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A Bibliometric Analysis of Research in Behavioural Finance: Special Emphasis on Selected Behavioural Biases in Investment Decision Making

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Abstract

Behavioural finance combines psychology and economics to understand the anomalies of financial markets by examining human behaviour. There has been a significant global increase in research on behavioural biases and investment decisions. This paper aims to conduct a bibliometric analysis of behavioural biases and investment decisions using literature from the Scopus database for the period from 1991 to 2022 using the VOSviewer software. The research findings confirm a substantial growth in research on behavioural biases and investment decisions between 2008 and 2022. The United States is the most influential country based on citation count, and Odean (1998) stands out as the most prominent author in this research field. Co-citation analysis identifies key clusters in "efficient market, behavioural biases, and trading frequency," while bibliographic coupling highlights "Information processing and investors' behavioural biases." Co-occurrence analysis reveals gaps in research on financial literacy, personality traits, and optimism bias, suggesting future research opportunities.

Keywords: Bibliometric Analysis, Behavioural Biases, Behavioural Finance, Investment Decisions

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Introduction

Finance is an area of study that primarily focuses on two fundamental actions: firstly, obtaining funds and, secondly, making sound investment decisions with the collected funds (Singh et al., 2021). In traditional finance theories, the concept of investment decision was explained on the grounds of rationality, risk-averse characteristics of investors, and the existence of market efficiency. But within two decades of the introduction of these theories, incidents of market volatility as a result of anomalies could be found in the stock markets which straightway question the validity and applicability of the assumptions of traditional finance theories. These incidents pointed out the presence of irrationality among investors, which traditional finance theories could not answer. Shleifer (2000) discussed that the presence of inefficiency in the market, cannot be rectified with arbitrage actions. In an instance where close substitutes are available, arbitrageurs can short-sell the overpriced securities and buy back them when prices fall. In the absence of close substitutes arbitrageurs cannot perform such trades. However, Fama (1998) argued against behavioural finance by demonstrating that anomalies attributed to behavioural factors can disappear when appropriate methods, like weighting schemes, are applied. On the contrary, Tversky and Kahneman (1974) explained that during uncertain situations, investors adopt heuristics to interpret information quickly by relying on past experiences accompanied by intuition. Another significant contribution was made by Kahneman and Tversky (1979), who explained the concept of loss aversion under prospect theory. Due to loss aversion bias, investors focus more on reducing loss than earning profit. Shefrin and Statman (2000) authored a number of significant works in the behavioural finance field and addressed the cognitive and emotional errors that influence investors' decision-making behaviour. Traditional finance theories assume that stock prices accurately reflect all available market information and that investors always make rational decisions based on fundamental and technical analysis. However, in reality, investors tend to take shortcuts in decision-making during uncertain situations, which can lead to suboptimal outcomes. Behavioural finance studies these shortcuts under the umbrella of behavioural biases, which affect not only individual investors but also have broader implications for the entire financial market. Understanding these biases is crucial globally since they influence how investment decisions are made. This study aims to comprehensively analyse and elucidate the evolving trends in published research concerning selected behavioural biases and investment decisions. Using data from Scopus and employing bibliometric analysis techniques, the study identifies trends in research, including prominent journals, authors, top articles, leading institutions, and countries in the field of behavioural finance. Additionally, through science mapping techniques, the research explores co-

citation, thematic clusters, and patterns of research collaboration in this area. By analysing these aspects, the study seeks to uncover the intellectual frameworks and influential factors surrounding behavioural biases and investment decisions. This investigation provides foundational insights into the dynamics within the academic community and highlights key contributors and emerging research centres in this evolving field. In the vast array of ideas developed under behavioural finance, the concept of behavioural biases with investment decisions is gaining importance, as indicated by the increasing number of publications in the research domain. The existing literature has contributed a pool of knowledge on this area, but a comprehensive literature combining the most significant behavioural biases to the present date is still missing. Hence, the present study aims to achieve the following objectives:

1. To assess the trends of published research in the field of behavioural biases and investment decision-making.
2. To identify the significant collaboration patterns, influential journals, articles, organisations, and countries in the area of behavioural finance.
3. To identify the intellectual and influential structure of behavioural bias and investment decisions.

