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Role of Investor Emotions in Financial Decision Making

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1. Introduction

The process of decision making is central to the existence of human beings. Whether financial or non-financial, decision making requires cognitive procedures. However, the component of 'affect' also impacts decision making to a large extent. With the current technological advancements, it has become possible to determine and measure the physiological and psychological mechanisms of human beings and their enormous impact on the process of decision making (Kuhnen & Knutson, 2011). Malmendier and Nagel (2011) propounded that individuals who have experienced loss in stock markets during their lifetime are less likely to invest in risky assets. Not only do these individuals go for investing in riskless assets but, they also invest a lower proportion of their liquid assets into the market. The emotional responses of these investors guide their future investment future options and therefore, past experiences and the emotions experienced therefrom impact their current and future trade choices.

2. Objectives of the study:

The objectives of the present paper are:

1. To review studies exhibiting the role of emotions in financial decision making.
2. To review studies exploring the role of hormones in discerning the trading behaviors of investors.

3. Role of 'emotions' during financial decision making:

An experiment, carried out by Ernst Fehr, neuroeconomist and professor of Microeconomics at University of Zurich and Christian Ruff, professor of Neuroeconomics and Decision Neuroscience at University of Zurich, in 2014 studies how stress and fear influence our decision making. Fehr, an eminent economist, firmly believes that a trader's decisions are influenced by their emotions, irrespective of the amount of money at stake. The volunteers play a typical gambling game, while placed under an MRI (Magnetic Resonance Imaging) machine. But before they can make a choice, a screen flashes in front of them. If the screen flashed is blue in color, nothing happens. However, if its green in color, the subjects get an electric shock, irrespective of whether they win or lose in the gamble game. As a result, the subjects get anxious and an activation is seen in the Amygdala and Anterior Insulla of the brain. It is seenthat the volunteers take impulsive and irrational decisions to quickly get out of the situation. Knutson (2005) concluded that the brain processes financial gains and losses differently. It was observed that the brain processes financial losses the same way it processes witnessing a dangerous road accident. Brain imaging technique used in the study exhibited that Anterior Insulla in the brain gets activated during the anticipation of physical brain, adverse visual stimuli or financial losses. Therefore, the activation of Anterior Insulla is linked to the anticipation of financial loss (Chua, Krams, Toni, Passingham and Dolan (1999); Simmons, Matthews, Stein and Paulus (2004)) while, Nucleus Accumbens in Ventral Stratium gets activated during the anticipation of financial profits (Breiter, Aharon, Kahneman, Dale and Shizgal (2001); Knutson, Adams Fong and Hommer (2001)). It is interesting to note here that Anterior Insulla is not just activated during an event of monetary loss but, also during situations and events that make an individual feel physical pain and generate emotions of sadness and disgust. On the other hand, Nucleus Accumbens is not just activated upon the anticipation of monetary gains but, also during the events that make an individual feel happy and proud. It is generated upon receiving rewards of any kind. This reiterates the fact that the same regions of the brain, activated during other situations or events, are activated during financial decision making also. Therefore, biologically, it is nearly impossible to eliminate the component of emotions while taking such decisions.

Knutson (2001) specified the activation of three Sub-Cortical brain regions associated to monetary rewards viz, the Thalamus, Medical caudate and Nucleus Accumbens, rich in Dopamine. In Kahneman's Prospect Theory also, the activation of Nucleus Accumbens was seen on the anticipation of financial gains. It is important to note that, while Nucleus Accumbens gets activated on the anticipation of gains, parts of Pre-Frontal Cortex, Amygdala and Stratium are activated during actual gains.

Yet another experiment conducted by Christian Ruff, studies where does the human analytical ability lie inside our brains. Ruff used the method of neuro-stimulation to ascertain the same. Non-invasive and non-painful electrical pulses were used to activate specific neurons in the brain. Using a pointer, a specific area of the brain in the Dorsal Pre-Frontal Cortex, involved in complex cognitive mechanisms and decision making, was targeted and localized. Thereafter, a unique apparatus that generates a carefully controlled magnetic field, was utilized to numb the neurons in this region of the brain. Therefore, the part of brain involved in decision making was made numb a few minutes and then, the researchers flashed a series of financial questions on the screens of the respondents. It was observed that, without the activation of Dorsal Pre-Frontal Cortex, respondents were more sensitive to losses. Because there was no mechanism to control their emotional outbursts, emotions overpowered their logical and reason. Thus, both, logic and reason as well as feelings and emotions, are generated by human brain itself. It is impossible to take logical decisions in the absence of emotions or reason. Amygdala, which is the centre of emotions both positive and negative, is balanced by the Pre-Frontal Cortex of our brain. The Amygdala might induce an investor to take on extremely

