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Model to Predict the Actual Annual Return of the Investor with the Investors' Behavioral Biases as the Independent Variables

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ABSTRACT: *The return earned by the investor in equity investments in the secondary equity market is influenced by the behavioral biases exhibited by the investors. With a sample of 436 secondary equity investors residing in Chennai, this article measured eight behavioral biases exhibited by investors and the actual return earned by investors. The biases measured include representativeness, overconfidence, anchoring, gambler's fallacy, availability bias, loss aversion, regret aversion, mental accounting, and optimism bias. Regression analysis was done to develop a robust regression model that predicts the actual return earned from equity investments using behavioral biases as the predictors. Biases that have a positive influence on the return and those that have a negative influence on the return were identified by the model. The negative biases identified by the study can help financial advisors and wealth managers to guide their clients to earn good returns by avoiding the negative biases. Conscious efforts can also be made by investors to be cautious about the negative biases identified because these biases hamper the main goal of equity investments, which is good returns.*

TOPICS: *Security analysis and valuation, emerging markets, statistical methods**

Returns are the main goal of any investment activity, and equity investment is no exception. Equity investments are a fruitful investment option that yield good returns, but only in the long term, and they require high risk tolerance because peer pressure is high and the stock prices that determine the profit/loss are ever changing and publicly available. Equity investment decisions are among the most difficult decisions because they require assimilation of abundant information and have a huge choice set of multiple stocks from which to choose. Emotions and market sentiments run very high when making stock market decisions; hence, the decisions are irrational. The anomalies recorded in the equity market are proof of this irrationality.

The behavioral biases exhibited by the investors in the stock market environment are responsible for the irrational decisions made. When decision variables are too numerous and the environment is bizarre, humans tend to use mental shortcuts called heuristics to make a decision. These heuristics cause the exhibition of behavioral biases. The bizarre equity market results in most investors exhibiting behavioral biases. This study attempts

to find a relationship between the final goal (i.e., the actual returns earned in the equity investment) and the behavioral biases exhibited by the investors.

Regression analysis was used to develop a robust regression model to predict the actual return with the behavioral biases as the predictors of the model. This study uses eight behavioral biases, namely representativeness, overconfidence, anchoring, gambler's fallacy, availability bias, loss aversion, regret aversion, mental accounting, and optimism bias, which were measured on a Likert scale using scenario-based questions. The biases were measured using a questionnaire survey on a sample of 436 secondary equity investors residing in Chennai.

The article is organized as follows. The Literature Review section highlights the anomalies recorded in the Indian equity market. The concept of behavioral finance is introduced, and the definition and studies related to the eight behavioral biases are discussed. This is followed by the Objective of the Study and the Sample and Methodology. Finally the regression model developed is explained in the Results and Discussion section, followed by the Conclusion section.

LITERATURE REVIEW

The Indian equity market has been characterized by several anomalies that have affected the actual return earned by the average investor. "An empirical result is anomalous if it is difficult to 'rationalize' or if implausible assumptions are necessary to explain it within the paradigm" (Thaler 1987, p. 198); hence, market anomalies are irrational deviations from standards that can be elaborated only with the help of unreasonable assumptions.

Seasonal anomalies including anomalies that have a seasonal pattern, such as the day-of-the-week effect, weekend effect, Monday effect, turn-of-the-month effect, semimonthly effect, month-of-the-year effect, and so on, have been recorded in the Indian equity market. The day-of-the-week effect was recorded by Sarma (2004) in the Indian market by analyzing the daily returns of the three important BSE indexes (NATEX, BSE200, and Sensex) during the period of January 1, 1996 to August 10, 2002. The highest positive deviation, mainly for the Sensex, was determined in the Monday–Friday set. Hence, buying on Mondays and selling on Fridays would serve as a profitable trading strategy to earn abnormal profits.

The weekend effect in the Indian stock market was documented by Singhal and Bahure (2009) by examining the returns of the indexes during the period of April 2003 to April 2008: BSE200, S&P Nifty, and BSE Sensex. In the Indian stock market for the period of January 1998 to December 2007, Garg, Bodla, and Chhabra (2010) recorded the Monday effect, in which the lowest negative returns occur on Monday; the semimonthly effect, in which the returns of the first half of the month are higher than the second half of the month; and the turn-of-the-month effect, in which the returns of the last few days of the previous month differ from those of the first few days of the current month. The month-of-the-year effect was documented in the Indian equity market by Dash, Sabharwal, and Dutta (2011) by analyzing the BSE Sensex between April 1997 and March 2007. They recorded positive returns during the end of the year in the months August, November, and December for reasons such as monsoon crop harvest, winter crop, and Diwali. They also recorded negative returns in March, which confirmed the tax-loss selling.