To achieve the aforementioned objectives, the present study conducts bibliometric analysis under which performance analysis and scientific mapping help in the critical evaluation of the existing literature, followed by giving insights to identify limitations and future research scope. The following section provides a conceptual framework for investment decisions and behavioural biases within the broad category of behavioural finance. The next section describes the methodology of the study. The subsequent section describes the results and interpretations of performance analysis and scientific mapping based on the existing literature. The final section briefly explains the major findings of the paper followed by a conclusion and a suggestion for the direction of future research.

An Introduction to Behavioural Biases

Behavioural Finance and Behavioural Biases: The concept of behavioural finance stemmed from a critical examination of conventional finance theories, which involved incorporating a psychological viewpoint into the process of decision-making (Ising, 2007). All the traditional finance theories were explained on the grounds of perfect rationality, risk-averse characteristics of investors, and the existence of market efficiency. However, all these concepts have been critically analysed by researchers from different grounds and explained that people make

decisions based on relative comparison rather than structuring the problem historically and comprehensively (Ising, 2007). In the mid-fifties, the concept of bounded rationality threw a question on the existence of global rationality. Later, in the year 1957, Leon Festinger introduced the concept of Cognitive Dissonance (Hinojosa et al., 2017). Furthermore, Prospect theory, heuristics in decision-making, and behavioural biases developed by Kahneman and Tversky built the foundations of behavioural finance as a discipline (Kahneman & Tversky, 1979). They explained that investors behave differently when they experience gains and losses of equal amounts. Research work based on the importance of information framing has been a subject of debate, and as a result, a new concept known as the “framing effect” emerged (Tversky & Kahneman, 1981). De Bondt and Thaler (1987) and Thaler (1985) introduced the concept of mental accounting; they also explained the phenomenon of “market overreaction” by analysing monthly data of market return. Therefore, it can be understood from the aforementioned literature that traditional financial theories cannot fully explain the anomalies present in financial markets. In more globalised economies, academicians have documented the role of behavioural factors in standard finance theories to explain the functioning of financial markets.

Behavioural Biases and Investment Decisions: The introduction of behavioural biases, heuristics in decision-making, and the Prospect theory by Tversky and Kahneman (1974) and Kahneman and Tversky (1979) are said to be the cornerstone of behavioural finance. Thus, the field has been enriched with the introduction of various behavioural biases. Global research on individual investors has discovered a direct link between behavioural biases and investment choices (Ahmed et al., 2022; Kartini & Nahda, 2021). Among all the behavioural biases, Individual and institutional investors' investing decisions have frequently been found to be influenced by overconfidence bias, herding effect, disposition effect, self-attribution bias, loss aversion bias, regret aversion bias, etc. (Mittal, 2022; Prosad et al., 2015). However, the field still lacks a comprehensive study combining major psychological biases that can influence investment decisions. To fill this gap, the study primarily focuses on the recent developments of various behavioural biases and their relationship with investment decisions. Additionally, the study aims to shed light on the less explored areas of behavioural finance in connection to various behavioural biases for future research work.

Materials and Methods

In this study, a bibliometric methodology is employed to explore and analyse the voluminous data sets using statistical and mathematical techniques (Donthu et al.,

2021). The utilization of bibliometric techniques facilitates identifying the most prominent themes in a specific research domain by providing bibliometric information over a long period. The study retrieves data from Scopus which is a large pool of peer-reviewed data that facilitates quantitative analysis (Donthu et al., 2021; Jain et al., 2022). The reason for selecting the Scopus database instead of other available platforms such as Web of Science, and Google Scholar is that Scopus provides the most extensive coverage of research that has undergone rigorous peer review, especially in the field of finance for conducting bibliometric analysis (Corbet et al., 2019). The present study uses an extensive range of search terms by using Boolean operators (OR, AND, etc.). Data obtained from Scopus with an initial search string are prone to erroneous bibliometric information. An appropriate data set is obtained after implementing certain inclusion and exclusion criteria such as introspecting its title, keywords, and abstracts. Further, filtration has been done based on the subject area, type of documents, source type, language screening, and content screening (Goodell et al., 2021). In this study, bibliometric analysis is performed on 459 articles and review papers after all the necessary manual screening as mentioned in Table 1.

