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Regret aversion bias and financial risk tolerance

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Abstract
Behavioural finance theories explain "why" individuals exhibit behaviours that do not maximize expected utility. Behavioural finance highlights inefficiencies, such as under- or over-reactions to information, as causes of market trends and, in extreme cases, of bubbles and crashes. Such reactions have been attributed to limited investor attention, overconfidence, over optimism, mimicry (herding instinct) and noise trading. Technical analysts consider behavioural finance to be behavioural economics' "academic cousin" and the theoretical basis for technical analysis.
This research work explores how regret aversion bias, as explained by regret theory, may shape financial risk tolerance attitudes. The results suggest that gender, income and regret aversion bias help explain risk attitudes of individual investment decision making. Financial risk tolerance appears to be an elastic and changeable attitude. This research expands on the research work of Shefrin [2000], who concluded through his research that recent stock market price changes exert a strong influence on risk tolerance attitudes and behaviours. Regret Aversion bias plays an important role in determining the financial risk tolerance factor.

Keywords: finance, market trends, academic cousin

Introduction
The Efficient market hypothesis was developed by Professor Eugene Fama who argued that stocks always trade at their fair value, making it impossible for investors to either purchase undervalued stocks or sell stocks for inflated prices. As such, it should be impossible to outperform the overall market through expert stock selection or market timing, and that the only way an investor can possibly obtain higher returns is by chance or by purchasing riskier investments. His 2012 study with Kenneth French confirmed this view, showing that the distribution of abnormal returns of US mutual funds is very similar to what would be expected if no fund managers had any skill—a necessary condition for the EMH to hold.
There are three variants of the hypothesis: "weak", "semi-strong", and "strong" form. The weak form of the EMH claims that prices on traded assets (e.g., stocks, bonds, or property) already reflect all past publicly available information. The semi-strong form of the EMH claims both that prices reflect all publicly available information and that prices instantly change to reflect new public information. The strong form of the EMH additionally claims that prices instantly reflect even hidden "insider" information.
Critics have blamed the belief in rational markets for much of the late-2000s financial crisis. In response, proponents of the hypothesis have stated that market efficiency does not mean not having any uncertainty about the future, that market efficiency is a simplification of the world which may not always hold true, and that the market is practically efficient for investment purposes for most individuals.
In today's world investing in stocks and funds is made easy. Investors do not need any specific education or knowledge to purchase stocks. Current technology enhances fast trade between individual investors. The concept of investing is seen as trendy. Therefore, people tend to make illogical decisions not based on true knowledge or information of a certain investment object. These decisions are explained via several behavioural finance theories. The outcome of poor knowledge is that investors allow these theories to effect on their decision-making process, thus resulting in major losses. The behavioural models can effect on individuals' decision-making whether actual investments are conducted via professionals or not. The concept of investing is extensive as it can include all the aspects of purchasing items expected to gain more value in the future (art, antique, securities etc.). Therefore, it has decided to narrow down the subject to concentrate on stock trading and the impact of behavioural finance on individual portfolio investors.
The portfolio investor is a human being and to err is just natural. Extreme volatility has plagued financial markets worldwide since the 2008 Global Crisis. Investor sentiment has been one of the key determinants of market movements. In this context, studying the role played by emotions like fear, greed and anticipation, in shaping up investment decisions seemed important. Traditional finance assumes investors always behave rationally and they can process new information quickly and accurately, whereas the evolving field of behavioural finance assumes that investors suffer from cognitive and emotional biases which may lead to irrational and unexplained financial decision making. All too many investors are completely unaware of the mental pitfalls that await them. Even once they are aware of their cognitive biases, it must also be recognized that knowledge does not equal behaviour. Huge amount of information is readily available and it is upon the investor to differentiate and select.
Much of the economic and financial theories presume that individuals act rationally in the process of decision making, by considering all available information. But there is evidence to show repeated patterns of irrationality in the way humans arrive at decisions and choices when faced with uncertainty. Behavioural finance, a study of the market