and excessively high risky situations due to greed or any other emotions. However, it is the Pre-Frontal Cortex that stops an investor on acting so irrationally. Therefore, it is also known as the command centre for decision making. Breiter et. Al. (2004); Fredrick et. Al. (2004); Kuhnen and Knutson (2003); McClure et. Al. (2004) use MRI (functional Magnetic Resonance Imaging) as an imaging technique and observe that financial decision making involves the participation of Orbitofrontal Cortex, the Medical Pre-Frontal Cortex (MPFC), the Amygdala, Nucleus Accumbens, Anterior Insulla, Stratium and other neural sources.

Kuhnen and Knutson (2016) conducted a study to ascertain the impact of exogenous and endogenous emotions on decision making of the respondents. The respondents were instructed to make 90 investment choices, in risky assets (stocks) and riskless assets (bonds). The reward on riskless assets was fixed at $3. However, the dividend on the risky assets or stocks could either be $10 or -$10, depending on the goodness of stock. Good stock would result in the likelihood of dividend being high and bad stock would result in the likelihood of low or negative dividends. During each trial, a shape or picture was shown to the subjects, just before their investment choice. The shape or picture so flashed on the screen however, had no connection to the investment choices. It was observed in the experiment that when the respondents were shown erotic pictures or pictures that made them feel good, even though unrelated to the investment task, it triggered positive emotions in them and heightened their confidence to invest into risky assets. However, when the subjects were exposed to disturbing pictures like rotten food, they were triggered with negative emotions, leading them to choose riskless assets only. In the first case, the Nucleus Accumbens (NAcc) in the subjects was activated, leading them anticipate gains. In the second case, Anterior Insulla was activated in the respondents, leading them to anticipate losses and therefore, they went for selection of bonds, rather than stocks. The experiment highlighted the fact that, emotions, whether generated exogenously by the policy makers, markets or competitors, or generated endogenously due to previous circumstances, do have an intriguing impact on the investment decisions taken by the people.

Another ground breaking experiment conducted by Gehring and Willoughby (2002) to investigate the evaluative financial neural activity amongst the subjects found the activation of Medial Frontal Cortex. The subjects viewed two squares, labelled with the numbers 5 and 25. The subjects had to choose one of the two squares, which turned green or red in just a second, depicting positive or negative outcome respectively. While the volunteers viewed the outcome of their current choice, they are also subjected to the outcome they would have received had they chosen the other box. During the entire trial, the neural activities of the brain are mapped. It was observed that the Medial Frontal Cortex, also composed of the Anterior Cingulate Cortex, whose dorsal part is connected to the highly evolved Pre-Frontal Cortex, was most active during the entire experiment to rapidly process monetary gains or losses. The experiment depicted the complex cognitive mechanisms that run in the brain to take a final decision. Knutson characterizes the Nucleus Accumbens as the “gas pedal” that “fuels appetitive behavior” and the Medial Pre-Frontal Cortex the “steering wheel” which “directs appetitive behavior towards appropriate goal objects” (Knutson et al.,2003).

Barret and Seo (2007) observed that, contrary to the popular belief that feelings are generally bad for decision making, individuals who experienced more intense feelings during the process of decision making, achieved much higher decision making performance compared to their counterparts. Kircanski, Lieberman and Craske (2012) postulated that articulating an emotion can help an individual achieve better performance.

