

# **Neurofinance: The New Era of Finance Based on Behavioral Finance and Individual Investment Behavior**

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## **ABSTRACT**

This paper highlights the effects of neurofinance, which is the study of the human brain and its impact on financial decision-making behavior. It explains why humans often deviate from the principles of conventional finance theory. The primary objective of this paper is to review the field of behavioral finance, including the emerging area of Neurofinance research conducted within this domain. In order to achieve this goal, behavioral finance, its characteristics and Neurofinance are briefly presented.

Financial and investment decisions made by individuals are considered to be both cognitive and biased, as they are executed by neural processes. This study is largely based on secondary sources of data, making its research rooted in conceptual analysis.

Keywords: Neurofinance, Behavioural Finance, Cognitive Psychology, Investment Decision.

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## **INTRODUCTION**

In this paper the behavioural finance and its characteristics is briefly presented the interaction of modern finance and behavioural finance will be discussed.

According to Kahneman & Tversky's (1974, 1979), they work on behaviour finance studies in which they discussed about the different biases, heuristics and prospect theory which tells about the investors behaviour and decision making by them in indecisive and uncertain situation, they also enlighten the performance of the investors while making the financial decisions but they fail to clarify why and how this behaviour occurs.

Kuhnen, 2007; Sapra & Zak, 2008: Neurofinance is the study of brain of human and their financial decision making behaviour which explain the cause why human behaviour are not balanced as per the rules of the conventional theory of Finance. We have tried to explain and present the literature on neurofinance in this paper. Neurofinance has developed out of neuroscience which tries to explain the working of the brain of human when decisions are taken by them. It also studies about the behaviour of the investors prior to making the choice of the investment with the help of neuroscience researcher, it helps to tell about the how effect influences the financial decision making and many psychological biases which also influence the decision choices.

Individual investment pattern have been discovered to be based on their reaction and perception. The study find that the formal processes and practices provide a strong substantiation of the brain activity connected with financial decision making via brain mapping techniques. Neurofinance is an interdisciplinary field that aims to study human decision making, the neurological activity that influences our understanding of the brain, and the ability to process multiple options available after taking a certain course of action.

## **OBJECTIVES**

1. The relation between neuro finance and investment decisions of the investors.
2. To present the difference between traditional finance, behavioural finance and neuro finance
3. To identify different Brain Mapping Technologies.

Neurofinance, along with human and ecological scientists, has been striving to understand how people make investment decisions. Neuro finance as an interdisciplinary field has been attempting to clarify human decision making the ability to evaluate various possibilities and to proceed with a course of action. Neurofinance is more concerned with the study of investors decision making neurofinance brings together neuro scientific knowledge and technology to investigate how the brain makes financial decision. At the instance of investment decision making, investors encounters with the emotions like anxiety, fear, happiness, feeling of satisfaction or dissatisfaction with the returns generated by their investments. The above mentioned feeling is also associated with the risk component of the investment alternatives. We will discuss above mention feeling with the reference to neurophysiology and their implication on investors behaviour. Neurophysiology deals with the structures and secretion from brain responsible for investor's behaviour.

Brain Secretions Responsible for Investors' Behavior

### **Role of dopamine**

Dopamine is a chemical secreted in brain at the time of feeling of pleasure. More quantity of dopamine is secreted at the time of unexpected profit earned easily, at the same time when investors face and unexpected loss the secretion of dopamine completely stops, and the person feels depressed.

### **Suggestions on Investment Decision**

As dopamine is responsible for the feeling of pleasure and depression, dopamine influences the risk taking behaviour of investor. Dopamine is responsible for behavioural biases like Herd behaviour, Overconfidence and Optimism in the investor.

### **Role of serotonin**

Serotonin is a transmitter available in central nervous system and digestive tract. serotonin is responsible for the feelings of anxiety depression and appetite.

### **Suggestions on Investment Decision**

The level of serotonin reduces at the time of unfulfilled expectations like investment losses. Such situations lead to deon, anxiety and loss of hunger in the investor.

### **Role of Amygdala**

Amygdala is responsible for “Fight or Flight” behaviour of investors. It is Almond shape body situated in brain temporal medial lobe is responsible for feeling of emotions like fear, pleasure, developing phobia and post-traumatic stress.

### **Suggestions on Investment Decision**

Investors want to fly away from the following market because of the feeling of fear but actually it is the time to flight with the dear fees bear phase

### **Role of Prefrontal Cortex**

The Prefrontal Cortex of a brain is responsible of cognitive decision making in social behaviour and expression of personality. It is responsible for memorizing, analysing and drawing conclusion from different situation.

### **Suggestions on Investment Decision**

Whenever investors commit cognitive errors, it means that Prefrontal cortex does not have proper data in form of accurate, appropriate and update information for drawing decision.