Other seasonal anomalies were also recorded in the Indian equity market. Siddiqui and Narula (2013) documented that the Indian equity market was not efficient because of the presence of seasonal anomalies found when examining the S&P CNX Nifty in the period 2000–2011. They also determined positive returns in the months of November and December because of Diwali and Christmas. They recorded volatility clustering on Fridays and Novembers, negative Tuesdays and Januaries, highly volatile Mondays, and positive Decembers.

Kaur (2004) examined the Nifty and Sensex and showed the maximum volatility conditions in the Indian equity market during the months of February and March (presentation of the Union Budget) accompanied by high returns. The study also documented high positive returns in the month of December without high volatility conditions. During September, the volatility was higher; however, returns were lower when third-quarter corporate results were announced.

These anomalies make the stock market more unpredictable and difficult for equity investors to strategize and earn good returns. These anomalies indicate that the Indian equity market has anomalous behavior unexplained by the classic financial theories, which assume rational behavior of investors. Hence, investors have irrational behavior owing to the emotions involved in the ever-changing equity market where

the information available is abundant and decision making is cumbersome. Researchers thus used psychological principles to understand the irrationality among the investors, which gave rise to behavioral finance. The two main concepts given by behavioral finance are the heuristics employed and the behavioral biases exhibited. Heuristics are mental shortcuts employed when a decision is too difficult to make in light of excessive available information, unpredictable environments, and a large number of decision variables to be considered. Behavioral biases are the biases exhibited owing to the employment of heuristics that cause investors to deviate from rational decisions. The behavioral biases resulting from the use of heuristics are emotional weaknesses that are also termed as errors of judgment or cognitive illusions (Kahneman and Riepe 1998). Investors who employ heuristics to process abundant information tend to become susceptible to biases. Investors do not use the available information objectively due to these behavioral biases (Prast 2004). Biases are the mistakes that investors make when the mental shortcuts (heuristics) are used to simplify the process of manipulating excessive information.

Several behavioral biases have been explored by researchers in numerous studies. This study considers eight behavioral biases, namely representativeness, overconfidence, anchoring, gambler's fallacy, availability bias, loss aversion, regret aversion, mental accounting, and optimism bias, suggested by Chandra and Kumar (2012) and Jayaraj (2013).

Representativeness Bias

Representativeness bias is said to be exhibited when the investor assumes that the past performance of a stock indicates the stock's future return, when the investor finds it easy to make stock purchase decisions when the stock has strong positive resemblance to the past, when the investor is able to recognize patterns in the stock prices even when the market is volatile, and when the investor makes stock market decisions based on a favorite financial advisor's or TV channel's recommendations.

Kahneman and Tversky (1973) explained that, when employing the representativeness heuristic, people tend to predict an outcome based on how representative it is of the evidence, thereby ignoring the prior probabilities of the outcome and the reliability of the evidence.

People tend to predict even extreme values and rare events if these are representative. They showed using both numerical predictions and categorical predictions that these predictions ignored both prior probability of the outcome and the reliability of the evidence. With respect to numerical predictions, the consistency of the inputs is an important determinant of representativeness. This in turn boosts the confidence with which the predictions are made but in the process reduces the validity. This leads to a phenomenon called *illusion of validity* where highly confident predictions are made in fallible situations.

The main example of the representativeness bias in the finance domain is the winner–loser effect from Bondt and Thaler (1985). Investors who exhibited representativeness bias gave more weight to the latest information and made predictions in accordance with that information. This overreaction led to mispricing, thereby making the past winners more valued and the past losers less valued. In the long run, however, the market autocorrected, and the loser portfolios beat the winner portfolios.

Representativeness bias leads investors to make quick decisions at the cost of judging resemblances that are merely superficial. This heuristic leads to unwanted importance being given to similarities between events, thereby ignoring the variables critical for determining the probability of the event (Jayaraj 2013).

The presence of the representativeness bias was examined in the Indian market as well (Mittal 2010; Chandra and Kumar 2011, 2012; Jayaraj 2013). Business class investors significantly had a higher tendency to overreact compared to salaried investors (Mittal 2010). A Delhi-based study proved that a significant majority of the investors considered the latest past performance of a stock as representative of the return and found it beneficial to invest in such hot stocks (Chandra and Kumar 2011, 2012).

Overconfidence Bias

Overconfidence bias is said to be exhibited when the investor is confident about his/her stock market decisions after the experience gained in the market, when the investor is confident about his/her interpretation of the available information, when the investor takes credit for all the successful stock market transactions made in the past, and when the investor foresees a

larger probability of success compared to failure in his stock market decisions.