Most of the studies and experiments conducted in the field of Neurofinance show a unanimous activation of the Amygdala, Nucleus Accumbens and Anterior Insulla, other tha the activation of dorsal or cognitive parts of the brain. In all kinds of decisions, whether financial or non-financial, the Limbic region of the brain, which is responsible for regulating the emotions of a human being is seen highly active. While there has always been a staggering debate from the time immemorial on whether one should use emotions while making investment decisions or not, the recent advancements in Neurofinance show that it is not a choice to use emotions rather, it’s a biological process wherein the emotional centres of the brain automatically light up during decision making. However, the most active region while making investment decisions is the newly evolved and highly specialized Pre-Frontal Cortex, whose ability is beyond measurable. It is the command centre of the brain, responsible for logic, reasoning and decision making. It is the interplay of both dorsal and ventral regions of the brain that balance logic and sentiments, in order to enjoy best outcomes. It is the Pre-Frontal Cortex that distinguishes human beings from other mammals, giving them high cognitive abilities and facilitating them to make a rational trade-off between current and future investment decisions (Manuck et. Al., 2003).

Lo and Repin (2002) investigate whether financial markets are governed using rational forces or emotional responses. The researchers take a sample of ten traders and measure their physiological responses during live trading sessions. Characteristics like blood volume pulse, skin conductance etc. are used as physiological responses of the traders. The researchers find significant differences in the physiological reactions of different traders during the trading sessions signifying that the bodily responses of the traders depend on their levels of experience. The study suggested that higher experience in trading results in better decision making performance. Rocha, Vieito and Rocha (2013) also conducted an experiment to investigate whether experience brings about a change in investment choices or not. The researchers conducted the experiment by dividing the volunteers into two groups. One group consisted of the undergraduate students studying financial courses at Insituto Politecnico de Viana do Castelo, who had theoretical knowledge but no practical experience. The other group of volunteers were professional traders from Sao Paulo. The volunteers were instructed to take 100 investment decisions by buying, selling or holding these shares, to gain maximum profits. The EEG technology was used to image the activated regions of the brain. It was concluded in the study that “the different experimental groups learned different trading strategies depending on the initial experiences they have in trading in different market conditions”

and so, they take decisions accordingly. The following table summarizes the experiments and research works discussed:

Table 1: Summary of research works demonstrating the role of 'emotions' during financial decision making

STUDY CONDUCTED BY LABORATORY/RESEARCHER:	YEAR	DISCUSSION
Ernst Fehr and Christian Ruff at University of Zurich	2014	Emotions, even if unrelated to the situation, affect the process of decision making. Investors take irrational decisions, during the experiment trials, to get out of dangerous situations.
Knutson	2001	Activation of three Sub-Cortical brain regions are associated to monetary rewards viz, the Thalamus, Medical Caudate and Nucleus Accumbens, rich in Dopamine.
Christian Ruff		Experiment demonstrating that it is impossible to take logical decisions in the absence of emotions.
Kuhnen and Knutson	2016	Emotions, whether endogenous or exogenous, do impact the decision making of an investor.
Gehring and Willoughby	2002	The Medial Pre-Frontal Cortex in the brain gets activated during the processing of monetary gains or losses.
Barret and Seo	2017	Investors who embrace their intensity depict much higher decision making performance.
Lo and Repin	2002	Traders with more experience tend to perform better in the marketplace than their counterparts with less practical experience.
Rocha, Vieito and Rocha	2013	The study demonstrated that "different experimental groups learned different trading strategies depending on the initial experiences they have in trading in different market conditions".

4. Role of Hormones in Discerning Trading Behaviours of the Investors:

Hormones have a massive impact on the trading behavior of individuals. John Coates, a highly renowned neuroeconomist, conducted a pioneering study in 2010 that discovered the influence of emotions and hormones on the financial decision making of a person. Coates, a trader turned economist conducted an experiment on his former colleagues, two hundred financial professionals. He observed the levels of hormones contained in the saliva samples of the financial traders. It was found that the male sexual hormone, Testosterone, played a major role in the risk taking abilities of these individuals. Testosterone is a hormone linked to aggression, competitive behavior as well as risk taking. Thus, a chain reaction was formed:

HIGH TESTOSTERONE → HIGH EXUBERANCE → HIGH RISK TAKING

Figure 1: Impact of testosterone on the risk taking capacity of a trader

Another hormone studied in the experiment was Cortisol, which is the primary stress hormone. Higher secretion of Cortisol resulted in more risk aversion amongst the subjects. Therefore, the experiment elaborated how the investor's hormones and emotions directly affect the decisions they make.

