



SOUTH ASIAN JOURNAL OF
SOCIAL SCIENCES & HUMANITIES

ISSN: 2582-7065 (Online)

SAJSSH, VOL 3, ISSUE 4, PP. 95-108

Financial Revolution: From Traditional Finance to Behavioral and Neuro-finance

Mohammed Rashid¹, Rais Ahmad² & Shazeb Tariq³

^{1,3}Research Scholar, Department of Agriculture Economics and Business Management at Aligarh Muslim University in Aligarh.

²Professor, Department of Agriculture Economics and Business Management at Aligarh Muslim University.

Corresponding Author: Mohammed Rashid, **Email:** rashidamin35@gmail.com

Received: 09th June 2022

Accepted: 10th July 2022

Published: 4th August 2022

ABSTRACT

The paper aims to study the growth and evolution of finance, as well as how the evolution of finance theories aids investors in decision-making. The traditional finance model's perfect mobility and rationality fail to predict the economic events, dot-com bubble, and the European debt crisis. These economic disasters provide the foundation for the development of behavioral finance. Psychology and finance are merged into behavioral finance. It defies the traditional financial premise. The field provides unique insights into financial and investment decision-making models. Behavioral finance also serves as a bridge for developing novel financial solutions known as Neurofinance. Neurofinance employs neurotechnology to explain participants' behaviour and predict their future behaviour based on observing their brains and hormonal activity.

Keywords: Behavioral Finance, Neurofinance, Neurotechnology, Traditional Finance,

INTRODUCTION

Evolution Of Standard Finance

Before 1960, the era was deemed pre-scientific because no one had offered a mathematical model or notion applicable to the financial profession. The company adopted the era before 1960 since it was the only descriptive and institutional model that could address its financial issues. There was just one journal that specialised in finance, titled the *Journal of Finance*. The period of the 1960s was a time of transition during which the majority of contemporary "finance theory" was developed. Several finance-specific doctoral programmes were established, and several periodicals focusing on finance were published. The shift to a scientific area was rapid and comprehensive. Numerous scholars have pondered whether this transformation was a Kuhnian moment. Mackenzie (2006) argues that the development of the pricing model by Black-Scholes-Merton marks a watershed event in the development of the field. In a critique of the idea, Watson (2007) said, "economists intervened into a previously foreign, important issue and their instant acquisition of it, rather than a Kuhnian revolution." According to Watson, the neoclassical rational expectations technique – the leading economic model of the period – was chosen as the only science because of its uniqueness in the 1970s. Many renowned academic journals' particular issues and the debut issues of contemporary journals are also distinguished to offer an estimated chronology of encounters with traditional research. Standard science and the present extraordinary scientific epoch may be loosely characterised and overlapped.

Meanwhile, in the 1960s, the efficient market hypothesis (EMH) recognised by Fama dominated Finance (Sewell 2012, 1965, 1970; Noor, 2022). Three major theoretical models support this idea, substantially altering financial concepts, investment, and financing operations (Malkiel 1992, Nik and Maheran 2009, Sewell 2012). The first argument states that investors are rational, so security pricing is also rational. The second states that every investor systematically reviews all relevant information before making investment decisions. The third principle states that decision-makers are always motivated by self-interest. According to Fama (1965), if rational, well-informed investors-controlled stock markets, assets would have been valued appropriately and reflected the available information. Prices act as information collectors and transmitters (Hayek 1945). Therefore, wise investors use this knowledge more effectively when using conventional approaches.

Consequently, the representative investor looks to have appropriate views and attains the anticipated usefulness. The EMH separates the hypothesis into weak, semi-strong, and strong

variants (Fama, 1970). Poor efficiency says past and current prices reflect all vital information. In this view, technical analysis is irrelevant. For all public information, the market is semi-strongly efficient.

