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The Effect of Mental Accounting on Sales Decisions of Stockholders in Tehran Stock Exchange

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Abstract: This study examines investors' preference for framing their gains and losses using trading records of individual investors at a large brokerage firm in Tehran Stock Exchange. In mental accounting theory, framing means the way a person subjectively frames a transaction in his mind that will determine the utility he receives or expects. We found that investors tend to bundle sales of losses on the same day and separate sales of wins over different days. The result is consistent with the principles of mental accounting, according to which individuals attain higher utility by integrating losses and segregating gains. Another result of this study shows that the gain or loss on the transaction is the decision criteria for the sale of stock by individual investors and individual investors' decision making methods comply with the mental accounting principles. They tend to make decisions based on wins and losses when selling their shares. This study also shows that there is a relationship between relative profits / losses and the decision to sell. In other words, individual investors collect all losses together and separate all the benefits.

Key words: Behavioral finance · Outlook theory · Mental accounting · Value function

INTRODUCTION

In the last decade, Many of empirical studies has documented in literature about behavioral finance. Behavioral finance is analyzing the concepts related to financial economy and cognitional psychology to form a model about the special aspects of human behavior, nowadays most of the financial scientists are discussing about it. Most of the financial and economic theories are based on the "Rational Choice" and using whole of information that is available for investors to take decisions. However, there are too many examples that show something else and they can't be explained by this common rule.

"Behavioral finance" is a subordination of "behavioral economics". Behavioral economics combines the twin disciplines of psychology and economics to explain why and how people make seemingly irrational or illogical decisions when they spend, invest, save and borrow money [1]. According to behavioral finance, we want to recognize and explain the ways that how sensation effects and misunderstanding can affect investors and their decision process.

One of the topics related to behavioral finance is mental accounting. According to mental accounting, investors tend to hold assets on which they have experienced paper losses, but they are inclined to sell assets on which they have enjoyed gains. Shefrin and Statman [2] label this evidence as the disposition effect. A combination of mental accounting [3] and prospect theory [4] is considered as the plausible explanation for this effect.

This paper provides a test of prospect theory and mental accounting regarding investors' preferences for framing their gains and losses. In prospect theory, individuals maximize over an "S"-shaped value function. The value function is defined over gains and losses and shows diminishing sensitivity to both gains and losses. Mental accounting concerns the way investors evaluate outcomes. For example, whether investors evaluate the overall outcome or evaluate each outcome separately is a question of mental accounting. Diminishing sensitivity of

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the value function implies that individuals attain higher utility by evaluating losses together and gains separately. Therefore, investors will try to integrate losses and segregate gains if they try to evaluate outcomes in whatever way makes them happiest [3].

Thaler and Johnson [5] assume that choices over the timing of events reflect preferences for integrating or segregating outcomes: It is likely that integration is easier if events occur on the same day and segregation is easier if events occur on different days. Under this assumption, people prefer having events occur on the same day if integration is desired. Similarly, people prefer having events occur on separate days if segregation is desired. When investors sell stocks, they choose whether to realize gains and losses together or separately. Therefore, stock sales by investors provide a natural setting to test the hedonic editing hypothesis. We can infer investors' preferences for framing gains and losses by examining how they time the gains and losses from stocks sales.

The contributions of the study can be summarized as follows. Firstly, it develops a hypothesis on investor trading behavior from the principles of mental accounting [3] and provides evidence that investors' stock selling decisions are consistent with the implications of prospect theory and mental accounting. Secondly, this study examines how selling decisions on individual investor are.

Literature Review: Recent literature in empirical finance is surveyed in its relation to underlying behavioral principles, principles which come primarily from psychology, sociology and anthropology. The behavioral principles discussed are: prospect theory, regret and cognitive dissonance, anchoring, mental accounting, overconfidence, , magical thinking, quasimagical thinking, attention anomalies, the availability heuristic, culture and social contagion and global culture [6].

