Behavioral biases in financial decision making

Bachelor Thesis Finance

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The influence of behavioral biases in financial decision making

Rational decision making is coupled with a structured or reasonable thought process. The choice to decide rationally can help the decision maker by making the knowledge involved choice open and specific. The theory of rational choice starts with considering a set of alternatives faced by the decision maker. Most analysts only consider a restricted set of alternatives that contain the important or interesting difference among the alternatives. Mostly, this is necessary because the full range of possible actions exceeds comprehension. Sanglier, M. et al (1994) show that if different investors receive the same information they will have their own interpretation of this information. These various interpretations will lead to different perception of the signals and therefore create differentiated behaviors. The established various behaviors will influence the financial markets through the decision making of these investors. Because they interpret the received information on their own way, each investor will make another decision. Therefore behavioral factors are important in financial markets because they influence the investors who make the financial decisions. In fact, according to Spaniol and Bayen (2005), cognitive skills of investors are an additional constraint that optimizes individuals financial decision making. Tversky and Kahneman (1981) find experimental evidence on financial decision making under uncertainty that shows that people do not behave as in traditional models. Because investors do not always behave as described in traditional models there are many behavioral phenomena that influence the financial markets.

Kahneman and Tversky (1979) give a critique of expected utility theory as a descriptive model of decision making under risk and develop an alternative model, which they call prospect theory. The prospect theory state that people make decisions based on the potential value of losses and gains rather than the final outcome. Prospect theory is a behavioral economic theory that describes decisions between various alternatives that involve risk. Their theory says that people make decisions based on the potential value of losses and gains rather than the final outcome and therefore will base decisions on perceived gains rather than perceived losses.

Overconfidence is a second behavioral phenomenon. In the model of Daniel, Hirshleifer and Subrahmanyam (2001), investors who are overconfident overrate signal precision and overreact to private signals about payoffs of economic factors. Consequently, mispricing of factor payoffs arise and all securities which cash flows are provided from these factors. Therefore, mispricing occurs from investors' misinterpretation of information about factor cash flow and reflects overreaction to cash flow news about fundamental factors.

Daniel et al. (1998) state individuals exaggerated to private signals when they are overconfident about those signals. If individuals correct their confidence over time then their overreaction to private signals becomes more important before changing. In this way there is a long-run overreaction and correction.

Another important behavioral phenomenon is disposition effect. According to Henderson (2012) there are various studies about the disposition effect that state investors are unwilling to sell assets at a loss comparing to the price at which they purchase this asset. Disposition effect is the tendency of an investor to sell winners too early and hold losers too long. The study of Ammann, Ising and Kessler (2012) conclude that managers who have a lower disposition effect invest more in larger equities with a higher trade volume, a higher past performance and a higher risk-adjusted performance. However, the economic environment and fund characteristics only account for a part amount of the diversification in the disposition effect across mutual funds.

According to Bailey et al. (2011) narrow framing is the propensity of an investor to select investments individually, instead of considering the broad impact on her portfolio.

Barberis and Huang (2004) state that narrow framing stand for the utility people receive direct from the outcome of a specific option and not indirect through the contribution of options to his total wealth. In this way people receive utility from the gamble's result instead of what would be justified by a concern for their overall wealth risk.

The classic demonstration of such behavior is due to the seminal paper of Tversky and Kahneman (1981). They have an understandable antithesis: when economic agents have to make two decisions they make a sub-optimal choice, opting for a certain dominated strategy. Individuals tend to concentrate on the outcome of each decision separately instead of the combined outcome of the two decisions.

These four behavioral phenomena have been explained and studied by several economics. For all these phenomena there is prove that they influences financial decision making. The prospect theory state that people make decisions based on the potential value of losses and gains rather than the final outcome and thus will base decisions on perceived gains rather than perceived losses. Overconfidence creates mispricing of factor payoffs and all securities whose cash flows are derived from the overestimate signal precision. This ensures difficulties in the financial decision making process. The phenomenon disposition effect is the tendency of an investor to sell winners too early and hold losers too long. In this way investors gain losses instead of winners which is not if favor for financial decision making. As mentioned before narrow framing is the propensity of an investor to select investments individually, instead of considering the broad impact on her portfolio. So the expected outcome is the individually outcome, instead of the combined outcome what it should be.

H2: Information on Financial Decision Making

In a rational world investors make financial decision to maximize their risk-return tradeoff. They have all the information they need on estimated return and risk. According to these information the make their choices. Rational investors value the securities for its fundamental value: the net present value of its future cash flow, minus their risk characteristics. When investors learn new things about fundamental values, they respond bidding up prices when the news is good and down when it is bad news.