An experiment conducted in 2010 by Jean- Claude Dreper and his team of students at Institut des Sciences Cognitives at Lyon, France, studied the specific phenomenon of brain's reaction after winning. The subjects were placed in front of slot machines under the imaging devices. There was no risk taking and no money to gamble here, instead, it was only seen if they fall upon a winning combination. Three types of prizes viz, an erotic image, food and a sum of money were randomly distributed. The researchers measure the brain's reactions on their screens in real time. The results suggested that in the event of victory, three brain regions, namely the Stratium, Amygdala (rich in neurotransmitter Dopamine) and a part of the Pre-Frontal Cortex were activated. These three zones are widely known by the specialists to be associated with the sensations of pleasure. Surprisingly, the activated zones are identical regardless of the nature of their price. Reward system in humans is regulated by a chemical called Dopamine. Also known as the pleasure chemical, it is released at the back of the human brain and spreads among the Amygdala, Stratium and Pre-Frontal Cortex during rewards, financial or non-financial. Dopamine has been linked to the 'feeling good' phenomenon that is derived from monetary gains. Bigger the win, more the secretion of dopamine, resulting in addictive behavior. It is this process that can propel a trader into a state of total exhilaration. Addiction to gambling or even stock market trading can be attributed to a phenomenon shown below:

POTENTIAL OPPORTUNITY/ CHALLENGE TO WIN MORE
↓
TESTOSTERONE SECRETION
↓
HIGH EXUBERANCE
↓
HIGHER RISK TAKING
↓
POSITIVE OUTCOMES/ WINS (IF ANY)
↓
RELEASE OF DOPAMINE
↓
HIGHER SECRETION OF DOPAMINE LEADING TO ADDICTIVE BEHAVIOUR

Figure: Formation Of Trade Addictive Behaviour In Investors

According to Mathias Passiglione, a distinguished Neuroscientist, Dopamine reinforces the actions that result in rewards, example compulsive shopping, gambling or stock market trading. It results in addiction. The following table summarises the experiments exhibiting the role of hormones in decision making:

STUDY CONDUCTED BY LABORATORY/ RESEARCHER	YEAR	DISCUSSIONS
John Coates	2010	Role of Testosterone (male sex hormone) and Cortisol in investment decisions.
Jean-Claude Dreper	2010	The results of the study suggested that in the event of victory, the secretion of Dopamine increases, inducing the investor to take more risk and even leading to addiction, in some cases.

5. Conclusion

All the objectives of the study have been discussed above. It can be observed that the psychological and physiological factors such as emotional state of investors, his or her trading experience and the interplay of logic and emotion guided by the interaction between the emotional centre of the brain (Limbic region with the Pre-Frontal Cortex determine what, why and how investors go for a certain investment alternative. While positive emotions such as happiness, optimism and excitement are linked to the choice of selecting risky assets for investments, negative emotions such as fear, anger, sadness and distress are linked to the choice of riskless assets for investment. Empirical studies have also shown that many a times, an investor experiences emotions that are completely unrelated to their investment decisions. However, these emotions still impact the decision maker.

References

1. Wilkerson, G. B., Colston, M. A., Short, N. I., Neal, K. L., Hoewischer, P. E., & Pixley, J. J. (2004). Neuromuscular changes in female collegiate athletes resulting from a plyometric jump-training program. *Journal of Athletic Training*, *39*(1), 17.
2. Pixley, J. (2002). Finance organizations, decisions and emotions. *The British journal of sociology*, *53*(1), 41-65.
3. Duxbury, D. (2015). Behavioral finance: insights from experiments I: theory and financial markets. *Review of Behavioral Finance*.
4. Gross, K., & Brewer, P. R. (2007). Sore losers: News frames, policy debates, and emotions. *Harvard International Journal of Press/Politics*, *12*(1), 122-133.
5. Flam, H., & Kleres, J. (Eds.). (2015). *Methods of exploring emotions*. Routledge.
6. Berezin, M. (2009). *Illiberal politics in neoliberal times: culture, security and populism in the new Europe*. Cambridge University Press.
7. Fairchild, R., Guney, Y., & Thanatawee, Y. (2014). Corporate dividend policy in Thailand: Theory and evidence. *International Review of Financial Analysis*, *31*, 129-151.