that draws on psychology, throws light on why people buy or sell stocks and why sometimes do not buy or sell at all. The most crucial challenge faced by the investor is in investment decisions. The profit made, or losses incurred by an investor can be attributed mainly to his decision-making abilities. The fact that even the most prominent and well-educated investors were affected by the collapse of the speculative bubble in the 2008 subprime crisis proved that something was fundamentally missing in the traditional models of rational market behaviour. In this study, the aim is to establish the existence of such fundamental issues, driven by various psychological biases, in the investment decision-making process. Behavioural economists firmly believe that psychological factors influence investment decisions. They argue that today's investment decisions demand a better understanding of individual investors' behavioural biases. However, many economists believe completely in the application of traditional theories in the decision-making process and hence do not consider the concept of irrational behaviour. Behavioural finance therefore studies the influence of psychology on the behaviour of portfolio investors and their consequent reactions in stock market investing. It is an evolving field that studies how psychological factors affect decision making under uncertainty. In this context, it seems relevant to check whether the behavioural factors have an influence on the decision-making process of portfolio investors.

Cognitive Biases and Behavioural Finance

The recent behavioural finance literature offers an alternative paradigm in which individuals make systematic mistakes in the way that they process information. In this paper, we consider one of these biases, that of overconfidence. There are a number of reasons why we concentrate on this particular bias: first, it is perhaps the best established of these biases. Second, we view it as a bias that is likely to manifest itself in the sort of analysis that is necessary in security valuation. Finally, we argue that overconfidence is a trait that is likely to arise through evolutionary selection. We believe this last argument is extremely important. Behavioural biases that distort decisions with no offsetting benefits are likely to be eliminated by natural selection. Hence, we should be considerably more sceptical about the existence of biases that cannot be explained in this way.

Although many economists are sympathetic to the view that behavioural biases play a role in economic decisions, they generally believe that irrational investors have only a minor effect on prices. The standard argument is that, in competing to take advantage of the profit opportunities created by the trades of irrational investors, rational investors will push prices to a level where the profit opportunities virtually disappear. Thus, in the end, prices will be determined in the market "as if" all investors are rational.

Regret Aversion Bias

"I should have computed the historical covariance of the asset classes and drawn an efficient frontier. Instead, I visualized my grief if the stock market went way up and I wasn't in it-or if it went way down and I was completely in it. My intention was to minimize my future regret, so I split my pension scheme contributions 50/50 between bonds and equities."- Harry Markowitz, Founder of Modern Portfolio Theory

People anticipate regret if they make a wrong choice, and take this anticipation into consideration when making decisions. Fear of regret can play a large role in dissuading or encouraging someone to do something. In investing, the fear of regret can make investors either risk averse or motivate them to take greater risks. For example, suppose that an investor buys stock in a small growth company based only on a friend's recommendation. After six months, the stock falls to 50% of the purchase price, so the investor sells the stock at a loss. To avoid this regret in the future, the investor will ask questions and research any stocks that his friend recommends. Conversely, say the investor didn't take the friend's recommendation to buy the stock, but the price increased by 50% rather than decreasing. Thus, to avoid the regret of missing out, the investor will be less risk averse and buy any stocks that his friend recommends in the future.

Regret Aversion is a therefore a psychological error that arises out of excessive focus on feelings of regret at having made a decision, which turned out to be poor, mainly because the outcomes of the alternative are visibly better for the investor to see. The root cause of this type of error is the tendency that individuals hate to admit their mistakes. Because of this cognitive bias, investors may avoid taking decisive actions for the fear that whatever decisions they make take will be sub-optimal in Hindsight.

This could lead investors into holding onto a losing position for too long, because of unwillingness to admit and rectify mistakes in a timely manner. Another negative is that it can stop investors from making an entry into the market when there has been a downtrend, which is showing signs of ending, and signals that it is a good time to buy. The Fear of Regret happens often when individuals procrastinate while making decisions. Various psychology experimental studies suggest that regret influences decision-making under uncertainty. People who are regret averse tend to avoid distress arising out of two types of mistakes

1. Errors of commission – which occur as a result of misguided action, where the investor reflects on this decision and rues the fact that he made it, thus questioning his beliefs
   Errors of omission – which occur as a result of missing an opportunity which existed. Pompian (2011),
2. Regret theory models' choice under uncertainty taking into account the effect of anticipated regret. It was originally developed simultaneously by Graham Loomes and Robert Sugden, David E. Bell and Peter C. Fishburn and subsequently improved upon by several other authors.

In general, these models incorporate a regret term to the utility function that depends negatively on the realized outcome and positively on the best alternative outcome given the uncertainty resolution. This regret term is usually an increasing, continuous and non-negative function subtracted to the traditional utility index. These types of preferences always violate transitivity in the traditional sense although most satisfy a weaker version.