Models of finance include investment decisions based on expected risk and return associated with an investment. They use risk-based asset pricing models like Capital Asset Pricing Model to make investment decision. Decision makers should also take into account the situational factors. Situational factors do not only relate to the decision maker but also to the environment. So to make an appropriate decision, the decision maker must consider the variables of the problem using cognitive psychology. An investor must have a positive vision, foresight and drive to make successful financial decision.

Modern theory of investors' decision-making suggests that investors do not always act rationally while making an investment decision. They deal with several cognitive and psychological errors. Investors must have a clear survey of the cognitive and emotional errors they are vulnerable to. Tversky (1990) found that 1) investors act not always risk averse but often risk seeking while they make an investment decision, 2) investors interpret outcomes of various decisions differently, 3) the expectations of investors are often biased in predictable direction, rather than rational.

In traditional theories of finance investment decisions are based on the assumption that investors act in a rational manner. This means that they behave rationally so they earn returns for the money they put in stock markets. To become successful in the stock market it is essential for investors to have rational behavior patterns. Rational behavior is also required to be financial successful and to overcome tendencies.

2.1 Stock prices

Stock prices are important in financial decision making because they influence the investors. To determine stock prices there are different approaches. The fundamental analysis is the approach that is used by most traditional investment analysts. It determines intrinsic stock prices by calculating expected future earnings and then applying an acceptable return on investment to calculate the stock price.

Lev and Thiagarjan (1993) state fundamental analysis is an aid to define the value of corporate securities. One can do this by gently examination of key value-drivers, such as earnings, risk, growth and competitive position.

Fundamental Analysis essentially tells us what the price of a stock should be. This can be considered as its intrinsic or fair value based on its future earnings and return on investment. However the actual price of a stock is determined by the stock market and the stock market is driven by human emotion. So what we really want to know is what price a stock will be on the stock market within a future time window.

According to Abarbanell and Bushee (1998) fundamental analysis relies mainly on the analysis of actual and past data of financial statement to judge when underlying firm value varies from prevailing market prices.

Technical analysis is another way to determine the price of a stock. This approach applies statistical techniques to historical stock prices and volumes to determine future stock price fluctuations. Lo, Mamaysky and Wang (2000) state that technical analysis is for many decades a part of financial practice. But this analysis has not the same level of academic acceptance and research as the more traditional disciplines like the fundamental analysis. The highly subjective aspect of technical analysis is one of the main obstacles. The actual stock prices consist of two components, the fair value price and a variance from the fair value due to dynamic environments and human emotion. The size of the variance depends on how volatile the environment and emotion is.

To make financial decision there are several pricing models that helps investors to decide. All these models rely on rationality.

2.1.1 Capital asset pricing model

One of such a model that relies on rationality is the capital asset pricing model. Ferson and Harvey (1991) look at the issue of return predictability and rational pricing in a regression setting. They use a multi-beta capital asset pricing model to decompose the variance of the fitted values from a regression of returns on a set of instrumental variables into explained and unexplained components. The capital asset pricing model (CAPM) invented by Sharpe and Lintner in 1964 assumes rational expectations. According to Berk and DeMarzio (2008) the CAMP describes the relationship between risk and expected return and that is used in the pricing of risky securities.

$$\bar{r_a} = r_f + \beta_a(\ \bar{r_m} - r_f\ )$$

Where:
r_f = Risk free rate
β_a = Beta of the security
$\bar{r_m}$ = Expected market return

CAMP makes clear that investors need to be compensated in two ways: time value of money and risk. The time value of money is shown by the risk-free (rf) rate in the formula. The other half of the formula represents risk and calculates the amount of compensations the investor needs for taking on additional risk. You can calculate this by taking a risk measure (beta) that compares the returns of the asset to the market over a period of time and to the market premium (Rm-rf). The CAMP defines that the expected return of a security or a portfolio must equal the rate on a risk-free security plus a risk premium. If this is not the case then the investment should not be undertaken.

According to Black (1976) the demand side of the capital asset pricing model is based on the well-know portfolio model of Tobin and Markowitz. The five basic assumptions they use are 1) a single period moving horizon for all investors, 2) no transaction costs or taxes on individuals, 3) the existence of a riskless asset with rate of return r*, 4) evaluation of the uncertain returns from investments in terms of expected return and variance of end of period wealth, 5) unlimited short sales or borrowing of the riskless asset. The common difficulty with these analyses is that they imply a persistent irrationality on the part of investors. By these assumptions it is necessary that

investors are rational because if they are influenced by behavioral factors the pricing model will not work and the wrong decisions will be made. According to Ross (1978) researchers have examined the rationality issue in capital markets paying special attention to the relationship between prices and beliefs. In his model he finds that only dividend uncertainty can exist in equilibrium, capital gains are sure. The natural solution to this conflict is to model equilibrium in terms of rational price functions.