As a result, the present-day prices reflect the company's product offering, balance sheet composition, accounting procedures, and managerial quality compared to their historical values. The fundamental analysis does not provide any further advantages in this area. The most efficient kind is a share price representing all relevant information about a firm, including information available only to corporate insiders. Numerous economic models, such as Markowitz's portfolio selection theory (1952), Sharpe and Lintner's capital asset pricing model (CAPM), Black and Scholes' option pricing theory (1993), and Merton's portfolio selection theory (1973), are founded on a representative's conceptual framework. Representative is logical because it folds and analyses all relevant information required to make a choice. He also idealises "rationalises. The German name for bales of hay is baltussen "baltu (2009). The efficient market theory is connected to "random walk," which says price movements are random deviations from initial values. According to the random walk hypothesis, if information circulates freely, share prices will rise. Tomorrow's prices will reflect tomorrow's information, not today's price volatility. Due to unforeseen news, price fluctuations must be random (Fama 1965, 1970, 1965, 1970).

Meanwhile, at the start of the twenty-first century, the swiftly challenged (LeRoy, 1976) and reaffirmed by Fama (1976, 1991) efficient market theory has been considerably less influential. Multiple investors, economists, and statisticians believed that the prices of securities were relatively predictable (Statman, 1997; Shefrin, 2000; Khalid & Sheerin, 2020). The concept is that psychological and behavioral variables play a significant role in influencing share prices. Future share prices are more predicted based on past patterns or basic valuation standards (e.g., Malkiel 2003; Asness et al. 2013). Investors may receive greater risk-adjusted returns because of these expected patterns. Fama's Nobel Prize in 2013 demonstrates that despite mounting criticism, the EMH and classical finance theory are still extensively utilised and recognised for judging stock market movements. (Fama, 2014). To address other flaws of classical theory, we shall use the behavioral economics technique. Before delving more into the rejection of the rational mind and the concept of homoeconomics, it is assumed that institutional framework conditions are external (e.g., financial intermediaries). Their improvement is not debated (Coase 1998).

Theories of traditional Finance

Authors	Year	Findings
John Stuart Mill	1844	Economic Man homo economicus.
Bernoulli	1738,1954	Expected utility theory
Von Neumann and Morgenstern	1944	
Harry Markowitz	1952	Markowitz portfolio theory
Treynor, Sharpe and Linter	1962,1964,1965	The capital asset pricing model
Jan Mossin	1966	
Eugene Fama	1970	Efficient market hypothesis
Stevenson, Richard A., and Robert M. Bear	1970	Spoke about Commodity futures in his paper titled "Commodity Futures: Trends or Random Walks?"
Black Scholes	1973	Black & Scholes model for the valuation of options.
Meir Statman	1974	Focused on the concept that individual behavior is primarily consistent as their primary focus is on maximising their marginal gains

Source: Prosad et al. 2015 Theory of standard Finance

BEHAVIORAL ECONOMICS

Meaning of Behavioral Finance

Behavioral finance study believes that market participants' behaviour is affected by psychological variables and the consequences of buying or selling, which affect pricing. Behavioral Science explains why markets are inefficient.

According to Sewell (2007), psychological finance examines the behaviour of market participants and its result in markets. Science studies what happens when people make impulsive or emotive decisions. (2010). Behavioral economics combines psychology and economics to explore why people tend to make unreasonable decisions, investments, savings, and loan applications. Swell, behavioral finance "softens the basic assumptions of financial economics by including these observable, systematic, and very human deviations from

rationality into conventional models of financial markets." The propensity of people to have an exaggerated sense of their capabilities is the root cause of the first investing bias.

On the other hand, the second is caused by the individual's wish to avoid regret. Thus, behavioral finance uses psychological biases to investigate abnormalities in the stock market instead of dismissing them as "random outcomes consistent with market efficiency theory" (Fama, 1998). Investors and market events are known to be affected by information gathering and stakeholder characteristics (Banerjee, 2011; Suhaimi, 2021). Behavioral economics is a branch of psychology and sociology concerned with the behaviour of market players and their subsequent impact on the financial markets. It helps to analyse why investors trade without performing fundamental analysis.