Table 1: Search Criteria and Selection of Final Articles

Filtering criteria	Reject	Accept
<u>Search Parameters</u>		
Information Retrieval System used: Scopus		
Date of Conducting The Search: 29 September 2022		
<u>Items Used for Search:</u>		876
"Behavio* Bias*" OR "Invest* Bias*" OR "Psycholog* Bias*" OR "Cognitive* Bias*" OR "Emotion* Bias*" OR "Information* Bias*" OR "Overconfidence Bias*" OR "Representativeness Bias*" OR "Anchoring Bias*" OR "Adjustment Bias*" OR "Cognitive Dissonance Bias*" OR "Availability Bias*" OR "Self-Attribution Bias*" OR "Illusion of Control Bias*" OR "Conservatism Bias*" OR "Ambiguity Aversion Bias*" OR "Endowment Bias*" OR "Self-Control Bias*" OR "Optimism Bias*" OR "Mental Accounting Bias*" OR "Confirmation Bias*" OR "Hindsight Bias*" OR "Loss Aversion Bias*" OR "Recency bias*" OR "Regret Aversion Bias*" OR "Framing Bias*" OR "Status Quo Bias*" OR "Disposition Effect" AND "Investment" OR "Invest* Decision" OR "Invest* Decision Making"		
Subject Area: "Economics, Econometrics and Finance", "Business, Management, and Accounting", "Social	153	723

Filtering criteria	Reject	Accept
Sciences”, “Decision Sciences”, “Psychology”, and “Arts and Humanities”		
Type of Document: “Articles” and “Reviews”	93	630
Type of Source: Journal	1	629
Article selection		
Language screening: Include documents in English only	8	621
Screening of Erroneous Data: Documents with valid author information are included	3	618
Screening of the Content: Articles are included with relevant “Titles, abstracts, and keywords” supporting the scope of the study (i.e., Behavioral Biases and Investment Decisions in the area of finance) only	159	459

Note(s): The table shows the methodical process used to select the final group of (459) papers for analysis. The generation of the search terms was conducted through collaborative brainstorming among the authors, comprising experts in the subject matter and research methodology.

The present study conducts performance analysis and science mapping, which identifies the trends of annual publication, top authors, most prolific institutions and countries, most cited journals and articles on behavioural bias, and investment decisions in the field of finance (Singh, 2021). Further, the co-citation analysis of cited references, thematic clusters with the bibliographic coupling of selected documents (Kessler, 1963), and the co-occurrence analysis with authors' keywords are used to analyse an intellectual structure of the area. These analyses focus on the modularity of networking nodes where each node represents referred citations, articles, and authors' keywords.

Results

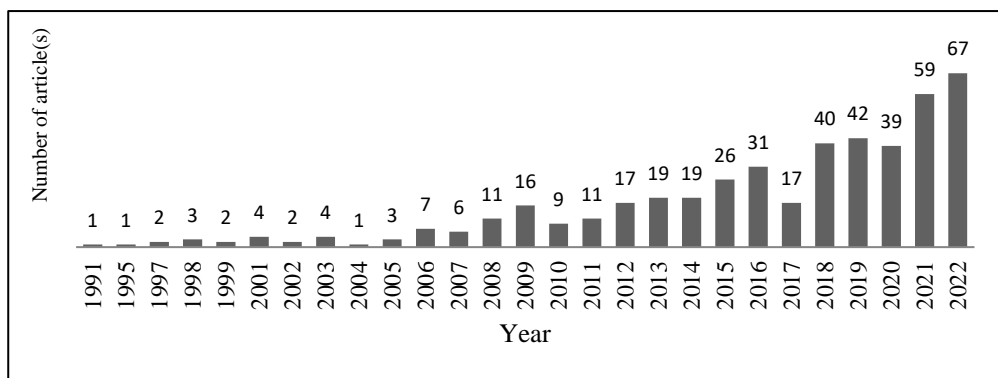
Performance Analysis Research on Behavioural Biases and Investment Decisions in the Field of Finance

Year-wise Publication Trends in the Field of Behavioural Biases and Investment Decision

Figure 1 depicts the year-wise trends of studies on behavioural biases and investing decisions that have been published in the field of finance. The growth of publications in the area of behavioural finance is not new; rather, Figure 1 depicts the progressive expansion of publications in this field, with a notable rise from one article in 1991 to 67 articles in 2022. This increasing trend of publication is noticeable from 2008 onwards. The most important year with the maximum number of publications is 2022 (67 articles), followed by 2021 (59 articles) and 2020 (39 articles). The rising body of literature in the field of behavioural finance indicates its importance and

applicability, which encourages researchers to conduct more research in the near future.