An article titled "Indian Retail Investors Are More 'Irrational' Traders" (Padiyath and Jha 2012) mentioned two important findings from two different studies. The Indian individual investor suffered higher trading losses due to the overconfidence effect when compared to financial institutions and nonfinancial corporations (De, Gondhi, and Sarkar 2011). Barber et al. (2009) showed that Indian retail investors suffered huge losses every year because of stock market trading. Hence, the overconfidence variable deserved much attention in the Indian context.

Chandra (2009) studied the Indian individual investor's competence, which caused overconfidence, among investors in Delhi. Investors with higher education were found to exhibit overconfidence in financial decision making, and investors' overconfidence was found to decrease with age; hence, old age led to lower confidence. The investors with higher income levels were more confident about their competence with respect to trading in stock markets.

Ray (2009) investigated whether the factors affecting investment decision making and the investment objectives among student investors differed during and after the Indian stock market crash of 2008. The relationship between the overconfidence bias and cognitive conflict was studied, and there was a difference between the perceived ability of respondents to predict the market and the view of whether the market was overvalued before the market crash.

Prosad, Kapoor, and Sengupta (2013) investigated the Indian stock market empirically by analyzing Nifty stocks for the period of 2006 to 2011 to prove the presence of behavioral biases, overconfidence, and disposition effect (the tendency to hold on to losers and sell the winners). The paper was grounded on the basic idea that, because of increased stock prices, the investor becomes overconfident; as a result, the trading volume increases. Using a time-series regression model, the effects of both the biases under study were isolated. The study proved that overconfidence increased the market's trading volume, and the disposition effect increased the stock's trading volume.

Francis (2012) studied the investment behavior of investors in equity shares in Kerala. According to Francis, the overconfidence dimension, measured in terms of factors such as stock-picking ability, self-control, and market knowledge, was found to be the most prominent dimension of investors' behavior. The stock-picking ability was the most weighted factor of the overconfidence dimension.

The degree to which investors in Indore are prone to the various behavioral biases, divided in terms of salaried class investors and business class investors, was studied. The overconfidence dimension measured in terms of better-than-average effect was found to be higher for business class than salaried class investors (Mittal 2010).

Chandra and Kumar (2011, 2012) studied overconfidence bias as one of the psychological biases determining the Indian individual investor's trading decision. Both psychological and contextual factors (publicly available information through various media; reputation of the firm and market share; financial and accounting information; advocate recommendations, including those from friends, brokers, and family; and personal financial needs) were first identified; then the presence of these biases was confirmed and their extent was studied. The overconfidence heuristic was not found to be popular among the respondents, and investors were found to be rather underconfident.

Jayaraj (2013) also studied the overconfidence bias as one of the determinants of individual investor behavior among the retail individual investors in the Tamil Nadu region. Most of the investors did not use their predictive skill gained from experience to outperform the market.

De, Gondhi, and Sarkar (2011) used the NSE database of orders of 755 stocks that traded between January 1, 2005, and June 30, 2006, to study the relative effects of the overconfidence and disposition effect among three categories of investors, namely individual investors, nonfinancial corporations, and financial institutions. Overconfidence was measured in terms of the proxies' turnover frequency and riskiness of the portfolio. The individual investors were found to be the worst hit with respect to wealth losses due to these biases. The study proved that the overconfidence bias results in more wealth loss than the disposition effect for the average investor across all groups.

Anchoring Bias

Anchoring bias is said to be exhibited by the investor when anchors are used as a reference to make

purchase/sale decisions. The anchors could be the purchase price of the stock, the price at which a friend or colleague bought or sold the same stock, the 52-week high, the 52-week low, and so on.

The phenomenon in which various starting points lead to different estimates, which are all biased toward their respective initial values, is anchoring. The adjustments from the initial value are, however, insufficient and lead to underestimation. The initial values are either given explicitly or determined based on an incomplete computation. The effects of anchoring are underestimation of the probability of disjunctive events, which has a funnel-like structure, and overestimation of the probability of conjunctive events, which has a chain-like structure. The other effect owing to insufficient adjustment is anchoring in the assessment of subjective probability distribution, which leads to narrowly defined confidence intervals (Tversky and Kahneman 1974).