Kahneman and Tversky [4] propose prospect theory as a descriptive model of decision making. In prospect theory, individuals maximize over a value function instead of the standard utility function. The value function is defined over gains and losses relative to a reference point rather than over levels of wealth. The function is concave for gains and convex for losses and steeper for losses than for gains.

Kahneman and Tversky [4] hypothesizes that people try to code outcomes to make themselves as happy as possible. That allows one to describe how people make choices in situations where they have to decide between alternatives that involve risk (e.g., in financial decisions).

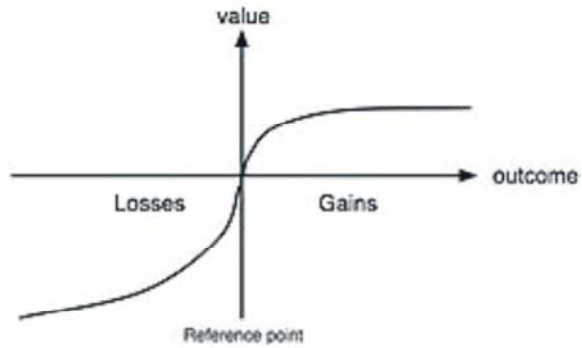

Fig. 1: Value Function: Segregation and Integration Preferred

Starting from empirical evidence, the theory describes how individuals evaluate potential losses and gains. In the original formulation the term prospect referred to a lottery.

The theory describes such decision processes as consisting of two stages, editing and evaluation. In the first, possible outcomes of the decision are ordered following some heuristic. In particular, people decide which outcomes they see as basically identical and they set a reference point and consider lower outcomes as losses and larger as gains. In the following evaluation phase, people behave as if they would compute a value (utility), based on the potential outcomes and their respective probabilities and then choose the alternative having a higher utility. The formula that Kahneman and Tversky assume for the evaluation phase is (in its simplest form) given by

$$U = \sum_{i=1}^{n} w(p_i)v(x_i) = w(p_1)v(x_1) + w(p_2)v(x_2) + ... + w(p_n)v(x_n) \quad (1)$$

where x_1, x_2 ,… are the potential outcomes and p_1, p_2 ,… their respective probabilities. ◎◎ is a so-called value function that assigns a value to an outcome. The value function (sketched in the Figure 1) which passes through the reference point is s-shaped and, as its asymmetry implies, given the same variation in absolute value, there is a bigger impact of losses than of gains (loss aversion). In contrast to Expected Utility Theory, it measures losses and gains, but not absolute wealth. The function ◎◎ is called a probability weighting function and expresses that people tend to overreact to small probability events, but underreact to medium and large probabilities.

Grinblatt and Han [7] and Frazzini [8] find empirical evidence that the disposition effect should cause underreaction to information and so momentum in stock returns. Grinblatt and Han [7] show that unrealized capital gains proxy is the main driver of momentum. Indeed, disposition effect creates a spread between a stock's fundamental value and its equilibrium price, as well as price underreaction to information and the profitability of a momentum strategy. Based on various variables to proxy for aggregate unrealized capital gains, Frazzini [8] shows that stocks with high capital gains overhang, underreact to positive news and exhibit strong positive abnormal returns in the succeeding periods, whereas stocks with high capital losses underreact to negative news and exhibit strong negative abnormal returns in the subsequent periods.

Kaustia [9] Empirically examined the extent of the importance of investor loss aversion through trading volume on the IPO. In this research through the normal trading volume of IPOs, the existence of Loss aversion effects in the New York Stock Exchange investors was investigated. The findings of this research have shown that until IPO price is less than the initial offer price, trading volume will be lower than normal and only when the IPO price for the first time be more than the initial offer price then trading volume will be increased. Marco explains this increase in a transaction will take up to two weeks).