The Development of Behavioral Finance

Kahneman and Tversky, the creators of behavioral finance, undertook different research lines in the 1960s and then worked in the 1970s to create the field's standards. First, psychological decision-theory tests were administered in real-world situations. In addition, they discriminated between normative responses to questions and actual subjective responses obtained from trials. Heukelom (2007) accomplished the desired aim by linking Tversky's mathematical work on normative theory with Kahneman's "psychological emphasis on the separation between objective inputs and subjective sentiments." 1971 saw the publication of their first essay collaboration, "Belief in the Law of Small Numbers". People's intuitions regarding chance are wrong, they say. They believe random samples are representative (Kahneman and Tversky, 1973). In their 1972 work, "Subjective Probability: A Judgment of Representativeness," they studied representativeness bias. In their 1973 publication, "On the Psychology of Prediction," representativeness affects people's intuitive judgements (Kahneman and Tversky, 1973). The publication of "Judgment under Uncertainty: Heuristics and Biases" in 1974 was one of their most significant works. Representativeness, availability, and anchoring were recognised as the three heuristics. They stated that "a more thorough understanding of these heuristics and the resulting biases could enhance judgement and decision-making in uncertain circumstances." "Prospect Theory: A Study of Choice Under Risk" was published in 1979 in *Econometrica* to review anticipated utility theory as a paradigm for decision-making under risk. Prospect Theory was the innovative model's moniker. Daniel Kahneman received the 2002 Economics Nobel Prize for Prospect Theory. Daniel Kahneman and Amos Tversky reveal that people's preferences for the same issue differ based on the psychological norms that control how they see decision-making problems and evaluate the probabilities and outcomes.

Theories of Behavioral Finance

Authors	Year	Findings
Herbert Simon	1955	Bounded rationality
Festinger, Riecken and Schachter	1956	Cognitive Dissonance
Tversky and Kahneman	1973,1974	Develops Heuristic biases: availability, Representativeness, anchoring and adjustment
Kahneman and Tversky	1979	Prospect theory, loss aversion bias
Kahneman and Tversky	1981	Framing bias
Richard Thaler	1985	Mental accounting bias
De Bondt and Thaler	1985	Overreaction to stock market
Barberis, Shleifer and Vishny	1998	Investor sentiment model for underreaction and overreaction of stock prices
Meir Statman	1999	Behavioral asset pricing theory and behavioral portfolio theory
Andrei Shleifer	2000	Linkage of behavioral Finance with Efficient market Hypothesis to find that stock markets are inefficient
Barberis, Huang and Santos	2001	Incorporation of prospect theory in asset prices
Grinblatt and Keloharju	2001	Role of behavioral factors in determining trading behavior
Hubert Fromlet	2001	Importance of behavioral Finance. Emphasis on departure from 'homo economicus' or traditional paradigm to more realistic paradigm
Barberis and Thaler	2003	Survey of Behavioral Finance
Coval and Shumway	2006	Effect of behavioral biases on stock prices. The price reversal for biased investors is quicker than unbiased investors

Source: Prosad et.al. 2015 Theory of standard Finance

NEUROFINANCE

Neurofinance studies, using brain imaging, the neurological substrates involved in financial decision-making. Neurofinance is an interface between psychology, neurology, and financial behaviour, according to Sapra and Zak (2008). In addition to the AMH and developmental

finance, neurobiology is considered a foundation for behaviour in other theories, such as evolutionary psychology and behavioral economics. Neuroscience, on the other hand, plays a lesser role in these procedures. Neurofinance research shows how emotions affect trading by proposing a cognitive explanation for financial decisions, such as trading during instability (Sapra and Zak, 2008). (Kuhnen and Knutson, 2005) This research will help create a new asset pricing model that incorporates pleasure-seeking (financial gain) with pain avoidance (financial loss) (Peterson, 2005).