Figure 1: Year-wise Publication Trend in the Field of Behavioural Biases and Investment Decision



Source: Compiled with data extracted from the Scopus database

Prominent Authors, Institutions, and Countries Associated with Research in Behavioural Bias and Investment Decisions in the Area of Finance

Table 2 represents the list of prominent authors, institutions, and countries in the field of behavioural finance considering two of its major dimensions: “behavioural biases” and “investment decisions”. The presentation of research constituents is done based on the highest to lowest total citations. Based on the citation count, T. Odean emerges as the most influential author in the field of behavioural biases and investment decisions, with 1641 citations. Following closely behind is D. Lovallo, with 827 citations, and A. Kumar, with 322 citations. McKinsey and Company, working as a global business consultancy firm with 556 citations, tops the list, followed by the University of California, United States, with 464 citations. With 7329 total citations and 95 total publications, the United States stands first in the study of behavioural biases and investing choices.

Table 2: Prominent Authors, Institutions, And Countries Associated with Research in Behavioural Bias and Investment Decisions in the Area of Finance

Panel 1: Prominent Authors		
Author	Total number of citations	Total number of publications
Odean, T	1641	3
Lovallo, D	827	4
Kumar, A	322	4

Author	Total number of citations	Total number of publications
Simonov, A	312	4
Nofsinger, J. R.	288	4
Goyal, N.	188	5
Kumar, S.	188	5
Liu Y, -J	146	3
Park, J	90	4
Hoffmann, A. O. I.	56	3
Baker, H. K.	53	3
Aspara, J	49	3
Jaiyeoba, H. B.	41	3
Jain, J	40	3
Walia, N.	40	3
Baccar, A.	33	3
Bouri, A.	33	3
Das, N.	33	5
Singh, S.	33	6
Zhang, W.	29	3

Panel 2: Prominent Institutions

Institution	Total number of citations	Total number of publications
University of California, United States	464	2
Stockholm School of Economics, Sweden	276	2
University of Texas at Austin, United States	166	3
China Europe International Business School, China	104	2
Malaviya National Institute of Technology, India	91	3
Hansung University, South Korea	62	2
American University, United States	53	3
RMIT University, Australia	33	2
North Carolina Central University, United States	22	2

Institution	Total number of citations	Total number of publications
The University of ST. Gallen, Switzerland	19	2
Sri Aurobindo College of Commerce and Management, India	9	2
Keihatsusha Inc., Japan	8	2
Multimedia University, Malaysia	6	2
University of Edinburgh Business School, United Kingdom	6	2
Aligarh Muslim University, India	5	2
Indira Gandhi National Open University, India	3	2
Aston University, United Kingdom	1	2
Loyola College, India	1	2
University of Central Punjab, Pakistan	0	2

Panel 3: Prominent Countries

Country	Total number of citations	Total number of publications
United States	7329	95
Australia	831	23
China	661	42
United Kingdom	635	37
India	619	81
Germany	616	35
Netherlands	415	11
France	380	11
Sweden	379	10
Israel	366	7
Taiwan	322	22
Hong Kong	314	7
South Korea	240	17
Switzerland	173	10
Canada	117	9

Country	Total number of citations	Total number of publications
Finland	108	9
Pakistan	103	19
Austria	86	5
Malaysia	83	13
Brazil	78	8

Note: The list of authors, institutions and countries are presented in order of the total citations

Source: Compiled with data extracted from the Scopus database

Most Influential Journals for Behavioural Bias and Investment Decision Research in the Area of Finance

The twenty most influential journals that have published articles about behavioural biases and investment decisions in the field of behavioural finance are shown in Table 3. All the journals have been presented based on total citations. The journal “Management Science” stands first on the list with 574 citations, followed by “Journal of Banking and Finance” and “Review of Financial Studies” with 479 and 356 total citations, respectively. Additionally, the publication productivity of the top twenty journals has been mapped against different periods from 1991 to 2022 to identify the recent rising trend on the topic of our study. Thus, in recent times, the journals "Qualitative Research in Financial Markets" and "Review of Behavioral Finance" have emerged as the most productive based on the number of publications. Additionally, Table 3 showcases the list of the top cited journals, with 50% of them holding A* and A rankings according to the Australian Business Deans Council 2019 Journal Ranking List. This highlights the willingness of these journals to publish research in this discipline and suggests a growing research focus on behavioural biases and decisions on investment in the future.