When people fear that their decision will turn out to be wrong in hindsight, they exhibit regret aversion. This bias is associated with risk aversion. Regret-averse people may fear the consequences of both errors of omission (e.g., not buying the right [optimal] investment property) and commission (e.g., buying the wrong [suboptimal] investment property) (Seiler *et al*., 2008). In investing, the

fear of regret can make investors either risk averse or motivate them to take greater risks. For example, suppose that an investor buys stock in a small growth company based only on a friend's recommendation. After six months, the stock falls to 50% of the purchase price, so the investor sells the stock at a loss. To avoid this regret in the future, the investor will ask questions and research any stocks that his friend recommends.

Conversely, say the investor didn't take the friend's recommendation to buy the stock, but the price increased by 50% rather than decreasing. Thus, to avoid the regret of missing out, the investor will be less risk averse and buy any stocks that his friend recommends in the future.

Several experiments over both incentivized and hypothetical choices attest to the magnitude of this effect.

Experiments in first price auctions show that by manipulating the feedback the participants expect to receive, significant differences in the average bids are observed. In particular, "Loser's regret" can be induced by revealing the winning bid to all participants in the auction, and thus revealing to the losers whether they would have been able to make a profit and how much could it have been (a participant that has a valuation of $50, bids $30 and finds out the winning bid was $35 will also learn that she could have earned as much as $15 by bidding anything over $35.) This in turn allows for the possibility of regret and if bidders correctly anticipate this, they would tend to bid higher than in the case where no feedback on the winning bid is provided in order to decrease the possibility of regret.

In decisions over lotteries, experiments also provide supporting evidence of anticipated regret. As in the case of first price auctions, differences in feedback over the resolution of the uncertainty can cause the possibility of regret and if this is anticipated, it may induce different preferences. For example, when faced with a choice between $40 with certainty and a coin toss that pays $100 if the outcome is guessed correctly and $0 otherwise, not only does the certain payment alternative minimizes the risk but also the possibility of regret, since typically the coin will not be tossed (and thus the uncertainty not resolved) while if the coin toss is chosen, the outcome that pays $0 will induce regret. If the coin is tossed regardless of the chosen alternative, then the alternative payoff will always be known and then there is no choice that will eliminate the possibility of regret.

The Regret Aversion bias is a cognitive bias for the status quo; in other words, people tend to be biased towards doing nothing or maintaining their current or previous decision.

‘The example also illustrates what Samuelson and Zeckhauser (1988) call a Regret Aversion bias, a preference for the current state that biases the economist against both buying and selling his wine’ Thaler (1992) p. 63

‘One implication of loss aversion is that individuals have a strong tendency to remain at the status quo, because the disadvantages of leaving it loom larger than the advantages. Samuelson and Zeckhauser (1988) have demonstrated this effect, which they term the status quo bias.’ Thaler (1992) p. 68

‘"The status quo bias" - individuals' tendency to prefer to remain at the status-quo - is similarly attributed to regret loss aversion: It is assumed that the loss of the status-quo option looms larger than the gain of an alternative option (e.g., Kahneman *et al*., 1991).’Gal (2006)

‘Both the Regret Aversion bias and the endowment effect are part of a more general issue known as loss aversion.’ (Montier 2007, p. 32)

Regret Aversion Bias therefore affects the investment behaviour of individual investors in a way that they end up selling winners too soon and holding losers for too long. This will lead to reduced investment returns.

Risk Tolerance Attitudes

Investors with a low-risk tolerance level are subject towards the mental accounting bias. These investors will compartmentalized information before making any hasty investment decisions. This was confirmative research done by Jagongo and Mutswenje (2014 Jagongo, A., & Mutswenje, V. S. (2014). A survey of the factors influencing investment decisions: The case of individual investors at the NSE. International Journal of Humanities and Social Science, 4(4), 92–102. [Google Scholar]) who also found that conservative investors with low-risk tolerance levels can possibly be subject towards the mental accounting bias. Conservative investors with a low-risk tolerance level were also subject towards the regret loss aversion bias. These results support prior research done by Pompian (2016Pompian, M. M. (2016). Risk profiling through a behavioural finance lens. Virginia, Charlottesville: CFA Institute Research Foundations. [Google Scholar]). These investor decisions will lead investors to keep investments that yield negative returns while hoping to reduce losses by taking on considerably more risk (Singh, 2012 Singh, S. (2012).