Some emotions are associated with the stock market's future direction. The research aims to determine the physiological and environmental elements associated with investor intelligence and investor irrationality (Payzan-Le Nestour, 2012). Academic Scholars seek to improve investor behaviour prediction, trading success, and financial market understanding. The normative implication is to offer tools, technology, training, and nudges to facilitate decision-making. This research's credibility is disputed. Initially, brain imaging approaches like fMRI are rapidly evolving. Consequently, the findings' veracity may be questioned. In addition, its applicability to the actual world is questionable since the samples are often minute and collected in a laboratory environment. (Kuorikoski and Ylikoski, 2012) Investigate in depth the challenges of integrating neuroscience across academic borders. The fundamental criticism of neuroscience is that it fails to discriminate between reality and interpretation. For instance, the answer to the question "Do specific behaviour stem from certain brain regions?" is positive. Thus, although the issue is intriguing to neuroscientists, economists (or finance) find it less so (or finance). We already assume that people cannot derive logical inferences from their experiences. In the case of neuroeconomics, according to Harrison (2008), a multitude of research adds neurological facts for innovation. Harrison also asks whether this study offers us the information we do not already possess. The results appear more indicative of investment behaviour than predictive.

In addition, this revelation has not yet produced fundamentally new questions. It utilises technological breakthroughs to overcome classic valuation and pricing issues. It may allow the formulation of more plausible ideas via models based on assumptions not physically realistic for the human brain and nervous system (Mundale and Bechtel, 1996). Statistics show that people are not predisposed to make sensible decisions (Peterson, 2005). Neurology, a branch of biology, is advancing despite sceptics. In addition, some higher education institutions are developing neuroscience labs, which are often utilised to research financial issues. From a logical perspective, Neurofinance varies in several ways. Initially, rationality is not assumed;

it is seen in laboratory studies. The second is a single brain. Therefore, simple study observations are rare. Trials include many brain measurements throughout time.

Difference between Traditional Finance, Behavioral Finance and Neurofinance

Standard Finance offers a range of tools to assist individuals in making rational investment decisions. Markowitz (1952) states that all portfolios within the efficient frontier are rational. In addition, a person's portfolio is determined by their degree of risk aversion. Historically, risk aversion is related to volatility sensitivity. It demonstrates that the portfolio's volatility is proportional to the variation of projected returns. The (Markowitz, 1952) model featured properties that did not exist. These are connected to the behaviour defined by (Kahneman and Tversky's (1979) prospect theory, which is a widely recognised conceptual model outlining the choices a person makes under situations of uncertainty and risk and lays the foundation for behavioral economics. Psychological finance studies how individuals make economic choices.

Neurofinance examines the behaviour of participants in the financial market using neurotechnology. The behavior regularity and its explanation would assist in their capacity to predict it. As behaviour becomes actions, the underlying concepts become more prominent and are revealed. Cognitive psychology thus contributes to behavioral finance. Tseng (2006) attempts to determine what occurs inside a person that causes them to think and behave as they do.

Traditional finance offers a range of tools to aid individuals in making rational investment decisions. Markowitz (1952) asserts that all efficient frontier portfolios are rational. In addition, a person's portfolio is determined by their degree of risk aversion. Historically, risk aversion is related to volatility sensitivity. It indicates that the portfolio's volatility is a function of the expected return variance. The standard MV idea (Markowitz, 1952) has properties that were never seen in practice. Kahneman and Tversky's (1979) prospect theory created the prospect theory as a generally recognised conceptual model for characterising an individual's choices under uncertainty and risk, providing the foundation for behavioral economics. Behavioral finance is the study of how individuals make financial choices.

Neurofinance, in contrast, examines the behaviour of financial market participants utilising neurotechnology. The regularity of the behaviour and its explanation would assist in their capacity to predict it. As thoughts become acts, behaviour becomes more apparent and reveals the underlying ideas. Cognitive psychology adds to the study of behavioral finance in this

manner. Neurofinance aims to grasp the intrinsic factors that lead to cognitive behaviour. According to Tseng (2006), the distinction between behavioral Finance and Neurofinance is that behavioral finance analyses how individuals behave and interact while making economic decisions.