### **Role of Nucleus Accumbens and Anterior Cingulate**

Nucleus accumbens is a group of neurons located behind the ears of a human being, this group of neurones plays a role in developing addictive behaviour.

Anterior Cingulate is the frontal portion of cingulated cortex plays important role in reward anticipation and decision making. Together, the nucleus accumbens and anterior cingulate help people to identify pattern and evaluate alternatives.

### **Suggestions on Investment Decision**

As the nucleus accumbens equivalents and anterior cingulate are responsible for patterns, they make investor to believe on trends without seeking any detail explanations. Most of the investors commit the error of pattern recognition in investment and prone to miss the investment opportunity in case of companies which have in consistent earnings.

### Difference between traditional behavioural and neuro finance

Traditional finance	Behavioral Finance	Neurofinance
It believes in existence of rational investors and market	It believes in existence of irrational investors and market	is the study of an individual who behaves or think emotionally not rationally  4
It facilitates the creation of a logical portfolios	It creates the best possible portfolios <sup>1</sup>	It helps in building and optimal portfolio
Traditional finance theories rest on the assumptions that oversimplify the real market conditions	Behavioural finance are in light with the real problem associated with human psychology	Neurofinance applies neuro technology to recognise the behaviour of the financial market investors.
It explain how investors “should” behave	it explain how “does” investors behave	It explains” how and why” the investors behaviour occurs  1
It believe in idealised financial behaviour	It believe in observed financial behaviour	It helps to understand the internal procedure that lead to the thinking that visible as an external actions.

### BRAIN MAPPING TECHNOLOGIES

The technologies used in brain mapping to record the participants electrical impulses while participating in the investing process, the activity of brain can trigger alteration in blood flow of oxygen level, in order to assess and create images it tries to manipulate the electromagnetic nuclei of water molecules using the devices magnetization.

Following are some of the brain mapping technologies such as:

**FMRI :**

FMRI monitors metabolism while MRIs demonstrates anatomy and physiological structure. FMRI can be employed for a variety of purposes, including:

- a. evaluating metal activity
- b. deducting a brain anomaly
- c. making pre-operative brain mapping.

**CT scan**

- a. CT scan can detect specific sort of neurological damage
- b. It determines cancerous Cells.
- c. It uncover any bleeding or inflammation in the brain
- d. It deducts Alzheimer's anatomical alternations in the brain.

**PET (Positron emission tomography)**

It assesses:

- a. Seizures, tremors, shocks, Vertigo etc.
- b. Alzheimer's early onset dementia diseases like Parkinson etc.

**EEG**

During an Electroencephalography (EEG) examination, individual brain impulses are examined. Tiny sensors with electrical connections will be placed on our forehead prior to the test by medical professional a doctor can learn more about someone brain activity function from each auto vibration that displays within its own track.

**MEG**

The electric flux or magnetism is measured by magnetoencephalography(MEG) using the electrical impulses of nerves. MEG is a technology that doctors employ to detect both random and stimulus induced brain responses.

Medical professional can evaluate things like :

- a. seizure sources
- b. motor regions muscular regions
- c. sense organs

d. voice and sight

## **NIRS**

Our brains respiration is monitored by NIRS. It employs infrared rays to identify the trends in our blood's haemoglobin oxygen concentrations.

NIRS is employed to track:

a level of cerebral oxygen during heart surgery

b. In a neonatal intensive care unit and (NICU) setting, pre-term new-borns brain activity and oxygenation level are measured.

## **CONCLUSION**

In conclusion, neurofinance stands as a promising frontier in the world of finance. It strives to unravel the mysteries of human decision-making by integrating knowledge from neuroscience and technology. As investors navigate financial markets, they grapple with emotions such as anxiety, fear, and satisfaction, often influenced by the returns generated by their investments. These emotions are inextricably linked to the risk inherent in investment alternatives.

Furthermore, we have explored the role of key brain secretions, such as dopamine, serotonin, amygdala, prefrontal cortex, nucleus accumbens, and anterior cingulate, in shaping investor behavior. Understanding the influence of these brain components on investment choices and the associated cognitive errors has profound implications for the field of finance.

We also differentiated between traditional finance, which assumes rationality, behavioral finance, which acknowledges human psychology, and neurofinance, which leverages neuroscience and technology to comprehend the behavior of financial market participants.

Lastly, we delved into various brain mapping technologies, including FMRI, CT scan, PET, EEG, MEG, and NIRS, which enable us to peer into the inner workings of the human brain during investment decisions.

In the ever-evolving landscape of finance, neurofinance offers an exciting and promising avenue for deeper insights into investor behavior and decision-making processes. As we continue to unravel the intricacies of the human mind, the integration of neuroscience and finance promises a more comprehensive and nuanced understanding of the financial world.

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