2.1.2 Fama and French three factor model

An expansion on the capital asset pricing model is the 'Fama and French three factor model'. In this model size and value factors are added in addition to the market risk factor in CAMP. The model explains the fact that value and small cap stocks outperform markets on a regular basis. By including these two additional factors, the model adjusts for the outperformance tendency, which is thought to make it a better tool for evaluation manager performance. There are many discussions about whether the outperformance tendency is due to market efficiency or market inefficiency. The efficiency side of the discussion says that outperformance is commonly declared by the excess risk that small cap stocks face resulting from their higher cost of capital and greater business risk. According to the inefficiency side, the outperformance is declared by market participants mispricing the value of these companies, which provides the excess return in the long run as the value adjusts.

The model declares that the expected return on a portfolio in excess of the risk-free rate is explained by the sensitivity of its return to three factors: 1) the market premium (Rm-rf), 2) the difference between the return on a portfolio of small stocks and the return on a portfolio of large stocks (SMB, small minus big) and 3) premium for relative distress, the difference between the return on a portfolio of high-book-to-market stocks and the return on a portfolio of low-book-to-market stocks (HML, high minus low). Specifically, the expected excess return on the portfolio is:

$$E(Ri) - Rf = bi[E(RM) - Rf] + siE(SMB) + hiE(HML)$$

Lakonishok, Shleifer and Vishny (1994), Haugen (1995) argue that the premium for relative distress is too large to be explained by rational pricing. They conclude that the premium is

almost always positive and so is close to an arbitrage opportunity. So if the relative-distress premium is too high to be explained by rational asset pricing, one must also be suspicious of the market and size premiums.

2.1.3 Arbitrage pricing theory

Ross (1976) developed the arbitrage pricing theory (APT) as an alternative for the capital asset pricing model, since the APT has more flexible assumption requirements. The APT is based on the idea that an asset's returns can be predicted using the relationship between the same asset and many common risk factors. It describes the price where a mispriced asset is expected to be. Arbitrageurs use the APT model to profit by taking advantage of mispriced securities. According to the APT there are two things that can explain the expected return on a financial asset: 1) macroeconomic or security-specific influences, and 2) the asset's sensitivity to those influences. This relationship takes the form of the linear regression formula:

$$E(r_j) = r_f + b_{j1}RP_1 + b_{j2}RP_2 + b_{j3}RP_3 + b_{j4}RP_4 + ... + b_{jn}RP_n$$

Where:

$E(r_j)$ = the asset's expected rate of return

r_f = the risk-free rate

b_j = the sensitivity of the asset's return to the particular factor

RP = the risk premium associated with the particular factor

It is a one-period model that has a linear relation between the expected return and its covariance, if arbitrage over static portfolios is excluded. However this theory does not preclude arbitrage over dynamic portfolios.

The model is based on the assumption that an asset's returns can be expected using the relationship between that same asset and many common risk factors. Ross (1976) finds that if there are no arbitrage opportunities in the equilibrium price, then the expected returns on assets have a linear relation to the factor loadings. The arbitrage pricing theory is a substitute for the

capital asset pricing model, because both have a linear relation between assets' expected returns and their covariance with other random variables.

According to the international arbitrage pricing theory (IAPT) posited by Solnik (1983), currency movements affect assets' factor loadings and associated risk premiums. The international arbitrage pricing theory requires optimal capital markets.

2.2 Arbitrage

In theory, 'arbitrage' means the simultaneous purchase of and sale of the same, but in price different, options. According to Sharpe and Alexander (1999) arbitrage means one purchase of and sale of the same, or essentially similar, security in two different markets of affordable different prices. In this way it is possible to be profitable by using price differences of identical or similar financial products, on different markets or in different forms.

Arbitrage exists as a result of market inefficiencies and ensures that for long periods, prices differ not substantially from its fair value. Many investors will turn these market inefficiencies to good account, so the price differences will quickly disappear and a re-equilibration will occur. Arbitrage plays a large role in options markets, since its effect is that markets are efficient.