Neurofinance, in contrast, evaluates this behaviour using existing psychological ideas and theories. Brain and hormone function research, on the other hand, analyses the evolution of specific behaviour because the brain and hormone function study. Cognitive psychology may be used to trace the origins of behavioral finance. Cognitive psychology investigates mental processes connected with cognition, such as the visual system, memory, cognition, learning, emotions, problem-solving, judgement, and language. The psychological paradigm says that emotion emerges from a stimulus or event's cognitive assessment (Merkle, 2007). Thus, it has been shown that emotional elements impact financial decision-making and cognitive limits to which individuals are susceptible. In addition, they have led to cognitive distortions, resulting in prejudices that must be addressed or repaired (Pompian, 2006). However, the current study reveals that the feelings that lead to psychological-behavioural tendencies are the product of a fault in the human mind rather than a structure (Zajonc, 1979; Haselton et al., 2005; Peterson, 2007). According to the canonical literature on finance, rationality is a condition of complete knowledge and competent judgement. Emotions were seen as incompatible with logic, Neurofinance, and investing behaviour. Emotional individuals lack rationality. Research in neurofinance has shown that emotion and reason are intertwined. It implies that the emotional component of the mind, which is more primitive, assists in making rapid decisions in the face of danger and uncertainty and aids in restricting possibilities.

As a result, the cognitive region of the brain that regulates the administrator's tasks operates more slowly. After thorough analysis, it reaches conclusions (O'Reilly and Munakata, 2000). Due to the brain's anatomy, an entire segment of the two portions of the brain would not be feasible, resulting in conclusions that conventional finance would deem unreasonable but evolutionary psychology would consider natural. Therefore, it is necessary to appreciate the influence on economic decision-making. Assume the validity of the notion that emotions influence behaviour. In such circumstances, behavioral finance research is restricted to understanding the influence of emotional drivers on decision-making since the discipline only investigates the behaviour that emerges in an external environment, not their causes. The combination of cognitive and feelings may facilitate comprehension of decision-making: Effect and cognition are managed by different, primarily autonomous systems that interact in various

ways, and both are independent sources of information processing effects (Zajonc, 1979). According to Taffler and Tuckett (2010), emotional finance is based on Sigmund Freud's psychoanalytic understanding of the human mind and dynamic mental states, which explain how unconscious processes influence investment choices and financial behaviour. In addition, Zajonc (1979) notes that a cognitive process must have preceded a choice for one to be persuaded that one has decided. Any available evidence does not support this statement. However, it is thus not without value to believe that effect plays a more fundamental role in many decisions than we are willing to accept. Therefore, it is crucial to comprehend unconscious processes by bringing them to light and calling people's attention to them (Taffler and Tuckett, 2010). By observing the human brain's operations, neuroscience tries to help investigate how these decisions are produced. Neurofinance is more predictive than behavioral finance since it explores the mechanics of economic decision-making. Neurofinance is the study of what influences the brain and how this takes place. These insights would assist in the development of more precise forecasts of decision-making behaviour. This research aims to know how the brain processes information about complex, time-constrained, potentially lucrative, unprofitable, dangerous, and strategic choices (Peterson, 2006).

CONCLUSION

A financial revolution is generally agreed to have occurred between 1960 and 1970. The researcher and academician came up with various concepts and approaches. It was proved by the financial crisis (which included the dot-com boom, the subprime and financial crises, and the subsequent European debt crisis). These economic events severely hit the world economy. The mainstream finance theory came under fire from several behaviorists (Krugman 2009; Shiller 2000a, b). In this setting, the conventional financial theory, based on the efficient market hypothesis and the rational representative agent paradigm (Fama 1970), has been subjected to extensive scrutiny and criticism (Kirman 2010). Behaviorists challenge the assumption of rationality and reflection of all available information in current stock prices. The behaviorist theory says that investors are not rational they are normal.

In addition, the notion of Neurofinance is evolving in finance, extending the behaviorist approach to decision-making. Neurofinance is applying technology to finance as a solution to emotional and rational decision-making. Neurofinance comprehends what influences the brain and how this occurs. These insights would result in more accurate forecasts of decision-making behaviour. Emotions were considered adverse to rationality, Neurofinance, and investment behaviour. However current study indicates that emotionality and rationality are connected. It

suggests that the emotional brain area aids in making quick decisions. Combining cognitive and emotional emotions may facilitate a deeper insight into decision-making behaviour. Neurofinance studies what affects the brain and how this happens. These findings would lead to more accurate behavioral finance projections. It has more forecasting ability than behavioral finance.

