



“Neural Architecture of Financial Decisions”

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Abstract, Neuroeconomics is the emerging segment of neuroscience, examine the role of human cognition in economic decision making. It is an interdisciplinary approach of arts and science involving behavioral economics, neuroscience and reinforcement and learning theories. Psychology and economics are complementary disciplines, in various cases studying the similar phenomena: decision making, value-based judgment, and heuristics. Neuroeconomics mechanism combines the disciplines of neuroscience, psychology, and economics in to models of decision making, rewards, risks, and uncertainties. Neuroscience research applied in neuroeconomics, can put in the picture the learning of financial decisions. Application of neuro imaging tools helps to unlock the black box of human nature to understand the decision behavior. This paper tries to make a conceptual framework on decision making behavior of a business in the aspect of neuroscience.

Key words: *Neuroeconomics, Neuroscience, Cognitive behavior and Finance decision*

INTRODUCTION

Neuroeconomics is a promising interdisciplinary field of neuroscience and economics. It is generally concerned with microeconomics factors like choice, preferences and attitudes exploring the brain interactions behind human decisions. It is an assessment of shared approach to study human behaviors through the assimilation of psychology, economics, and cognitive neuroscience. Neuroeconomics is a branch of economics which studies the behavioral responses that arise from the brain. There are different factors influencing the individual's decision making behavior, can be explained through neuroeconomics. This study tries to establish the brain areas of the individuals mind and look for to understand its nature depending upon the activities in brain areas with respect to human decision making. Cognitive and emotional factor of an individual determines

the type and style of his decision. Functional neuro imaging methods as a key mechanism responsible for behavioral learning has been extensively investigated in decision-making situations involving uncertainty, temporal delay, and the exploration of potential rewards. Social and psychological foundations of neurobiology determine the individual difference in decision making.

SIGNIFICANCE OF THE STUDY

By conducting experimentation with the aid of neuroscience tools, we can obviously understand the multifaceted decision making of an individual. Scanning the brain helps to read minds of individuals and acquire certain information about human decisions has gone through four stages: speculating, observing, experimenting, and scanning. When an economist fall with speculation about why people do what they do, he can goes to observation stage trying to understand human behaviors based on observable evidence. Neuroscience might help us to ourselves to make our own decisions as well as others. This may help us learn how we could better control ourselves one comes to irrational choices. This article tries attempting to understand and analyze the contribution of neurosciences to the economic decisions.

SCOPE OF THE STUDY

The article makes an effort to framework a conceptual study on role and importance of neuroeconomics in finance decision. This is a budding branch of science with a greater scope for detailed research. Economics is that it is the study on limited and scarce resources to meet unlimited human wants, needs and desires. Neuroeconomics bind with biological aspects of the economic studies. Neuroeconomics felicitates a further level to experimental studies in neurobiology which have made major assistance to the understanding of economic decision making. Experimental design in neuroeconomics considerably gained from game theory which aims to understand how people maximize their interest among competing strategies given the fact they face tradeoffs/opportunity cost no matter what they choose. It seeks to find those strategies through brain activities assuming that they are encoded in the brain.

OBJECIVES OF THE STUDY

- To describe a conceptual framework on neuroeconomics.
- To analyze the role of neuroeconomics in decision making behavior.
- To identify the areas of neuro based financial decisions.

DATA USED FOR THE STUDY

The study is primarily concerned with published data. Data are collected from research papers, books of references, standard publications, published reports, periodicals, internet etc. to accomplish the objectives of the article.

FINANCIAL DECISIONS BASED ON NEUROECONOMICS

Economists are concerned with neural activities behind human choice and preferences but the neuroscientists are engaged in biological structure, connections, and activities of neurons which produce/support cognitive skills in a human being. In other words, both neuroeconomists and neuroscientists apply brain stimuli and response mechanism in their studies related to brain activities. But, they hold opposing views and requisites in their interest and inferences of these activities. Neuroeconomists try to measure activities themselves while neuroscientists want to analyze messages supposedly carried through those activities. Likewise, neuroeconomists want to understand subject strategies from the presumed messages, while neuroscientists want to understand neural mechanism behind neural activation.

Neuroscience makes the concept that purchasing decisions is a trade-off between the “pleasure” of buying and the “pain” of paying. Knutson *et al.* (2007) indicated that choices are correlated to the activation of areas associated with anticipated gains, whereas the impact of prices results in activation of the insula in cases of high prices, and in activation of the medial prefrontal cortex in cases of low prices. Models of the purchasing decision explain the brain areas are able to explain the resulting choice buy the product. In the economic viewpoint, this resembles a trade-off between the interest in the product that is observed through the activation of the nucleus accumbens and its price be observed via the insula if the price is high or via the MPFC if it is low. Different types of neural circuits are effectively activated and the instantaneous preference is modulated by deliberative functions that take into account the price to be paid by a purchaser.