Theoretically, according to Shleifer and Vishny (1997) arbitrage requires no capital and there is no risk involved. When an arbitrageur buys a cheaper security and sells a more expensive one, its net future cash flows are zero because he gets his profits in advance. Arbitrage plays a critical role in the analysis of security markets because its effect is to bring prices to fundamental values and to keep markets efficient.

Shleifer and Vishny (1997) explain that in reality the arbitrage opportunities are more complex than in theory. Almost all arbitrage require capital and are typically risky. On the fact that arbitrage requires capital, whether it is risk-free or risky, becomes more important in de agency context. In models without agency problems arbitrageurs are often more aggressive when prices move further from fundamental values. Grossman and Miller (1998), De Long et al. (1990) and Campbell and Kyle (1993) conclude this as well. Another thing what differs from reality, is that the theory assumes that millions of 'small' investors with too little knowledge and information engage in arbitrage. Much more common is that there are relatively few professional, specialized investors who combine their knowledge with outside investors to take a great position. This has a

number of interesting implications of security pricing; including the possibility that arbitrage becomes ineffective.

Two options have often different trading hours, currencies data and delivery times. When prices fluctuate rapidly and the value of a bond provides by an investor and the value of a bond acquired by an investor differs, there are risks for the arbitrageur. This is called "risk arbitrage". In risk arbitrage, the arbitrageur is likely to need capital to exercise his trades and to cover his losses state Thaler (2005). The arbitrage theory has many points which in most cases do not match reality. Yet this is a common theory in economics.

Shleifer and Vishny (1997) show that performance based arbitrage can be ineffective in various circumstances, especially where prices are significantly out of line and arbitrageurs are fully invested. If this is the case arbitrageurs might bail out of the market when their participation is most needed.

There are limits to arbitrage. DeLong et al (1990) present a mispricing that is persistent and correlated by noise traders. These noise traders influence the equilibrium price when arbitrageurs are risk averse and have a limited investment horizon, despite arbitrage. The noise traders will bid the price shares higher and the arbitrageurs do not know if the mispricing will get even worse in the next period. The arbitrageurs have a short horizon so they cannot short the shares aggressively enough. DeLong et al (1990) also state that the noise traders are not leaving the market; in fact they outperform the rational traders since they take more risk.

2.3 Market efficiency

An efficient market is one where the market is an unbiased estimate of the true value of the investment. It is the degree to which stock prices reflect all available and relevant information. Market efficiency was introduced by Fama (1970), whose theory efficient market hypothesis (EHM) stated that is not possible for an investor to outperform the market because all available information is already built into stock prices.

The central proposition of finance theories, the efficient markets hypothesis is based on the assumption that investors always act in a rational manner. Barberis and Thaler (2003) say that a security's value price equals its fundamental value if the agents are rational and there are no frictions. This is the sum of expected future cash flow where investors take all the available

information into account while making a decisions and where the discount rate is consistent. The hypothesis that actual prices reflect fundamental values is the efficient markets hypothesis.

Shleifer (2000) state that when investors are rational this implies the impossibility of earning risk-adjusted returns, just as Fama (1970) wrote. So the efficient market hypothesis is a consequence of equilibrium in markets which are competitive with fully rational investors. But the EHM is not completely dependent on investor rationality. There are various cases where investors are not fully rational but markets are still predicted to be efficient.

The economic efficiency of financial markets is the theoretical basis for current monetary and financial theory. This is since there is much attention paid to the efficient markets hypothesis, usually by investigation of the predictability of equity returns. According to Lehmann (1990) such a predictable variation has regrettably two competing explanations: 1) market inefficiency and stock price 'overreaction' due to speculative 'fads', 2) predictable changes in expected security returns associated with forecasted changes in market or individual security fundamentals. The implications of predictable variation in asset returns for market efficiency are unclear. Namely, this phenomenon is declared by two competing explanations. On one hand financial markets may be efficient and the asset pricing theory take into account predictable changes in expected security returns. On the other hand the predictable variation can be a reflection of the overreaction of stock prices to speculative 'fads' or in an inefficient market it can reflect the cognitive misperceptions of investors.