Investors with anchoring bias tend to predict market forecasts very close to current market levels. Even when there is new information about the company whose stock they are holding, they tend not to change their original estimates. Forecasts for the next year will also be anchored to the current rise or fall in the returns. The economic states of certain countries or companies may also be held as anchors by some investors (Pompian 2006). Investors are better off with relative thinking than absolute thinking. Investors tend to base their hold/sell decisions based on illogical reference points that serve as anchors for further adjustments. Investors will resist redistribution of stocks in the portfolio if the price is below the purchase price that served as an anchor (Pompian 2008). Hence, financial advisors need to know that risk of loss is an essential trait of risk, and loss is a relative term and varies with every investor (Kahneman and Riepe 1998).

The Indian market has definite proof of the anchoring bias among individual investors (Mittal 2010; Chandra and Kumar 2011, 2012; Jayaraj 2013). Indian investors were found to have a tendency to employ the purchase price of the stock as a reference when making stock trading decisions and to be affected by the latest price experiences in the market (Chandra and Kumar 2011, 2012; Jayaraj 2013).

Mittal (2010) proved that the salaried class investors showed a higher propensity to employ the purchase price of a stock as a reference for stock trading decisions than the business class investors. That is, the investors sold a share only if the current price was above the purchase price and held the share if the current price was below the purchase price.

Gambler's Fallacy Bias

Gambler's fallacy bias is said to be exhibited when the investor is able to anticipate the end of a falling/rising trend and assumes that the downtrend/uptrend will be followed by a reversal of trend; believes, for example, that the stock market cannot decline for four years in a row (though the everyday share prices are completely random); or believes in reversal of indexes.

In the scenario of the equity market, Montier (2003) explained that the main example of gambler's fallacy was the bullish belief that the equity markets cannot decline for four years in a row. The annual return in the stock market is completely random, just like the toss of a fair coin. Hence, the returns are independent and unpredictable. The markets were as likely to rise as decline in a yearly time frame. Using regression, the author proved that the year-on-year returns were statistically independent in the US stock market, and valuations dominated the long-term returns, whereas sentiments dominated the short term. With past US stock market data, he proved that the year-on-year returns were random, and there was a record of five and four years of back-to-back stock market declines.

Jayaraj (2013) explained that, because of gambler's fallacy, investors thought that the probability of occurrence of a certain random event was lower following a series of events. Hence, investors tended to sell (hold) their stock position after continuous highs (lows), thinking that further highs (lows) were not possible, not understanding that each event was random. He proved that the Indian investors exhibited gambler's fallacy by questioning the respondents on whether they anticipated the end of good or poor returns at the stock market. A parallel study done in Delhi by Chandra and Kumar (2011, 2012), however, proved that the Indian investors were not influenced by gambler's fallacy.

Rakesh (2013) studied the behavior of the Indian investors in the Bombay Stock Exchange so that the influence of gambler's fallacy on their trading decisions could be proved. He showed that, when no information about the stocks' past performance was provided, the investors made rational choices. However, when given the history of a stock, they tended to see patterns in the

past performance and made irrational choices, thereby proving the presence of this bias.

Availability Bias

Availability bias is said to be exhibited when the investor buys stocks that are in the current trend of the market, recommended by famous financial analysts and brokers, vividly displayed in the media by repeated recommendations, and about which information is readily available but is not checked before being acted upon. The investor may also buy a stock after continuous positive news in the media or, on the other hand, sell a stock after continuous negative news.

According to Tversky and Kahneman (1973), the availability heuristic is used when one estimates the probability of an event by the ease with which associations and occurrences come to mind. The connections are amplified by repeated co-occurrences, and the availability heuristic uses this association as a foundation to determine the probability. However, when the instances cannot be retrieved from memory, as in cases of low distinctiveness, too many items, or long retention interval, the availability heuristic is not employed.

Kliger and Kudryavtsev (2010) explained the availability heuristic as the propensity to overweight the latest information, as opposed to processing all necessary information. They defined and tested two forms of the availability heuristic, namely outcome and risk availability. The daily market return was proxied for the outcome availability, and they documented stronger positive (negative) stock price reactions to the analysts' recommendation upgrades (downgrades) when accompanied by positive (negative) stock market index returns. With respect to risk availability, they documented that, on occasions of significant market moves, the abnormal stock price reactions were stronger for analysts' downgrades and weaker for upgrades.

Chiodo et al. (2004) documented heuristic explanations for different stock market anomalies. They explained the excess stock price volatility with the availability heuristic. The stock price volatility was explained by the subjective expectation of future dividends. High dividends along with high stock prices would call to mind the good parts of the bull market, owing to the availability heuristic. This led to an increase in the expectation of future dividends, making the stock prices highly volatile. Similarly, low dividends along with low stock prices would call to mind the bad parts of the bear market, owing to the availability heuristic, thereby leading to a lower expectation of future dividends.