There are so many research works can be seen in the neurology based of financial studies. Financial decision involves investment decision. It is the selection of better investment avenue from the alternative sources. The selection of investment is based on future ability for wealth maximization. The selected investment avenues are featured by the difference in their return and risk. Standard financial models are based on the proposal that an individual investor should have made an investment to maximize returns related to the risks undertaken by him. It can be see that under standard economic models, financial decisions are in most ways not any different than decisions made in other domains. Individual investor merely focuses on utility function while choosing an investment. The risk-taking constrains and the process of the formation of expectations of an investor based on prior behavior of assets.

The other aspect of neuroeconomics can be seen in the reaction of traders of financial assets to market price fluctuations. The decision making of traders in the real time or day trading events are purely on psychological intuition. Most of the active market traders, those trading with bonds, currencies, futures, options and stocks, trading decisions have to be made within a matter of seconds to minutes. In this cases most probably no enough time to investors for deliberative and cautious decisions based on all currently available market

information. Hence, decisions on transactions to buy or sell the financial assets at the current market price are based on some momentous and unconscious processes where neuroeconomics might be capable to provide some considerable explanatory power in the investors. Andrew Lo and Dmitry Repin (2002) conducted a study on the physiological responses of traders to real time trading events. The study revealed that the intuition as opposed to reflective decisions due to the amount of time in which these decisions had to be made. In this study, the authors focus to compare the physiological responses like blood pressure, skin conductance, etc. of younger traders to those of more experienced traders. They found that, except for very high volatility events and periods when the bid-ask spread changed, the more experienced traders had lower physiological responses than less experienced traders. This indicates that at some level experienced traders processed the information they observed in the market differently than did the less experienced traders.

In the financial market transactions, individuals and institutions take effort to outsmart the market, or at least to not be outsmarted by the market. In other words decisions regarding investments in financial markets are dependent on beliefs about how other actors in the markets will behave at that time. A constant inflow of information can be seen in financial market in connection with price movements of financial products. The price may be volatile and this volatility depends on political, legal, economical, social and other events. Much of this information will have uncertain effects on prices. Definitely, the extraction of relevant from the irrelevant information is one of the biggest concerns for financial decision-making by the investor. Because market players have no capability to process all available information that is potentially related to prices at a time. Investors can only focus on particular sets of information. Different investors will focus on different sets of information in accordance with their financial perceptions. The investors use the same information for different models for processing the information they have. Simply the level of complexity of financial markets is high and it is a great concern to investors.

DECISION MAKING SITUATIONS

In decision making under risk and un-certainty that humans are rational to make options based on the expected utility. Our decisions are based on risk, economics and psychology. The region of brain dealing with uncertainty situations, are BA8 of the frontomedian cortex and area mesial prefrontal cortex and the prefrontal cortex is for determining the best course of action, as it is generally involved in all reasoning and understanding. The neurotransmitter dopamine is proved to transmit information about uncertainty it is a mediator of risky behavior. The costs and benefits that are distributed over time are called inter-temporal choices. Neuroeconomics focuses on understanding the inter-temporal choices like what mediates observed behaviors and this is done by serotonin in the two brain areas. The social decision making focused on the individual's decision making based on social aspects like cooperation, punishment, altruism and retribution.

The bounded rationality theory and ecological rationality theory concerned with human emotion and value affected decision-making.

NEURO ECONOMIC MODELS

1. Risk Neutral Economic Model

This type of investors select risk oriented portfolio with a view to its expected value. He acts differently from the other real individual investors in many ways in different risky situations.

2. Expected Utility Maximizing Model

This is the conventional view of the rational model and in this case an investor will avoid risks and he measure chances of occurrence in future.

3. Almost Rational Economic Model

In this model the investor have preferences but eventually moves away from expected utility maximization, he tends to overestimate and underestimate small probabilities. Once his reference point is clear and the probability curve pointed he can be said to have preferences which means that he will be happy to choose over some non-utility maximizing choices, but will abstain from bundles that are valued separately and the decision made on the bundle is different than when they are valued jointly.

4. Neurobiological Model

Here the investor has no definite collection of mental processes. Certain biological and chemical processes occurred in investor's mind and these processes will influence in his decision behavior. This helps in understanding how chemistry connects with mental process.

CONCLUSION

Neuroeconomics aims to fill the gap between the real factors that influence an individual and not just choices, it answers the question that how the individual makes choices under various emotional situations. neuroeconomics expand the understanding on how to train individuals to become better decision-makers, especially in conditions of extreme time pressure. An investor faces difficulties in decision making while the market has high volatile in terms of economic, social, political and technological aspects. The neural or genetic based financial decision helps the investor to makes successful events in his investment. Neurotransmitters play a vital role in decision making

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