Table 3: Most Influential Journals for Behavioural Bias and Investment Decision Research in the Area of Finance

Journal	TC	TP	ABD C	1991-1995	1996-2000	2001-2005	2006-2010	2011-2015	2016-2020	2021-2022
Management Science	574	11	A*				4	2	2	3
Journal of Banking and Finance	479	11	A*			2	1	4	2	2
Review of Financial Studies	356	4	A*				1	1	2	
Qualitative Research In Financial Markets	289	18	B					2	11	5

Journal	TC	TP	ABD C	1991-1995	1996-2000	2001-2005	2006-2010	2011-2015	2016-2020	2021-2022
Journal of Behavioral Finance	257	15	A					8	5	2
Journal of Financial and Quantitative Analysis	239	4	A*				2	1		1
Journal of Behavioral and Experimental Finance	151	14	A					3	9	2
Pacific Basin Finance Journal	105	5	A				3	2		
Review of Behavioral Finance	105	15	B				1		7	7
Emerging Markets Finance and Trade	42	4	B				1		3	
European Journal of Finance	41	5	A					1	3	1
Indian Journal of Finance	39	7	C					2	4	1
Sustainability (Switzerland)	35	4	NA						3	1
Journal of Economic Behavior and Organization	34	5	A*					2	2	1
Applied Economics Letters	32	4	B	1			1		1	1
Applied Financial Economics	31	5	B				1	4		
Cogent Economics and Finance	19	4	B						2	2
International Review of Financial Analysis	15	4	A						2	2
International Journal of Scientific and Technology Research	14	5	NA						5	
Investment Management and Financial Innovations	9	6	B				2	1	3	
Total Publications		150								

Notes: 1. ABDC = Australian Business Deans Council 2019 Journal Ranking List. TC = total number of citations. TP = total number of publications

2. Names of the journals appear in order of the total citations

Source: Compiled with data extracted from the Scopus database

Leading Articles on Behavioural Bias and Investment Decision Research in the Area of Finance

The most frequently cited articles in the area of behavioural bias and investment decision research are shown in Table 4. "Investor psychology and security market under- and overreactions" by Daniel et al. (1998) has received the most citations

(2396), making it the predominant article. Following closely behind is "Are Investors Reluctant to Realize Their Losses?" by Odean (1998) with 1513 citations. Daniel et al. (1998) proposed a theory on the over and under-reaction of the security market, while Odean (1998) identified the existence of the disposition effect among investors. Further, Lovallo and Kahneman (2003) and Reimsbach et al. (2018) analysed the combined effect of organisational pressures, competitive neglect, and anchoring on managers, resulting in unduly optimistic decision-making. Chen et al. (2007) conducted a similar study, empirically testing the presence of behavioural biases among Chinese investors. Dhar and Zhu (2006) found that differences in literacy and knowledge about the financial market along with trading frequency significantly affect the disposition effect, which confirms the findings of Barber et al. (2007), Chen et al. (2007), Hens and Vlcek (2011). Similarly, Shapira and Venezia (2001) found the presence of a disposition effect in the investment decisions of professional investors and individual investors. Furthermore, Daniel and Titman (1999) identified the presence of overconfidence bias among investors can lead to momentum in stock returns. Kahneman et al. (2011) argued that executives, over time, build decision processes that can help in the reduction of the effect of behavioural biases and enhance the value of investment returns. Zacharakis and Shepherd (2001) analysed the presence of overconfidence bias on Venture Capitalists' investment decisions. Similarly, Lim and Kumar (2007) concluded that well-informed investors trade more frequently when they exhibit stronger behavioural biases. Massa and Simonov (2006) identified the presence of familiarity bias in Swedish investors' decision-making. Falk et al. (2007) conducted a study on a multichannel environment and confirmed the presence of status quo bias. Coeurdacier and Rey (2013) reviewed the phenomenon of home bias in international capital markets by highlighting the recent developments in macroeconomic modelling. Kumar and Goyal (2015) thoroughly reviewed the existing literature on behavioural biases and investment decisions in the field of finance. Lim and Kumar (2007) studied the influence of framing effect on investment decisions. Flyvbjerg et al. (2018) demonstrated that behavioural biases are the primary contributor to cost overruns in significant capital investment projects.