Numerous studies (Chandra and Kumar 2011, 2012; Jayaraj 2013) have addressed the availability bias in India. Indian investors influenced by the availability bias were found to be drawn by the media demand for growth stocks and tended to choose to buy those stocks, compared to stocks with less media attention (Chandra and Kumar 2011, 2012). Cheng (2010) suggested that the use of the availability heuristic could be avoided by sleeping on the decision and letting the unconscious mind take over so that less accessible information would come to mind. Because of the delayed time factor, the impact of ease of retrieval from memory was mitigated.

Loss Aversion Bias

Loss aversion bias is said to be exhibited when the investor is extremely averse to losses and prefers conservative investments such as fixed-income securities. Loss-averse investors always hold on to losing stocks in the equity market with hope of revival because they do not want to sell losing stocks and book the losses. They prefer selling the wining stocks in their portfolio at times of uncertainty.

According to Kahneman and Riepe (1998), loss aversion is the result of the asymmetry between the values people place on gains and losses. According to Soman (2004), the implication of loss aversion is that a variance between two options will have a larger impact when they are framed as a variance between two disadvantages instead of a variance between two advantages.

Loss aversion has been termed *get even* by industry experts because investors hold on to losing investments with the hope of breaking even. This period of prolonged holding of losing investments might result in major negative effects on the portfolio returns (Pompian 2008). Novemsky and Kahneman (2005) explained the limits of loss aversion and argued that only purchases that go beyond the budget elicit loss aversion.

Loss aversion branched out of prospect theory (Kahneman and Tversky 1979), which documents that the value function defined in terms of changes in wealth is steeper for losses than for gains. Hence, people tend to deliberate more for changes that worsen than for those that improve. This explains why the disutility obtained from surrendering something is more than the utility obtained from acquiring the same (Kahneman, Knetsch,

and Thaler 1991). Because of loss aversion, people tend to be risk taking when faced with losses and risk averse when they encounter profit (Soman 2004).

Jayaraj (2013) studied the impact of prospect theory (Kahneman and Tversky 1979) on Indian investors in the Tamil Nadu region and found that investors make stock decisions based on perceived gains rather than on perceived losses because they perceive gains and losses differently. The emotional impact of losses seemed to be more than that of gains.

Chandra and Kumar (2011, 2012) studied the loss aversion bias among the Indian investors in the Delhi region. The research gave strong evidence for the investors being risk averse in the profit domain and weaker evidence for being risk seeking in the loss domain. Hence, in general, investors tended to resort to safer options when given a choice as they had an aversion to losses.

Regret Aversion Bias

Regret aversion bias is said to be exhibited when the investor is more cautious about the consequences of the decision and attempts to avoid regret by postponing the sale of losing stocks. Regret-averse investors continue to monitor the price level of the stocks already sold and express regret if prices increased after the sale of the stock. They feel more pain of regret than joy.

Loomes and Sugden (1982) proposed the regret theory where the utility of an option depends not only on the emotions caused by the selected option but also on the emotions induced by the results of the rejected options. The two main assumptions of regret theory include the comparison of the actual results with the results foregone and the resulting regret that follows if the foregone results are better. The second assumption is that the negative outcomes of a decision are anticipated and considered during decision making (Zeelenberg et al. 1996).

In the stock market, regret-averse investors fear potential financial injury, such as facing a loss or letting go profit; hence, they hate being accountable for their own mistakes. This fear that surrounds investment decision making leads investors to make irrational choices. Regret-averse investors tend to become very conservative in the long run due to losses experienced in the past as a result of high-risk choices. Regret aversion also leads to herding behavior among investors because investors are driven by common investment choices to avoid regret. Because of regret aversion bias, investors tend to stay out of the market after a loss and hold their losing positions for prolonged time periods due to fear of regret. On the other hand, they also tend to hold winning positions for a long time, fearing prices will increase after the sale (Pompian 2006).

Financial advisors need to consider the regret-averse nature of investors before recommending investment strategies because investment decisions have both emotional and financial aftereffects attached, thereby giving much room for regret and pride. There is a feeling of regret for poor decisions and a feeling of pride for good decisions. Moreover, regret makes the loss even worse and more unbearable, particularly losses that the investor believes could have been foreseen. Financial advisors could also be blamed for poor decisions owing to the hindsight bias, which is an important trait of regret aversion. Because all the consequences are obvious owing to hindsight bias, advisors could be blamed for wrong predictions (Kahneman and Riepe 1998).