H3: Behavioral Biases

3.1 Behavioral biases in financial decision making

3.1.1 Prospect theory

The prospect theory state that people make decisions based on the potential value of losses and gains rather than the final outcome. Kahneman and Tversky (1979) give a critique of expected utility theory as a descriptive model of decision making under risk and develop an alternative model, which they call prospect theory. Decisions weights are generally lower than the corresponding probabilities, except in the range of low probabilities. In addition people commonly discard components that are shared by all prospects under consideration. This is called the isolation effect and leads to inconsistent preferences when the same choice is presented in various forms. As shown in figure 1 the value function is normally concave for gains (implying risk aversion), generally convex for losses (risk seeking) and is commonly steeper for losses than for gains (loss aversion).
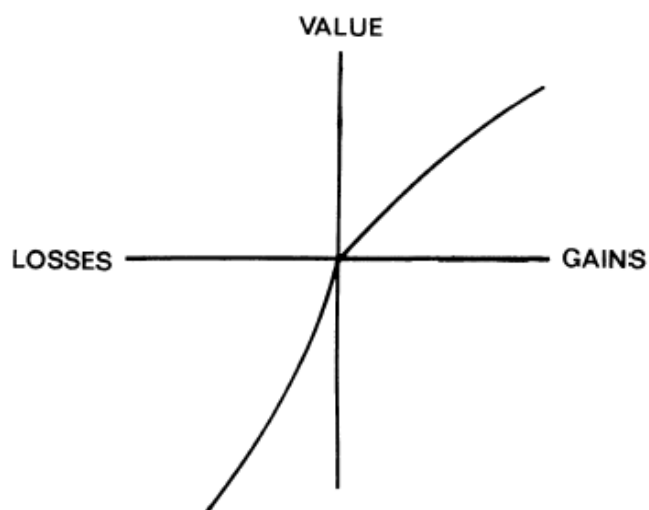
Figure 1: A hypothetical value function. Kahneman and Tversky (1979)

Thaler et al (1997) state that loss aversion has two implications. First, investors accept risks easier if they evaluate their investments less often. Secondly, when all playoffs are will increase enough to remove losses, investors will accept more risk.

Prospect theory is a behavioral economic theory that describes decisions between different alternatives that involve risk. Their theory state that people make decisions based on the potential value of losses and gains rather than the final outcome and thus will base decisions on perceived gains rather than perceived losses. When a person is given two equal choices, one expressed in possible gains and the other in possible losses, people will choice the first one. This theory is also known as the loss aversion theory.

3.1.2 Overconfidence

Overconfidence is the behavioral phenomenon where investors tend to overestimate their own capabilities and investors perceive themselves as skillful. Excessive trading is in stock market often caused by investor's overconfidence. Odean (1998) allocates the high trading volume to investor's overconfidence. Overconfidence increases expected trading volume, increases market depth and decreases the expected utility of overconfident traders. It has also an effect on volatility and price quality but this depends on who is overconfident. Traders who are overconfident can cause markets to underreact to the information of rational traders.

Glaser and Weber (2003) conclude that there are three types of overconfidence, namely miscalibration, the 'better-than-average' effect (investors may believe that they have better skills than average skills) and illusion-of-control (tendency to believe that his own change of success is higher than the objective change of success). Concluding that all aspects but miscalibration lead to higher trading activities. Odean (1998) states that people rate their capabilities and their prospects higher than those of their peers. For example, when a sample of U.S. students judge their own driving safety, 82 percent assessed themselves to be in the top 30 percent of the group Svenson (1981). And according to Cooper et al. (1988) 81 percent of 2994 new business owners thought their business had a 70 percent or better chance of succeeding but only 39 percent thought that any business like theirs would be this likely to succeed. So people tend to overestimate their own contributions to past positive results, remembering information related to their successes more than those related to their failures.

According to Shefrin (2000) there are two main implications of investor overconfidence. The first is that investors take bad bets because they fail to realize that they are at an informational disadvantage. The second is that they trade more frequently than is prudent, which leads to excessive trading volume.

Thorley (2006) says that the overconfident of investors about their trading skills can explain high observed trading volume. They find that share turnover is positively related to lagged return by testing the trading volume predictions of formal overconfident models.

Schrand and Zechman (2011) study the setting of high-tech firms and alternative proxies for overconfidence. They find evidence in support of a positive association between AAERs and executive overconfidence. This is in accordance with their hypothesis that optimistic bias increases the probability that a firm will misreport. This is associated with investor's overconfidence. This analysis shows that overconfidence is connected with financial reporting concerns.

In the model of Daniel, Hirshleifer and Subrahmanyam (2001), investors who are overconfident overrate signal precision and overreact to private signals about payoffs of economic factors. Consequently, mispricing of factor payoffs arise and all securities whose cash flows are provided from these factors. Therefore, mispricing occurs from investors' misinterpretation of information about factor cash flow and reflects overreaction to cash flow news about fundamental factors.