Shumway and Guojun [10] examine 13,460 accounts at a large Chinese brokerage firm for the period from January 2001 to March 2004. The results show the absence of momentum effect in the sample period. Moreover, arranging stocks by unrealized gains and losses of disposition investors generates a significant spread of 7% per annum.

Ljungqvist and Wilhelm [11] examine how mental accounting of multiple outcomes affects the behavior of market participants in various contexts of finance. However, there has not been a theory that would completely sort out the behavior of investors for mental accounting in the case of multiple exposure units.

Lim [12] tests the segregate gains and integrate losses on individual investor's behavior and finds results consistent with the hedonic editing hypothesis. More precisely, using a trading record of individual investors at a large discount brokerage house from 1991 to 1996 in U.S. stock market shows that individual investors prefer integrating losses and segregating gains. In addition, the extent to which mixed sales of winners and losers are consistent with the hedonic editing hypothesis is greater than what would be expected under random sales of stocks. These results suggest that mental accounting is likely to play a significant role in investors' trading decisions.

Vieider [13] studied the analyzed the level of responsibility and accountability of Investment Fund Managers on the tendency of loss aversion. His research findings indicated that increased levels of responsibility of funds managers tend to reduce loss aversion and increasing in responsibility will be achieving through cognitive efforts.

Methodology and Hypotheses: In this study at Tehran stock exchange, the relationship between investors' feelings and time period of holding share to sell is investigated.

Investor's feeling has two aspects: win or loss. Therefore, the research is on about surveying Hedonic hypothesis in investors' behavior while selling stocks belong to their portfolio.

The edited Hedonic hypothesis implies that investors mostly tend to sell their stock instantly, when it is winning, to get more satisfaction and utility. But, they postpone selling stock when they are in loss, it happens because of loss aversion and they hope it will turn to bullish stock. Hence, the following hypotheses are tested:

Hypothesis 1: Investors tend to sell their profitable stocks at winning status and hold bearish ones in their portfolio.

Hypothesis 2: There is a significant relationship between Relative profits and losses.

There are a few papers that test the hedonic editing hypothesis. Two experimental studies: Thaler and Johnson [5] and also Linville and Fischer, find that people prefer having positive and negative events on different days. Thus, the experimental evidence shows only mixed support for the hypothesis. However, these studies are based on responses to questions about hypothetical alternatives, not on the behavior of investors faced with actual investment choices. Meanwhile, we examine preferences for integrating and segregating outcomes as exhibited in actual trading decisions of individual investors.

Population in this study is all individual investors in Tehran Stock Exchange. Due to the nature of the Population, cluster sampling was used. First, the number of stock brokers was chosen randomly and then in the next step, brokerage customers were randomly selected. The data set of individual investor trades used in this study is from selected brokers. It contains the daily

trading records of 1532 investors from January 2005 to November 2009. The file has more than Three hundred thousand records of trades in common stocks.

According to the hypothesis in this paper, Mean difference test, ANOVA and correlation analysis to test hypotheses are used.

RESULTS

At first, nonparametric Kolmogrov & Smirnov test for normality was used to test Hypotheses. The results of this test are presented in Table 1.

Considering the significant level and testing statistics calculated for data on waiting time to sell shares in winner portfolio (p-value= 0.138 , K-S-Z= 1.08) and loser portfolio (p-value= 0.391, K-S-Z= 0.901), at 95 percent confidence level, the null hypothesis (H0) is confirmed and means data from both groups have a normal distribution. Many data analysis methods (t-test, regression) depend on the assumption that data were sampled from a normal distribution.

Table 1: Result of Kolmogorov & Smirnov test

	Winner Portfolio	Loser Portfolio
Total records	1,326,296	726,296
Mean of sales	$ 82,126	$ 79,144
Standard deviation	$ 37,238	$ 21,615
Z statistics	1.08	0.901
p-value	0.138	0.391

First Hypothesis: According to the first hypothesis, the time of sale for winners and losers are different. To test this hypothesis, the median difference test was used for two independent groups. Statistical hypotheses for the first hypothesis are defined as follow:

Parametric t- test was used for independent groups - winner and loser. Results of the test are presented in Table 2.