Table 4: Leading Articles on Behavioural Bias and Investment Decision Research in The Area of Finance

Author(s)	Title	TC
Daniel et al. (1998)	Investor psychology and security market under- and overreactions	2396
Odean (1998)	Are investors reluctant to realize their losses?	1513
Lovallo and Kahneman (2003)	Delusions of Success: How Optimism Undermines Executives' Decisions	527

Author(s)	Title	TC
Dhar and Zhu (2006)	Up close and personal: Investor sophistication and the disposition effect	341
Zacharakis and Shepherd (2001)	The nature of information and Overconfidence in venture capitalists' decision making	328
Shapira and Venezia (2001)	Patterns of behavior of professionally managed and independent investors	293
Chen et al. (2007)	Trading performance, disposition effect, overconfidence, representativeness bias, and experience of emerging market investors	250
Massa and Simonov (2006)	Hedging, familiarity, and portfolio choice	229
Kahneman et al. (2011)	Before you make that big decision...	198
Daniel and Titman (1999)	Market Efficiency in an Irrational World	167
Falk et al. (2007)	Identifying cross-channel dis-synergies for multichannel service providers	154
Kumar (2009)	Hard-to-value stocks, behavioral biases, and informed trading	145
Coerdacier and Rey (2013)	Home bias in open economy financial macroeconomics	132
Barber et al. (2007)	Is the aggregate investor reluctant to realize losses? Evidence from Taiwan	123
Reimsbachtel al. (2018)	Integrated Reporting and Assurance of Sustainability Information: An Experimental Study on Professional Investors? Information Processing	104
Kumar and Goyal (2015)	Behavioral biases in investment decision-making? A systematic literature review	91
Chang et al. (2016)	Looking for Someone to Blame: Delegation, Cognitive Dissonance, and the Disposition Effect	87
Kumar and Sonya (2008)	How do decision frames influence the stock investment choices of individual investors?	76
Flyvbjerg et al. (2018)	Five things you should know about cost overrun	73
Hens and Vlcek (2011)	Does prospect theory explain the disposition effect?	67

Notes: 1. TC = total number of citations. TP = total number of publications.
 2. Names of the articles appear in order of total citations in this table.

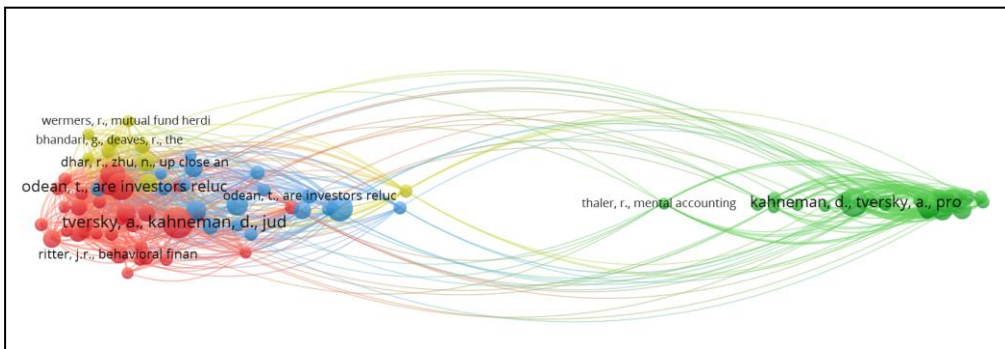
Source: Compiled with data extracted from the Scopus database

Science Mapping Analysis on Behavioural Biases and Investment Decisions in the Field of Finance

Research on the Theoretical Underpinnings of Behavioural Bias and Investment Choice in Finance Using Co-Citation Analysis

Co-citation analysis is a measure of how often two documents are cited together by different authors, indicating a relationship that relies on the number of authors citing them (Small, 1973). It reveals the knowledge base of a particular field by uncovering the semantic connections among co-cited references (Goodell et al., 2021). It simply indicates the documents or sources that are being cited most frequently by the present review corpus. A map of co-citation of all sources that have been referenced a minimum of seven times by the articles extracted from the Scopus database from 1991 to 2022, as depicted in Figure 2.