There is strong evidence for the presence of regret aversion bias among Indian investors (Mittal 2010; Chandra and Kumar 2011, 2012; Jayaraj 2013). Indian investors display a propensity to delay selling losing stocks until prices reach a reference level; even when there is a chance of winning stocks increasing further, they have a propensity to sell and book profits (Chandra and Kumar 2011, 2012; Jayaraj 2013). Mittal (2010) proved that salaried class investors had a significantly higher propensity to avoid regret when compared to business class investors.

Mental Accounting Bias

Mental accounting bias is said to be exhibited when the investor views the winning stocks together and the losing stocks together in separate mental accounts and when the investor assigns different functions to different investments. Hence, an investor exhibiting the mental accounting bias would tend to sell all the losing stocks on the same day (aggregation of losses) because they are in one mental account or to sell the winning stocks on different days to segregate the gains.

Mental accounting explains why investors are reluctant to readjust the reference point for a stock. When a stock is bought, a new mental account is opened, and the reference point for that mental account is naturally the purchase price of the stock. Based on the changes in the stock price, the gain or loss relative to the purchase price is calculated, and a running score is maintained (Shefrin and Statman 1985). The mental account stays

open until some gain is made (Soman 2004)—in this case, until a profit is made.

The model by Grinblatt and Han (2005) anticipated that the difference between the market price and the purchase price of the stock was a better predictor of future stock returns when compared to the past returns. In stock market transactions, the investor organizes the various gambles into different mental accounts and then applies the prospect theory (Kahneman and Tversky 1979) and mental accounting combination (PT/MA). The PT/MA investors had differences in risk attitude toward the stocks that had a capital gain and those with a capital loss. Due to this differential risk attitude, investors had a higher propensity to sell stocks that had increased in value since their purchase (Grinblatt and Han 2005).

Investors with mental accounting bias tend to allocate investments into different accounts based on their goals, which in turn prevents them from looking at positions that correlate across accounts. These investors also tend to irrationally discriminate between capital returns and return from income that resulted in investments, where the principal is eroded in the long run. Mental accounting can also lead to formation of underdiversified portfolios owing to loyalty to employer stock and failure to treat funds as fungible. Investors also refrain from selling stocks that once reaped huge gains but have since fallen owing to the mental accounting bias (Pompian 2006).

There is strong evidence for the presence of mental accounting bias among Indian investors (Mittal 2010; Chandra and Kumar 2011, 2012; Jayaraj 2013). When asked whether they would consider a decrease in value in 2 out of 10 stocks in their portfolio an overall loss against the portfolio or treat it separately, the majority treated it separately. They believed that the loss of an asset must be attributed to that asset only and not be adjusted against the entire portfolio. Hence, each asset had an unreasonable appointment of functions, justifying the effect of the mental accounting bias (Chandra and Kumar 2011, 2012; Jayaraj 2013).

Mittal (2010) proved that the salaried investors were more prone to the framing effect when compared to business class investors. They preferred a sure alternative in the profit-making domain and a risky alternative in the loss-making domain.

Optimism Bias

Optimism bias is said to be exhibited when the investor expects a high actual return above the average return out of the equity investments made.

Manglik (2006) explained that optimism bias is an obvious characteristic of stock market players because it is generally strong in uncertain environments and in comparative situations where there are judgments based on others. In the stock market, decision making takes place under major uncertainty, and one's result is based on the performance of the other players in the market who buy or sell. Furthermore, the optimism bias exhibited by portfolio managers or financial advisors could translate into biased behavior of the secondary investors transacting in the stock market based on optimistic advice. Optimism bias in the stock market could also be introduced by new-generation investors who come in at a continuous rate and tend to be more optimistic than older-generation investors. Hence, learning from overly optimistic decisions such as overestimations has not really been passed on to new entrants in the equity market.

Stout (1995) explained that it is mainly the optimistic individuals who are positive about their stock selection capabilities who indulge in equity trading. As the share prices are mispriced, it takes optimism and confidence to see through the imperfect information available and test stock-picking skills by buying the stocks perceived as underpriced and sell the stocks perceived as overpriced. Optimism among the stock players also enabled them to hold strong viewpoints about the stock positions in the market and thereby induced more speculative trading. Speculative buying (selling) would artificially increase (decrease) the share prices owing to false demand. This in turn would lead to a distortion of prices in the stock market and hence high volatility in the market (Stout 1995; Manglik 2006).

Diether, Malloy, and Scherbina (2002) showed that stock prices reflect only the view of the optimistic players in the stock market when investors who have lower valuations do not participate for reasons such as short-sale cost constraints, incentive pattern of analysts, and so on. They provided evidence to show that stocks with difference of opinion in the earnings' forecast among the analysts earn lower returns. This pattern was more evident among small stocks and stocks with a poor history of performance.

