected the phenomenon that the level of information feedback frequency truly influenced the amount of bets, however, while comparing the investment behaviors by increasing and adjusting the flexibility of disposal (betting), there was no significant difference on the amount of bets, due to the reason that none of the population panel provided reliable data to validate Treatment H ≠ Treatment M and Treatment M ≠ Treatment L. However, there was one astonishing finding, when analyzing by different identity categories, Financial Officers however did not exhibit significant tendency of Myopic Loss Aversion, which was in departure with the thesis pointed out by Haigh and List (2005) that traders as opposed to College students were more prone to MLA tendency.

Table-6. Average Amount of Bet by Occupation

Panel A: General Public						
	Treatment			Mann–Whitney z		
	H	L	M	H vs. L	H vs. M	M vs. L
Rounds 1–3	50.56 (17.44)	74.17 (15.63)	60.00 (10.49)	-2.11 [0.041]	-1.13 [0.310]	-1.61 [0.132]
Rounds 4–6	61.11(15.55)	65.00 (8.37)	61.67 (18.07)	-0.49 [0.093]	0.00 [1.000]	-0.49 [0.699]
Rounds 7–9	59.72 (13.84)	73.33 (10.80)	72.50 (10.37)	-1.77 [0.093]	-1.63 [0.093]	-0.33 [0.818]
Rounds 1–9	57.13 (12.17)	70.83 (8.99)	64.73 (12.13)	-1.93 [0.065]	-1.12 [0.310]	-0.89 [0.394]
Panel B: MBA Students						
	Treatment			Mann–Whitney z		
	H	L	M	H vs. L	H vs. M	M vs. L
Rounds 1–3	38.89 (10.47)	75.00 (28.11)	48.33 (27.87)	-2.40 [0.015]	-0.57 [0.589]	-1.65 [0.132]
Rounds 4–6	50.56 (26.45)	76.67 (19.66)	65.00 (30.17)	-1.64 [0.132]	-0.81 [0.485]	-0.74 [0.485]
Rounds 7–9	51.11 (27.82)	88.33 (24.01)	76.67 (26.58)	-1.91 [0.065]	-1.47 [0.180]	-0.63 [0.589]
Rounds 1–9	46.85 (20.63)	80.00 (17.76)	63.33 (24.04)	-2.33 [0.015]	-1.13 [0.310]	-1.29 [0.240]
Panel C: Financial Officers						
	Treatment			Mann–Whitney z		
	H	L	M	H vs. L	H vs. M	M vs. L
Rounds 1–3	55.28 (9.68)	64.17 (21.54)	63.33 (23.59)	-1.21 [0.240]	-0.65 [0.589]	0.00 [1.000]
Rounds 4–6	53.61 (7.33)	66.67 (16.63)	66.67 (22.51)	-1.69 [0.093]	-1.37 [0.180]	0.00 [1.000]
Rounds 7–9	61.94 (14.24)	66.67 (18.62)	76.67 (16.33)	-0.16 [0.937]	-1.21 [0.240]	-1.23 [0.240]
Rounds 1–9	56.94 (8.53)	65.83 (16.72)	68.89 (18.25)	-0.72 [0.485]	-1.20 [0.240]	-0.40 [0.699]

Remark: Values in each column of Treatment represent average amount of bets, and their corresponding standard deviations are within the small brackets; Values in each column of Mann-Whitney represent the *z* values of two-tailed test, and their corresponding *p* values are within the medium brackets.

Table-7. Average Amount of Bet by Gender

Panel A: Male						
	Treatment			Mann–Whitney z		
	H	L	M	H vs. L	H vs. M	M vs. L
Rounds 1–3	52.04 (17.24)	85.56 (13.10)	60.56 (28.11)	-3.27 [0.000]	-0.89 [0.387]	-2.00 [0.050]
Rounds 4–6	60.00 (21.98)	75.00 (14.14)	75.56 (20.53)	-1.82 [0.077]	-1.33 [0.190]	-0.31 [0.796]
Rounds 7–9	65.56 (23.09)	81.11 (18.50)	80.56 (13.79)	-1.48 [0.161]	-1.29 [0.222]	-0.18 [0.863]
Rounds 1–9	59.20 (17.95)	80.56 (13.82)	72.22 (17.56)	-2.52 [0.011]	-1.33 [0.190]	-0.97 [0.340]
Panel B: Female						
	Treatment			Mann–Whitney z		
	H	L	M	H vs. L	H vs. M	M vs. L
Rounds 1–3	44.44 (9.72)	56.67 (18.71)	53.89 (13.41)	-1.61 [0.113]	-1.67 [0.113]	-0.42 [0.730]
Rounds 4–6	50.19 (11.34)	63.89 (15.77)	53.33 (20.00)	-1.96 [0.050]	-0.09 [0.931]	-1.25 [0.222]
Rounds 7–9	49.63 (10.10)	71.11 (20.88)	70.00 (20.77)	-2.27 [0.065]	-2.18 [0.031]	-0.13 [0.931]
Rounds 1–9	48.09 (8.00)	63.89 (12.36)	59.07 (16.37)	-2.33 [0.024]	-1.46 [0.161]	-1.11 [0.297]