3.1.3 Disposition effect

Another important behavioral phenomenon is disposition effect. According to Henderson (2012) disposition effect is the tendency of an investor to sell winners too early and hold losers too long. Shefrin and Statman (1985) their model provides that the disposition effect should be weaker at the end of the year because investors can control themselves then. Rationally, the investor recognizes that realizing losses can be advantageous for tax purposes. Irrationally, he disposes the tax considerations because he is driven by the positive thoughts associated with realizing gains. Investors find discarding loss-making stocks easier when the deadline for the end of the tax year approaches.

Bailey et al (2011) shows that the investor sells relatively more winners than losers, which indicates a positive value of the disposition effect proxy. It is costly for higher-income investors to sell winner too soon and hold loser to long because of the fact that they face higher marginal rates. Thus disposition effect could be related to tax incentives.

Odean (1998) shows evidence in favor of the disposition effect. His results were that on average 14.8 percent of the gains available are actually realized, while only 9.8 percent of the losses are realized. You can conclude that investors are 50 percent more likely to realize gains than losses.

The paper of Frazzini (2006) tests whether the disposition effect caused 'underreaction' to new information what will lead to return predictability and price drifts. With data of mutual fund holdings he builds a new measure of reference purchasing prices for individual stocks. The conclusion of the paper is that the disposition effect can induce 'underreaction' to new information. And this will indeed lead to return predictability and price drifts. The information content of the news and the investor's preference price relative to the current price determine the price pattern. Frazzini (2006) also finds that the average fund is about 20 percent more likely to realize gains than losses. He distinguished the funds based on their past returns, based on this he concludes that about a third of the funds (those with lower return) are 50 percent more likely to realize gains and losses.

Barberis and Xiong (2009) investigate whether prospect theory preferences can predict a disposition effect. One of the most robust facts about the trading of individual investors is the disposition effect: when an individual investor sells a stock in his portfolio, he has a greater propensity to sell a stock that has gone up in value since purchase than one that has gone down. They consider two implementations of prospect theory. In one case, preferences are defined over annual gains and losses, in the other they are defined over realized gains and losses. They find that the annual gain/loss model often fails to predict a disposition effect. In contrast, the realized gain/loss model predicts a disposition effect more reliably.

3.1.4 Narrow framing

According to Bailey et al (2009) narrow framing is the propensity of an investor to select investments individually, instead of considering the broad impact on her portfolio. It is typical for the economic agent to combine the new option he confronts with those already confronted, then he checks if the new option enhance or not the future distribution of wealth and/or consumption. They also find that when the behavioral biases narrow framing has a negative slope investors are less likely to invest in equity mutual funds. Sims (2003) state that a consequence of narrow framing is that it implies that individuals make the choice that is apparently the best one. But the absence of the optimal skills in processing information provides the sub-optimal choice. The overall framing is decreased in favor of the narrow of one because of the absence of such optimal skills in processing information. Magi (2008) declare that in many cases when people evaluate risk, they often involve in narrow

framing. Meaning they evaluate risks in isolation, separately from other risks they are already facing.

Barberis and Thaler (2003) state that narrow framing may encourage them to derive utility from gains and losses in the value of individual stocks, when investors hold certain different stocks. They give a betting example. When offered a gamble, people tend to evaluate this as the only gamble there is in the world, instead of adding it together with pre-existing bets to look if the new bet is a meaningful addition.

A decision frame is the time interval between two sequential decisions, where the separated decisions that are temporally are more likely to be framed narrowly than simultaneous decisions. Hence investors who perform less grouped trades have a greater change to be using narrower decision frames.

3.1.5 Heuristics

Heuristics stands for the tendency that individuals make judgments quickly. Heuristics are strategies used to access complex problems and limit the explaining information. Investors tend to make rules of thumb in order to process the information so that they can make investment decisions. It is possible that investors have evaluated the information objectively, but is difficult to ignore the emotional and cognitive errors involved in each step taken by the investor. It may lead to desired decisions, but most of the time it result in unfavorable and poor decision outcomes.

3.1.6 Regret aversion

Regret is the negative feeling which occurs after a bad choice. In investment context is refers to the investor's reaction at making a mistake. They joy of satisfaction and the pain of regret is relevant to understand the behavioral impact on investment decisions. Because people want to be satisfied and ward off regret they will realize profits and retard losses. Investors are not allowed to admit their mistakes and feel regret because if they do, they tend to avoid selling the stocks which decreased in value and sell the stocks they have increased in value promptly. Zeelenberg, Beattie and de Vries (1996) state that regret theory is an action-based theory. The utility of a choice option depends on the feelings generated by the results of rejected options. According to Loomes and Sugden (1982) regret theory stands on two fundamental assumptions.