Stout (2000) explained how the optimism bias played an important role in deciding when to purchase a stock at the desired price. When the stock prices are high, only a few highly optimistic investors will buy the stock. When the stock prices are lower, the less optimistic players will buy the stock. Hence, it is the "relatively optimistic

marginal investor" (Stout 2000, p. 25) who decides the price of the share. In addition, he explained that the level of uncertainty in the market decides the level of optimism. With higher uncertainty, investors' opinions in the range of pessimistic to optimistic shift to the range of wildly pessimistic to wildly optimistic.

Bennet et al. (2012) tested the optimism bias toward the Indian equity market among Indian stock market investors. They showed that the sample investors were optimistic that the Indian market would immediately revive after a drop of 3% and were optimistic about the future as they projected the market to rise for the next 12 months. The investor optimism was also reflected in their judgment that there was no better investment option than the equity market. Investor optimism was unaffected by the limitations of cost and risk.

OBJECTIVE OF THE STUDY

The main objective of the study was to predict the actual return (actual capital appreciation in equity investment in the last two years) using regression analysis, where the predictors, the independent variables, are the behavioral biases exhibited by secondary equity investors residing in Chennai: representativeness, overconfidence, anchoring, gambler's fallacy, availability bias, loss aversion, regret aversion, mental accounting, and optimism bias.

SAMPLE AND METHODOLOGY

The present research was carried out in Chennai, in the state of Tamil Nadu. The secondary equity investors chosen were members of the Tamil Nadu Investors Association (TIA) and the clients of a popular financial services company, Integrated. TIA was selected because it was the only formal body that allowed access to collect data from its members. Integrated was selected because it was the only company that allowed access to collect data from its clients. Questionnaire surveys were used to collect data from 436 secondary equity investors. The behavioral biases were measured on a Likert scale.

RESULTS AND DISCUSSION

Regression analysis was used to predict the actual return of the investor, which was the dependent variable in the regression model. The independent variables included mental accounting, anchoring, gambler's fallacy, availability, loss aversion, representativeness, overconfidence, and optimism. Out of these eight independent variables, the significant variables include mental accounting, loss aversion, representativeness, overconfidence, and optimism biases; their p values (0.036, 0.023, 0.024, 0.000, 0.000) were less than the alpha value, 0.05. The bias regret aversion was removed from the model owing to insignificance and high correlation with the independent variables loss aversion (0.534) and representativeness (0.565).

Most biases were negative, implying that they had a negative influence on the actual return; that is, the higher the level of the bias, the lower the return. The negative biases include mental accounting, gambler's fallacy, availability, loss aversion, and representativeness. The anchoring, overconfidence, and optimism biases were positive biases, indicating that higher levels of these biases lead to higher actual return.

Furthermore, nearly 59.2% (R^2 value) of the variation in the dependent variable (actual annual return) was explained by the variation in the independent variables, which proved that the model was robust. The condition of normality was also found to be significant at the 0.01 level in the one-sample Kolmogorov–Smirnov test. The collinearity among the independent variables was checked with the tolerance statistics, which were all close to 1, indicating that little of the variability in the independent variable was explained by other independent variables. Hence, multicollinearity was not a problem among these independent variables. The variance inflation factor (VIF), which was the reciprocal of the tolerance statistic, was also less than 2 for all the independent variables, indicating no evidence of multicollinearity.

The regression equation is given by

$$Y = 5.657 - 0.189X_1 + 0.134X_2 - 0.086X_3 - 0.196X_4 - 0.213X_5 - 0.201X_6 + 0.356X_7 + 0.799X_8$$

in which Y is actual annual return of the investor, X_1 is mental accounting, X_2 is anchoring, X_3 is gambler's fallacy, X_4 is availability, X_5 is loss aversion, X_6 is representativeness, X_7 is overconfidence, and X_8 is optimism.

The model summary, analysis of variance (ANOVA) results, and coefficients of the independent variables are given in Exhibits 1, 2, and 3.

EXHIBIT 1
Regression Model—Model Summary

		Model Summary		
Model	**R**	**R²**	**Adjusted R²**	**Std. Error of the Estimate**
1	0.769	**0.592**	0.584	5.83077

Note: 59.2% (R² value) of the variation in the dependent variable (actual annual return) was explained by the variation in the independent variables, which proved that the model was robust.