Remark: Values in each column of Treatment represent average amount of bets, and their corresponding standard deviations are within the small brackets; Values in each column of Mann-Whitney represent the *z* values of two-tailed test, and their corresponding *p* values are within the medium brackets.

CONCLUSION

This study replicated the experiments by past literatures to conduct a colored balls guessing experiment in terms of the level of information feedback frequency and adjustments on investment flexibility on panels of experimenters classified under domestic general public, MBA students and financial officers (total of 54 individuals). Below are the conclusions we derived: 1. The level of information feedback frequency would influence the amount of bets. Our findings revealed that where the frequency of information feedback was high, its corresponding bet amount was actually much lower and the outcome of Treatment H ≠ Treatment L was significant (panels of general public and MBA students). This was consistent with the empirical results by past literatures. 2. Adjusting the investment flexibility was not able to validate its impact on the amount of bets. Our findings uncovered that the constraints on the methods of betting did not affect largely the amount of bets. There was no data to prove that lowering the investment flexibility would increase the average amount of bets. 3. Domestic Financial Officers were less prone to Myopic Loss Aversion phenomenon. Our findings revealed that there was no significant difference for financial officers based on the statistics obtained and the gap between their corresponding average amounts of bets of each panel was comparatively smaller. 4. Average amount of bets for males in general was higher than females. Comparatively in respect to females, males had more prominent tendency of Myopic Loss Aversion. This was a simple and interesting betting experiment. When we compelled the experimenters to observe the results of lottery at each round, the corresponding average amount of bets was contrarily lower, even though 2.5 times of the bet amount can be won for right guess of the ball colors, anticipated return was positive; Since at the results of each round, the experimenters

would know that a mere 1/3 probability of guessing the right ball colors was not high. Moreover, under the condition of continuously computing of the gains and losses of previous rounds, most people were reluctant to take risk on making a large betting.

Experimenters within the panel of Financial Officers overall had more than 8 years of working experiences at banks, and over half of them were engaged in Wealth Management professions, and had many years of investment experiences in market. Our findings pointed out these domestic professional financial officers were less inclined to Myopic Loss Aversion phenomenon due to the reason that their amount of bets did not exhibit significant difference.

This finding was inconsistent with the thesis which Haigh and List (2005) had pointed out that traders as opposed to College students were more prone to MLA. In our colored balls guessing experiment, in respect to the Financial Officers; their rationalities told them that there was always 1/3 of probability for making the right guess on the ball colors, it was not possible to lose it all, and the anticipated return must be positive. On average, their amount of bets was about 64, and the magnitude of difference between their betting was relatively smaller than that for the panels of General Public and MBA Students.

In the field of academic and studies, there were many studies to review the relationships between gender and Behavioral Financial Study, Barber and Odean (2000) discovered that in terms of trading behaviors, males in general were more inclined to over-confidence than females. In our betting experiment, on analyzing by gender, regardless the level of information feedback frequency or investment flexibility, amount of bets by males comparatively was higher than that by females. The ratios of average amount of bets in the 9 rounds for males to females were around 70:57. Males were also more inclined to Myopic Loss Aversion phenomenon than females.