The first assumption contains the comparison that people make between the actual outcome and the outcome received when they would have make a different choice. They see the emotion obtained from this as a consequence. When the not made decision has a better outcome people experience regret. That the emotional consequences of choices are anticipated and considered when making choices is the second assumption of regret theory. So people tend to avoid negative post-decisional emotions like regret, disappointment and seek for positive emotions and feeling like joy, pride and pleasure. These emotions are assumed to be important determinants of individual decision making.

3.1.7 Cognitive Dissonance

Cognitive dissonance refers to the conflict caused by holding conflicting cognitions simultaneously. This concept was introduced by the psychologist Festinger (1956). Because the experience of dissonance is unpleasant, the person will strive to reduce it by changing their beliefs. Later research shows that when people are confronted with new information, they want to keep their current understanding of the world and reject or avoid the new information. Or they convince themselves that there is no conflict at all. Cognitive dissonance is considered as an explanation for attitude change, it is the mental conflict investors have to deal with when they realize they made a mistake. Investors do not want to change their decisions, so they persuade themselves that they made a rational decision.

3.1.8 Anchoring

When investors need to make a decisions they often fail to do enough research because there is just too much data to collect and analyses. Instead they proceed based on a single figure or fact, while ignoring the important information. This irrational behavior is called anchoring. Hoguet (2005) shows that when investors need to define a quantum investors will 'anchor' on the most recent information available. Therefore investors tend to underreact to new information. Sewell (2007) state that when a relevant value (an anchor) is available, people make expectations by beginning from an initial value (an anchor), that is adjusted to yield the final answer. It is possible that the anchor is proposed by the formulation of the problem, or it can be the outcome of a specific computation. In both ways adjustments are insufficient.

3.1.9 Mental accounting

Thaler (1990) introduced the notion of mental accounting. In 1999 he notes that mental accounting includes three components. The firs component of mental accounting consists of how results are received and experienced, and after that how decisions are made and then evaluated. The second part allocates the activities to specific accounts. It follows the inflow and outflow of funds from the specific activities. The third component is about the frequency with which account is evaluated. This can be daily, weekly, monthly or on yearly basis. Every component of mental accounting reduces the economic principle of substitutability. Consequence is that decision choices are influenced.

Generally, people do not look at the decision problem as whole but they tend to treat these decision units, called mental accounts, separately. Shefrin and Thaler (1988) conclude that people divide their income into three categories and find that the marginal propensity to spend the income differs among these categories.

3.2 Behavioral biases in investment decision making

Behavioral finance is the branch of finance that studies the effects of psychological anomalies in financial decisions and the subsequent effect on markets. Models in behavioral finance are commonly developed to interpret investor's behavior or market anomalies when rational models give no sufficient explanations. It helps to understand economic decisions and how they affect market prices, returns and allocation of resources because it applies research on human and social cognitive and emotional biases. Behavioral finance searches for the reason why people forget fundamentals and make investment decisions based on emotions. It is primarily concerned with rationality of economic agents. Many psychological biases that affect investor's behavior and decisions making have been studied intensively.

Shleifer (2000) shows that behavioral finance has developed as an alternative view of financial markets. In this way economic theory does not result in one expecting financial markets to be efficient. Behavioral finance provides new predictions that have been confirmed in the date and explains the evidence that emerge from the efficient markets perspective.

H4: Behavioral anomalies resulting from behavioral biases

Lam, Liu and Wong (2008) state that there are three anomalies that have a long history and receive the most empirical support. Those are market excess volatility, overreaction and underreaction. DeBondt and Thaler (1985) define overreaction as the foreseeability of good (bad) future returns from bad (good) past performance. Underreaction refers to the predictability of good (bad) future returns from good (bad) past performance. Kaestner (2005) state that underreaction provides a slow adaption of prices to corporate events, overreaction deals with extreme stock price reactions to previous information or past performance. These anomalies constitute major obstacles for financial economists. Financial economists meet these obstacles by constructing different behavioral models to explain these anomalies. Two behavioral biases stand out: investors' usage of the conservatism heuristics and the representativeness heuristics in decision making. The most important model of this is the work of Barberis et al. (1998). In this model they show that the short-run underreaction and the long-run overreaction are a consequence of the two mentioned heuristics.