REFERENCES

- Baltussen, G. (2009). Behavioral finance: an introduction. Available at SSRN 1488110.
- Banerjee, S. (2011). Learning from prices and the dispersion in beliefs. *The Review of Financial Studies*, 24(9), 3025-3068.
- Belsky, G., & Gilovich, T. (2010). *Why smart people make big money mistakes and how to correct them: Lessons from the life-changing science of behavioral economics*. Simon and Schuster.
- Coase, R. (1998). The new institutional economics. *The American economic review*, 88(2), 72-74.
- Copur, Z. (Ed.). (2015). *Handbook of research on behavioral finance and investment strategies: Decision making in the financial industry: Decision Making in the Financial Industry*. IGI Global
- Fama, E. F. (1965). The behavior of stock-market prices. *The journal of Business*, 38(1), 34-105.
- Fama, E. F. (1970). Efficient capital markets: A review of theory and empirical work. *The journal of finance*, 25(2), 383-417.
- Fama, E. F. (1976). Efficient capital markets: reply. *The Journal of Finance*, 31(1), 143-145.
- Fama, E. F. (1991). Efficient capital markets: II. *The journal of finance*, 46(5), 1575-1617.
- Fama, E. F. (1998). Market efficiency, long-term returns, and behavioral finance. *Journal of financial economics*, 49(3), 283-306.
- Fama, E. F. (2014). Two pillars of asset pricing. *American Economic Review*, 104(6), 1467-85.
- Fischer, B., & Myron, S. (1973). The pricing of options and corporate liabilities. *Journal of political Economy*, 81(3), 637-654.
- Harrison, G. W. (2008). Neuroeconomics: A critical reconsideration. *Economics & Philosophy*, 24(3), 303-344.
- Haselton, M. G., Nettle, D., Andrews, P. W., & Buss, D. M. (2005). The handbook of evolutionary psychology. The evolution of cognitive bias, 724-746.
- Hayek, F. A. (1945). American Economic Association. *The American Economic Review*, 35(4), 519-530.
- Heukelom, F. (2007). Kahneman and Tversky and the origin of behavioral economics.
- Khalid, B., & Sheerin, A. (2020). Behavioural Intent of Indian Consumers to Accept Mobile Banking Services. *South Asian Journal of Social Science and Humanities*, 1(3), 50-70.
- Kirman, A. (2010). The economic crisis is a crisis for economic theory. *CESifo Economic Studies*, 56(4), 498-535.