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Appendix-1. Table of Record for Amount of Bets by General Public

Experimenter	Gender	Panel	R1	R2	R3	R4	R5	R6	R7	R8	R9
GM01	Male	H	70	80	90	70	80	100	80	70	60
GM02	Male	H	20	50	40	50	50	70	100	50	100
GM03	Male	H	50	70	30	50	70	60	50	50	60
GW01	Female	H	30	30	30	50	50	50	50	50	50
GW02	Female	H	50	25	75	50	50	25	50	75	25
GW03	Female	H	50	60	60	70	75	80	50	55	50
GM04	Male	M	70	70	70	80	80	80	75	75	75
GM05	Male	M	60	60	60	65	65	65	70	70	70
GM06	Male	M	70	70	70	85	85	85	90	90	90
GW04	Female	M	45	45	45	50	50	50	60	60	60
GW05	Female	M	50	50	50	40	40	40	65	65	65
GW06	Female	M	65	65	65	50	50	50	75	75	75
GM07	Male	L	85	85	85	70	70	70	60	60	60
GM08	Male	L	90	90	90	70	70	70	75	75	75
GM09	Male	L	80	80	80	70	70	70	85	85	85
GW07	Female	L	60	60	60	50	50	50	60	60	60
GW08	Female	L	50	50	50	60	60	60	80	80	80
GW09	Female	L	80	80	80	70	70	70	80	80	80

Remark: There are three digits for the experimenter code. First code indicating the identity category (G for General Public, S for College Business School Students, F for Financial Officers), Second code for gender (M for Man, W for Woman), Third code for Experimenter Serial No.

Appendix-2. Table of Record for Amount of Bets by MBA Students

Experimenter	Gender	Panel	R1	R2	R3	R4	R5	R6	R7	R8	R9
SM01	Male	H	50	50	50	100	100	100	100	100	100
SM02	Male	H	40	50	50	50	50	50	20	10	100
SM03	Male	H	20	10	30	20	30	20	30	20	30
SW01	Female	H	30	40	40	30	40	40	30	30	30
SW02	Female	H	40	40	40	30	30	100	50	50	100
SW03	Female	H	40	40	40	40	40	40	40	40	40
SM04	Male	M	20	20	20	40	40	40	60	60	60

SM05	Male	M	100	100	100	100	100	100	100	100	100
SM06	Male	M	30	30	30	100	100	100	100	100	100
SW04	Female	M	50	50	50	30	30	30	40	40	40
SW05	Female	M	50	50	50	70	70	70	100	100	100
SW06	Female	M	40	40	40	50	50	50	60	60	60
SM07	Male	L	100	100	100	80	80	80	90	90	90
SM08	Male	L	100	100	100	80	80	80	100	100	100
SM09	Male	L	100	100	100	100	100	100	100	100	100
SW07	Female	L	60	60	60	40	40	40	100	100	100
SW08	Female	L	40	40	40	80	80	80	40	40	40
SW09	Female	L	50	50	50	80	80	80	100	100	100

Remark: There are three digits for the experimenter code. First code indicating the identity category (G for General Public, S for College Business School Students, F for Financial Officers), Second code for gender (M for Man, W for Woman), Third code for Experimenter Serial No.

Appendix-3. Table of Record for Amount of Bets by Financial Officers

Experimenter	Gender	Panel	R1	R2	R3	R4	R5	R6	R7	R8	R9
FM01	Male	H	55	70	70	60	40	60	70	80	80
FM02	Male	H	50	60	70	50	40	50	50	60	50
FM03	Male	H	50	100	30	50	100	50	100	50	100
FW01	Female	H	40	50	30	50	70	50	70	45	50
FW02	Female	H	40	50	50	40	60	50	40	40	70
FW03	Female	H	40	80	60	50	60	35	50	50	60
FM04	Male	M	75	75	75	80	80	80	70	70	70
FM05	Male	M	30	30	30	50	50	50	80	80	80
FM06	Male	M	90	90	90	80	80	80	80	80	80
FW04	Female	M	50	50	50	70	70	70	80	80	80
FW05	Female	M	85	85	85	90	90	90	100	100	100
FW06	Female	M	50	50	50	30	30	30	50	50	50
FM07	Male	L	80	80	80	90	90	90	100	100	100
FM08	Male	L	65	65	65	55	55	55	70	70	70
FM09	Male	L	70	70	70	60	60	60	50	50	50
FW07	Female	L	90	90	90	85	85	85	70	70	70
FW08	Female	L	50	50	50	60	60	60	50	50	50
FW09	Female	L	30	30	30	50	50	50	60	60	60

Remark: There are three digits for the experimenter code. First code indicating the identity category (G for General Public, S for College Business School Students, F for Financial Officers), Second code for gender (M for Man, W for Woman), Third code for Experimenter Serial No.