Thaler (1980) state that the endowment effect is a pattern where people tend to demand much more to sell an object than they actually would be willing to pay to buy it. He refers to the results that any assigned owners of an object will value the object more than any assigned non-owner of the object. The one well-known experiments concerning endowment effect, Kahneman, Knetsch and Thaler (1991) found that any assigned owners of a mug required significantly more money to part with their possession than any assigned buyers were willing to pay to buy it. The endowment effect, also known as status quo bias by Samuelson and Zeckhauser (1988), is the phenomenon in which people require a higher price for a product that they are an owner of than they would be prepared to pay for. These anomalies are a manifestation of an asymmetry of values that Kahneman and Tversky (1984) call loss aversion. Los aversion occurs when the disutility of given up an object is greater than the utility associated with acquiring this object.

The prospect theory of Kahneman and Tversky (1979) along with Thaler's (1980) mental accounting framework creates the disposition effect. The important aspect of prospect theory is

an S-shaped value function which is concave (risk averse) in the domain of gains and convex (risk loving) in the domain of losses. Both these points are rated relative to a reference point. Mental accounting gives a basis for the way decision makers set reference points for the statements that determine gains and losses. The main foundation is that decision makers separate different types of gambles into various accounts and then use prospect theory to each account by disregarding possible interactions. When the relevant accounts are gains in individual stocks, then the prospect theory and mental accounting together provides a disposition effect. According to Grinblatt and Han (2005) this is because prospect theory and mental accounting investors are generally risk averse over gambles for some stock and for the others locally risk loving. The difference between risk attitudes of these two distinct types of stocks is driven fully by whether the stock has generated a capital gain of a capital loss. Because of the difference in risk attitudes, investors are more likely to sell stocks that have become more valuable since purchase.

H5: Conclusion

An efficient market is one where the market is an unbiased estimate of the true value of the investment. It is the degree to which stock prices reflect all available and relevant information. Market efficiency was introduced by Fama (1970), whose theory efficient market hypothesis (EHM) stated that is not possible for an investor to outperform the market because all available information is already built into stock prices.

In a rational world investors make financial decision to maximize their risk-return tradeoff. They have all the information they need on estimated return and risk and they make their choices according to these information. In traditional theories of finance investment decisions are based on the assumption that investors act in a rational manner. This means that they behave rationally so they earn returns for the money they put in stock markets. To become successful in the stock market it is essential for investors to have rational behavior patterns. Rational behavior is also required to be financial successful and to overcome tendencies.

Modern theory of investors' decision-making suggests that investors do not always act rationally while making an investment decision. They deal with several cognitive and psychological errors. These errors are called behavioral biases and are there in many ways. I have discussed nine behavioral biases that occur in financial decision making. The four behavioral phenomena that I highlighted are prospect theory, overconfidence, disposition effect and narrow framing. These four behavioral phenomena have been explained and studied by several economics. And for all these phenomena there is prove that they influences financial decision making. The prospect theory state that people make decisions based on the potential value of losses and gains rather than the final outcome and thus will base decisions on perceived gains rather than perceived losses. Overconfidence creates mispricing of factor payoffs and all securities whose cash flows are derived from the overestimate signal precision. This ensures difficulties in the financial decision making process. The phenomenon disposition effect is the tendency of an investor to sell winners too early and hold losers too long. In this way investors gain losses instead of winners which is not if favor for financial decision making. As mentioned before narrow framing is the propensity of an investor to select investments individually, instead of considering the

broad impact on her portfolio. So the expected outcome is the individually outcome, instead of the combined outcome what it should be.

There are also behavioral anomalies resulting from behavioral biases. Lam, Liu and Wong (2008) state that there are three anomalies that have a long history and receive the most empirical support. Those are market excess volatility, overreaction and underreaction. Financial economists construct different behavioral models to explain these anomalies. Two behavioral biases stand out: investors' usage of the conservatism heuristics and the representativeness heuristics in decision making. The most important model of this is the work of Barberis et al. (1998). In this model they show that the short-run underreaction and the long-run overreaction are a consequence of the two mentioned heuristics.

The endowment effect by Thalor (1990), also called status quo bias by Samuelson and Zeckhauser (1988), is the phenomenon in which people require a higher price for a product that they are an owner of than they would be prepared to pay for. These behavioral anomalies are a manifestation of an asymmetry of values that Kahneman and Tversky (1984) call loss aversion.

The conclusion can be drawn that investors not always act in a ration manner due to the cognitive and psychological errors they have to deal with. They are influence by behavioral factors that are important in financial markets because they influence the investors who make the financial decisions. Busenitz and Barney (1998) state that if the environment is uncertain and complex, biases and heuristics can be an effective and efficient aim to decision making. Under these circumstances a more comprehensive and careful decision making is not possible. Biases and heuristics present an effective way to estimate the appropriate decisions.

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