- Kuhnen, C. M., & Knutson, B. (2005). Finansal risk almanın sinirsel temeli. *Nöron*, 47, 763-770.
- Kuorikoski, J., & Ylikoski, P. (2010). Explanatory relevance across disciplinary boundaries: the case of neuroeconomics. *Journal of Economic Methodology*, 17(2), 219-228.
- LeRoy, S. F. (1976). Efficient capital markets: Comment. *The Journal of Finance*, 31(1), 139-141.
- Lintner, J. (1975). The valuation of risk assets and the selection of risky investments in stock portfolios and capital budgets. In *Stochastic optimisation models in finance* (pp. 131-155). Academic Press.
- Lo, A. W., & Repin, D. V. (2002). The psychophysiology of real-time financial risk processing. *Journal of cognitive neuroscience*, 14(3), 323-339.
- Lo, A. W., Repin, D. V., & Steenbarger, B. N. (2005). Fear and greed in financial markets: A clinical study of day-traders. *American Economic Review*, 95(2), 352-359.
- MacKenzie, D. (2008). *An engine, not a camera: How financial models shape markets*. MIT Press.
- Malkiel, B. G. (2003). The efficient market hypothesis and its critics. *Journal of economic perspectives*, 17(1), 59-82.
- Markowitz, H. (1952). Portfolio selection. *J. Finance*.
- Merkle, C., Kempf, A., & Niessen-Ruenzi, A. (2009). *Emotion and Finance-An Interdisciplinary Approach to the Impact of Emotions on Financial Decision Making*.
- Merton, R. C. (1973). Theory of rational option pricing. *The Bell Journal of economics and management science*, 141-183.
- Muhammad, N. M. N., & Maheran, N. (2009). Behavioural Finance vs traditional finance. *Adv. Manage*, 2(6), 1-10.
- Mundale, J., & Bechtel, W. (1996). Integrating neuroscience, psychology, and evolutionary biology through a teleological conception of function. *Minds and Machines*, 6(4), 481-505.
- Newman, P., Milgate, M., & Eatwell, J. (Eds.). (1992). *The new Palgrave dictionary of money & Finance* (Vol. 3, pp. 445-446). London: Macmillan.
- Noor, M. A. (2022). Factors Influencing the Implementation of Integrated Financial Management Information Systems: Study Focus on Bangladesh. *South Asian Journal of Social Science and Humanities*, 3(2), 32-55.
- O'reilly, R. C., & Munakata, Y. (2000). *Computational explorations in cognitive neuroscience: Understanding the mind by simulating the brain*. MIT press.
- Paul, K. (2009). *The return of depression economics and the crisis of 2008*. New York.

- Payzan-LeNestour, E., & Bossaerts, P. (2012, May). Learning to choose the right investment in an unstable world. In Paris December 2012 Finance Meeting EUROFIDAI-AFFI Paper.
- Peterson, R. L. (2005). The neuroscience of investing: fMRI of the reward system. *Brain research bulletin*, 67(5), 391-397.
- Pompian, M. M. (2011). *Behavioral finance and wealth management: how to build investment strategies that account for investor biases*. John Wiley & Sons.
- Sapra, S. G., & Zak, P. J. (2008). Neurofinance: Bridging psychology, neurology, and investor behavior. *Neurology, and Investor Behavior* (December 1, 2008).
- Sewell, M. (2007). *Behavioural Finance*. University of Cambridge, 1-14.
- Sewell, M. (2012). The efficient market hypothesis: Empirical evidence. *International Journal of Statistics and Probability*, 1(2), 164.
- Sharpe, W. F. (1964). Capital asset prices: A theory of market equilibrium under conditions of risk. *The journal of finance*, 19(3), 425-442.
- Shefrin, H. (2002). *Beyond greed and fear: Understanding behavioral Finance and the psychology of investing*. Oxford University Press on Demand.
- Shiller, R. J. (2000). *Irrational Exuberance*, Princeton Univ.
- Shiller, R. J. (2000). Measuring bubble expectations and investor confidence. *The Journal of Psychology and Financial Markets*, 1(1), 49-60.
- Statman, M. (1999). Behavioral Finance: Past battles and future engagements. *Financial analysts journal*, 55(6), 18-27.
- Suhaimi, S. (2021). Challenges of Public Participation: A Qualitative Study. *South Asian Journal of Social Science and Humanities*, 2(5), 100-109.
- Taffler, R. J., & Tuckett, D. A. (2010). Emotional Finance: The role of the unconscious in financial decisions. *Behavioral Finance: Investors, corporations, and markets*, 95-112.
- Tseng, K. C. (2006). Behavioral finance, bounded rationality, neuro-finance, and traditional finance. *Investment Management and Financial Innovations*, 3(4), 7-18.
- Tversky, A., & Kahneman, D. (1974). Judgment under Uncertainty: Heuristics and Biases: Biases in judgments reveal some heuristics of thinking under uncertainty. *science*, 185(4157), 1124-1131.
- Watson, M. (2007). Searching for the Kuhnian moment: The Black-Scholes-Merton formula and the evolution of modern finance theory. *Economy and Society*, 36(2), 325-337.
- Zajonc, R. B. (1980). Feeling and thinking: Preferences need no inferences. *American psychologist*, 35(2).