Table 2 shows the t-student test results for two independent groups. As it can be seen, the significant level and test statistics calculated in the case of two groups of equal variance assumed P-value=0.00, t=4.51.

Table 2: The mean difference test results for two groups

			95% confidence intervals for mean difference		
	T statistic	Mean variance	Lower bound	Upper bound	Significant level (P-value)
Equal variances assumed	4.51	3.22	$ 4,325	$ 7,145	0.00
Equal variances not assumed	4.58	3.22	$ 4,167	$ 7,372	0.00

Table 3: Correlation test result

		Relative profit / loss
Time to sell	Correlation	0.621
	Significant level	0.032

Table 4: Summary results of regression model

Model	R	R2	Estimated standard error
	0.621	0.386	1.42

Table 5: Regression analysis of variance results

Model	Total squares	Degree of freedom	Mean square	F statistic	Significant level
Regression	27,926	1	27,926		
Residual	314,926	1,531	140.39	205.69	0.00
Total	575,852	1,532			

Table 6: Estimating of regression coefficient

	Non-standardized coefficients		Standardized coefficients		
Model	B	Standard error	Beta	T statistic	Significant level
Constant	80.91	6.15		13.1	0.00
Relative profit / loss	9.26	2.47	8.4	3.74	0.001

Also state of disparity variances in two groups is as follow: P-value = 0.00, t= 4.58. aforesaid matters pose that at confidence level of 95%, there is significant difference between the average waiting time to sell of the losers and winner group.

Second Hypothesis: The second hypothesis test says that there is a significant relationship between Relative profits and losses. To test this hypothesis the Pearson correlation test and regression analysis between time to sell data and relative income levels were used. The results are shown in Table 3.

Given the significance level and Pearson correlation calculated for data, (P-value=0.032, r =0.621) in 95 percent confidence level, confirm a relationship between two variables. Thus, the relative amount of gain / loss on sale of shareholder behavior is effective. However, to ensure test results, regression model was tested with the same data. In this model, Relative profit / loss is independent variable (variables predicted) and mean waiting time for sale is dependent variable. Results of regression model are presented in tables 4 to 6.

The results of the regression model show a significant relationship between time of sales and relative profit / loss.

RESULTS AND DISCUSSION

Mental accounting exceeds the confining assumptions of the traditional paradigms so to develop models of financing in compliance with the realities. The limited power of calculation, complexity of decision making problems and systematic errors of judgment are all the causes of irrational behavior of humans.

Behavioral finance theory believes that people apply mental accounting at the time of financial decision. In other words, people tend to make differing financial decisions in separate mental accounts, undermining the more rational way of making all decisions under a unifying decision portfolio. It can be said that in the time of investment, people tend to buy stocks separately without paying attention to their inter-relationships, neglecting the need for optimizing their investment portfolio.

According to the results of this research, profit or loss are the criteria for deciding on the time of selling the stocks which is in exact concordance with the theoretical bases of behavioral finance and mental accounting. It was also found out that individual investors' methods of making decisions follow the theories of value function theory. In other words, the individual shareholders active in the stock market tend to decide based on their profits or loses.

Based on the results of this research, there was a meaningful relation between the relative level of profit/loss with the decision to sell stocks. The individual investors do cumulate the losses and separate profits.

The research on mental accounting on stock exchange markets of foreign countries support the findings of this research.

Mental accounting of the investors affect their mental predictions on the stock prices , leading to the deviation between the current stock price and its inherent value which is of a great opportunity for the speculators in a way that the efficiency of the market would become under question.

Under such circumstances, market makers and experts can be of their greatest value in reducing the effect of the mental accounting on the inefficiency of the market.

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