EXHIBIT 2
Regression Model—ANOVA Table

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	21,056.763	8	2,632.095	77.419	0.000
Residual	14,517.091	427	33.998		
Total	35,573.853	435			

EXHIBIT 3
Regression Model—Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
	B	**Std. Error**	**Beta**	**T**	**Sig.**	**Tolerance**	**VIF**
(Constant)	5.657	2.357		2.400	**0.017**		
Mental Accounting Total	−0.189	0.090	−0.075	−2.105	**0.036**	0.753	1.327
Anchoring Total	0.134	0.089	0.057	1.509	0.132	0.670	1.493
Gambler's Fallacy Total	−0.086	0.113	−0.026	−0.761	0.447	0.790	1.267
Availability Total	−0.196	0.107	−0.065	−1.839	0.067	0.761	1.314
Loss Aversion Total	−0.213	0.093	−0.089	−2.284	**0.023**	0.629	1.590
Representativeness Total	−0.201	0.089	−0.085	−2.264	**0.024**	0.679	1.473
Overconfidence Total	0.356	0.078	0.158	4.544	**0.000**	0.789	1.268
Optimism Bias	0.799	0.042	0.652	18.840	**0.000**	0.797	1.255

Notes: The variables mentioned in bold text include mental accounting, loss aversion, representativeness, overconfidence, and optimism biases; their p values (0.036, 0.023, 0.024, 0.000, 0.000) were less than the alpha value, 0.05. Hence they are significant.

CONCLUSION

This study showed that the behavioral biases exhibited by the investors do have an influence on the return earned by the investor in equity investments. Using a questionnaire survey on a sample of 436 secondary equity investors residing in Chennai, the behavioral biases were measured on a Likert scale. Regression analysis was used to develop a robust regression model to predict the actual return earned in the equity investment using the behavioral biases as the predictors. The significant biases in the model included mental accounting, loss aversion, representativeness, overconfidence, and optimism. Most of the biases were negative, implying that they had a negative influence on the actual return; that is, the higher the level of the bias, the lower the return. The negative biases included mental accounting, gambler's fallacy, availability, loss aversion, and representativeness. The anchoring, overconfidence, and optimism biases were positive, indicating that higher levels lead to higher actual return.

This study can benefit wealth managers and financial advisors by helping them guide investors to be cautious about the negative biases that reduce their returns. These results can also help investors to be self-aware of the negative biases that they should avoid and the positive biases that are harmless.

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ADDITIONAL READING

Drivers of Stock Investment Decision: *An Orthogonal Linear Transformation Approach*
R. Renu Isidore and P. Joseph Christie
The Journal of Private Equity
https://jpe.pm-research.com/content/22/2/55

ABSTRACT: *According to the expected utility theory, investment decisions are a result of the tradeoff between deferred consumption and*

immediate consumption. Several drivers influence the stock investment decision in the bizarre equity environment. A survey of 436 secondary equity investors residing in Chennai, India, explores the influence of 20 variables on their stock investment decision. Using principal component factor analysis followed by varimax rotation, the 20 variables became five key factors of five decision-making tools, including fundamental analysis, economic analysis, industry analysis, company analysis, advocate recommendation, and technical analysis. Financial advisors and wealth managers may use this research to identify the tool used by their clients (investors) to make stock investment decisions, and hence, guide them accordingly.

How Much Is Behavioral Advice Worth?

Michael M. Pompian

ABSTRACT: *Behavioral finance is a powerful tool when used effectively by investors and financial advisers. Although this usefulness is generally accepted in theory, the practical value of behavioral advice to investors has not been quantified to a large degree. The article provides a quantitative analysis of behavioral mistakes using a fictional case study of a private family that is making two key behavioral mistakes: loss aversion and mental accounting. First, these biases are explained, with examples. Next, the case study illustrates and quantifies investment losses due to behavioral mistakes. The key conclusion of the case study is that making behavioral mistakes causes investors to forgo returns, and this loss of return can be significant. However, if advisers and investors can recognize and correct behavioral mistakes, recouping or avoiding these gains is possible; these losses are not necessary. In sum, the value of behavioral advice is significant.*

A Unified Behavioral Finance

Meir Statman

ABSTRACT: *We often hear that behavioral finance is nothing more than a collection of stories about irrational people—that it lacks the unified structure of standard finance. Yet today's standard finance is no longer unified because wide cracks have opened between its theory and the evidence. The first generation of behavioral finance attempted to fill the cracks in standard finance largely by accepting its notions of investors as rational, yet describing investors as irrational and misled by cognitive and emotional errors. The second generation of behavioral finance described briefly here and in detail in the author's book Finance for Normal People characterizes investors as normal. It depicts behavioral finance as a unified structure that incorporates parts of standard finance, replaces others, and bridges the gaps between theory, evidence, and practice.*