Conservative investors with a medium-risk tolerance level can be tilted towards the anchoring bias. Pompian (2016Pompian, M. M. (2016). Risk profiling through a behavioural finance lens. Virginia, Charlottesville: CFA Institute Research Foundations. [Google Scholar]) confirmed that conservative investors are subject towards the anchoring bias. These investors are slow in making investment decisions since they hold on to a single piece of information and are slow to adjust to new information. As a result, from the sample and from theory, stated by Pompian (2016Pompian, M. M. (2016). Risk profiling through a behavioural finance lens. Virginia, Charlottesville: CFA Institute Research Foundations. [Google Scholar]), conservative investors tend to be more subject towards the anchoring bias. Investors subject towards the regret aversion bias were found to be mainly moderate investors associated with a medium-risk tolerance. This result is in agreement with Bourse securities (2016 Bourse securities. (2016). Bourse weekly review: Making the most with your US dollars. Retrieved fromhttps: //bourseinvestment.com/bourse-weekly-review-making-us-dollars/ [Google Scholar]) who found moderate investors subject towards the regret aversion bias to have a medium-risk tolerance level. Investors subject towards the regret aversion bias will make investment decisions in such a way as to avoid the regrets of past investment decisions (Quiggin, 1994Quiggin, J. (1994). Regret theory with general choice sets. Journal of Risk and Uncertainty, 8(2), 153–165. doi:10.1007/BF01065370 [Crossref], [Web of Science ®], [Google Scholar]).

Investors subject towards the self-control bias were the only investors to fall in the aggressive personality category according to the Dospert scale. Moreover, the SCF scale found investors’ subject towards the self-control bias to have a high-risk tolerant level. This concurs with the research of Pompian (2016Pompian, M. M. (2016). Risk

profiling through a behavioural finance lens. Virginia, Charlottesville: CFA Institute Research Foundations. [Google Scholar], p. 8) which stated that aggressive porfolio investors can experience the self-control bias. These investors move towards risk temptation and will exercise self-control when making their investment decisions.

Research Methodology

A questionnaire was used to execute the quantitative approach. The first section of the questionnaire contained a single risk tolerance question known as Survey of Consumer Finance (SCF). The question is:

Which of the following statements comes closest to the amount of financial risk that you and your (husband/wife/partner) are willing to take when you save or make investments?

1. Take substantial financial risks expecting to earn substantial returns.
2. Take above average financial risks expecting to earn above average returns.
3. Take average financial risks expecting to earn average returns.
4. Not willing to take any financial risks.

A 7-point Likert scale was used to rate the questions ranging from (1) strongly disagree to (7) strongly agree. The 7-point Likert scale was preferred as it provides a greater variety of options, which results in increasing probability of achieving the objective reality of participants. It is a shorter version (25% shorter) and more applicable to suit a broader range of ages, cultures and educational levels, and involves the five risk constructs as the Dospert scale of 2002. The Dospert scale of 2006 displays the following characteristics:

- Rates the likelihood of engaging in a behaviour using the risk-taking scale using 7-point ratings (1 = extremely unlikely to 7 = extremely likely); and
- Rates the perceived riskiness of a behaviour using the risk perception scale using 7-point ratings (1 = not at all risky to 7 = extremely risky).

The statistical analysis included descriptive statistics for the investor personality scale—Dospert. In order to have ensured internal consistency reliability a Cronbach's test was also executed. A null hypothesis was stated in order to determine the statistical difference between regret aversion bias and Dospert/constructs. The statistical differences were determined by undertaking an analysis of variance test (ANOVA) set at a confidence level of 95%.

The statistical results can be viewed as a chart to clarify

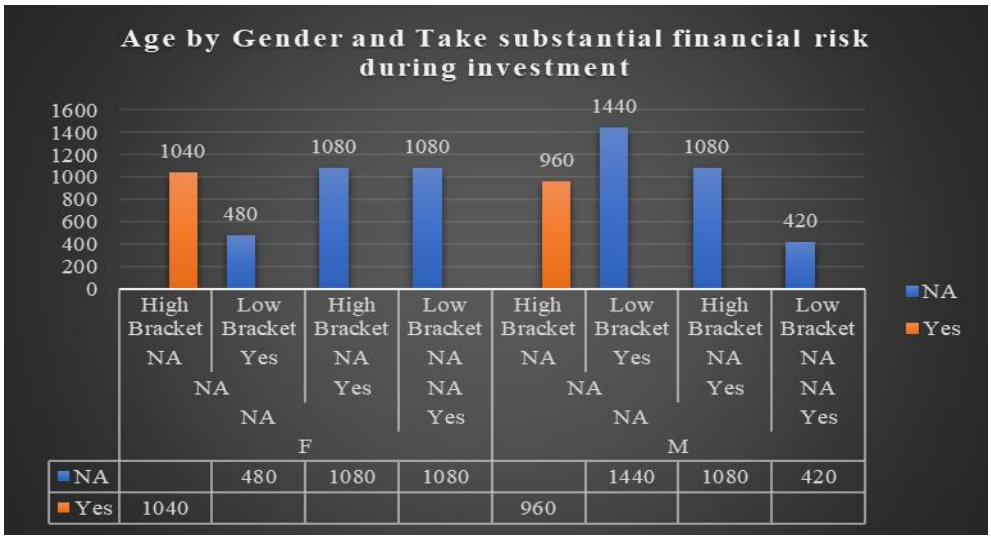

Fig 1

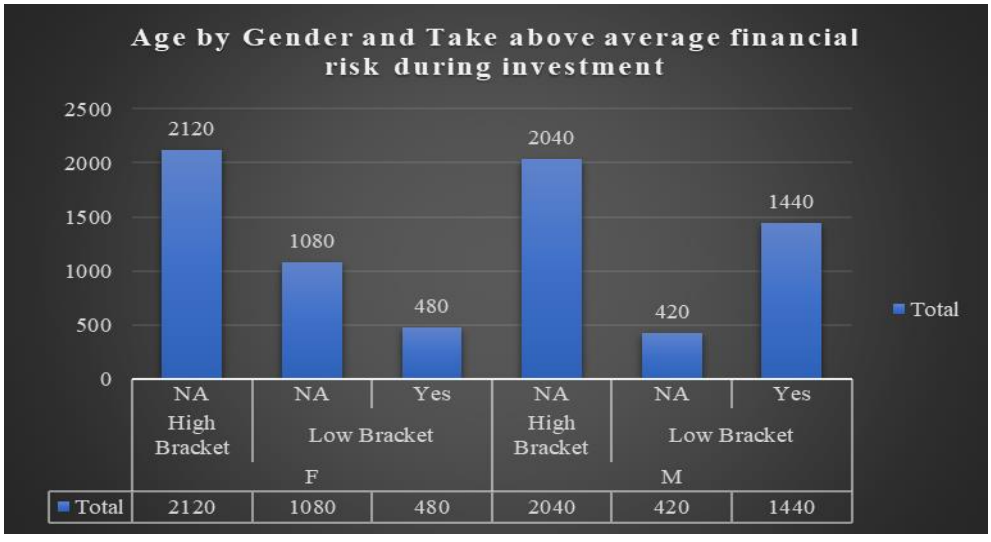

Fig 2

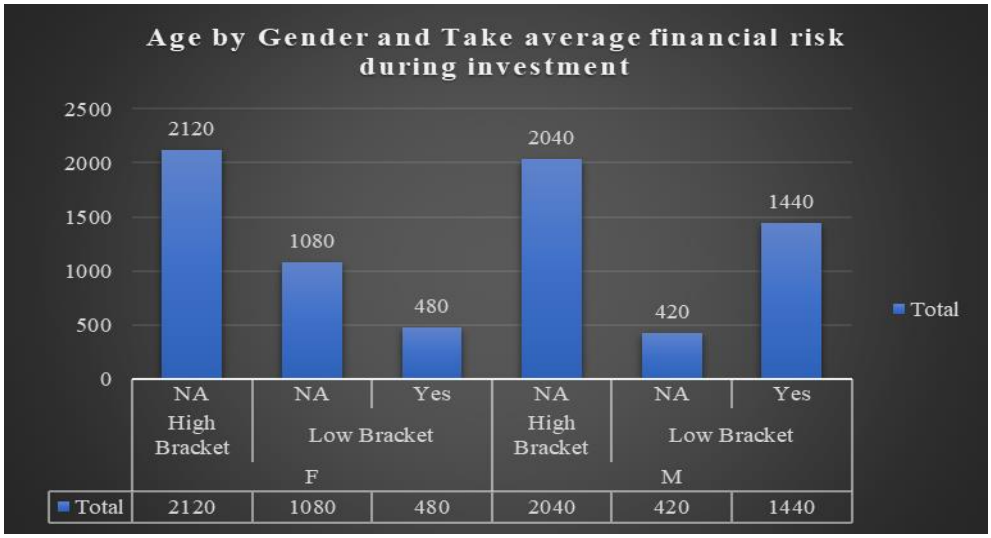

Fig 3

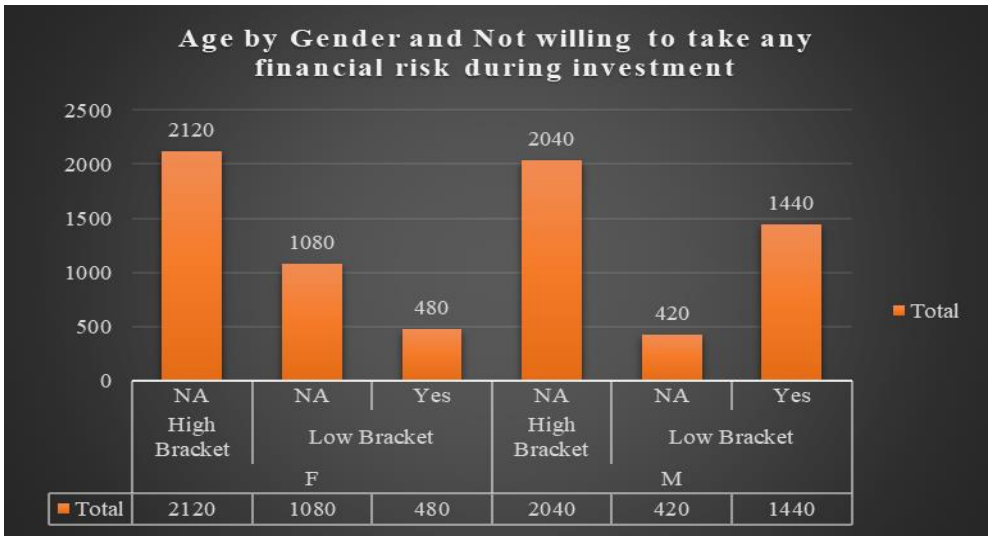

Fig 4

Conclusion

Up to 1970s when the focus was on the study of the environment, the agents of the environment were set under some basic assumptions of standard finance theory. These assumptions were unrealistic and hence lead to erroneous conclusions. So, during 1980s when these assumptions were questioned the agents of the decision-making process and environment, i.e. the people became the subject matter of the study. This gave rise to a different branch of finance called behavioural finance, wherein analysis is made about the role of psychological biases in decision making. This branch tried to relax the assumptions of standard finance theory and build the improved models of decision-making process. The emphasis has been on identifying portfolio anomalies that can be explained by various psychological traits in individuals or groups when it is possible to develop highly lucrative portfolio by exploiting the behavioural bias and to recognize that rational behaviour and profit maximization is not complete since it does not consider individual behavioural traits/biases of investors, analysts or portfolio managers. Further, behavioural finance only acts as a supplement and not as a replacement to standard finance theory because it explains those phenomena that cannot be explained by the traditional finance theory. Theories of behavioural finance that are built on the models of standard finance can help the investors to understand their own behaviour and thus help them to improve upon their decision-making process keeping in view the models of traditional finance theories.

In sum, behavioural finance literature has grown by leaps and bounds in recent years. However, much work remains to be done in the field. The literature could shed specific light on which agents are biased and whose biases affect prices. There also is room to analyse the fast-growing field of market microstructure and Behavioural finance. For example, a central role played by financial markets is that of price discovery. What is the effect of cognitive biases of market makers on price formation? A start on the study of this subject is the paper by Corwin and Coughenour (2005) who argue that limited attention influences transaction costs. Specifically, it is shown that specialist attention gets diverted to the most active stocks in their portfolio, thus raising transaction costs and leading to less frequent price movements in the less active ones. The impact of well-documented biases such as overconfidence and the disposition effect on market makers and the concomitant implications for transaction costs would seem to be a valuable topic for research.

Thus, as can be concluded from this research study that regret aversion cognitive bias does affect the financial risk

tolerance of an individual investor decision making process in the long run perspective and therefore this information can be substantially effective to investors who regularly affect in the equity markets to learn, implement and reap long term returns on their investments.

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