Figure 2: Co-Citation of References Cited by Articles on Behavioral Biases and Investment Decisions in Finance Research



Note: Cited reference is represented by each node in the diagram, and the colours of each node correspond to different thematic clusters based on their similarity. The links connecting the nodes indicate co-citations between references. The degree of co-citation is indicated by the thickness of the linkages, with thicker links denoting a higher intensity of co-citations.

Source: Prepared using VOSviewer with data extracted from the Scopus database

The four core clusters that make up the analysis of co-citations among the references that are cited together on behavioural biases and investment decision research are efficient markets, behavioural biases, trading frequency (red node), disposition effect, and investment behaviour in the stock market (green node), asset pricing and behavioural biases in decision making (blue node) and investment psychology, herding and momentum strategies (yellow node). Interestingly, the biggest foundational cluster is related to the efficient market, behavioural biases, and trading frequency (red node), where the most cited reference is “Judgment under uncertainty: Heuristics and biases” by Tversky and Kahneman (1974), in which the study discovered the presence of heuristics in human behaviour. Another work by

Kahneman and Tversky (1979) titled “Prospect Theory: An Analysis of Decision under Risk” under the green node cluster detected the varied investors’ behaviour when faced with loss and gain of an identical amount. It indicates that these documents or sources are being cited most frequently by the articles extracted from the Scopus database from 1991 to 2022.

Theme-Based Clusters of Behavioural Biases and Investment Decision Research in the Area of Finance Using Bibliographic Coupling

In this section, the main objective of the study is to map the conceptual framework of academic work on behavioural bias and financial investment decisions. To explore the most prominent themes in the research domain, we have applied bibliographic coupling considering all the reviewed documents. Bibliographic coupling is used to reveal the existing knowledge based on cited publications in a specific area (Kessler, 1963). Table 5 presents a bibliographic coupling of the most prominent themes segregated into six clusters published during 1991-2022.

Table 5: Bibliographically Coupled Thematic Clusters of Behavioural Biases and Investment Decision Research in Finance

Theme	Author(s)	Title	TC
Information processing and investors' behavioural biases	Zacharakis and Shepherd (2001)	The nature of information and Overconfidence in venture capitalists' decision making	328
	Reimsbacht al. (2018)	Integrated Reporting and Assurance of Sustainability Information: An Experimental Study on Professional Investors? Information Processing	104
	Flyvbjerg et al. (2018)	Five things you should know about cost overrun	73
Disposition effect and investment decision	Odean (1998)	Are investors reluctant to realize their losses?	1513
	Dhar and Zhu (2006)	Up close and personal: Investor sophistication and the disposition effect	341
	Shapira and Venezia (2001)	Patterns of behavior of professionally managed and independent investors	293
Overconfidence, self-attribution bias, and virtual communities	Gu et al. (2014)	The allure of homophily in social media: Evidence from investor responses on virtual communities	65

Theme	Author(s)	Title	TC
Overconfidence, self-attribution bias, and virtual communities	Park et al. (2013)	Information valuation and confirmation bias in virtual communities: Evidence from stock message boards	61
	Mishra and Metilda (2015)	A study on the impact of investment experience, gender, and level of education on overconfidence and self-attribution bias	42
International investment and behavioural bias	Massa and Simonov (2006)	Hedging, familiarity, and portfolio choice	229
	Kumar (2009)	Hard-to-value stocks, behavioral biases, and informed trading	145
	Coourdacier and Rey (2013)	Home bias in open economy financial macroeconomics	132
Momentum, overreaction, and investment performance	Daniel et al. (1998)	Investor psychology and security market under- and overreactions	2396
	Chen et al. (2007)	Trading performance, disposition effect, overconfidence, representativeness bias, and experience of emerging market investors	250
	Daniel and Titman (1999)	Market Efficiency in an Irrational World	167
Investors' personality	Durand et al. (2013)	Personality	40
	Dickason and Ferreira (2018)	Establishing a Link between risk tolerance, investor personality, and behavioral finance in South Africa	16
	Lai (2019)	Personality traits and stock investment of individuals	14

Note: TC = Total Citation

Source: Compiled with data extracted from the Scopus database

Cluster 1 comprises 66 articles focusing on information processing and investors' behavioural biases, which have accumulated a total of 1,669 citations based on the Scopus database. The top three cited articles in Cluster 1 are Zacharakis and Shepherd (2001), Reimsbach et al. (2018), and Flyvbjerg et al. (2018), with 328, 104, and 73 citations, respectively. Zacharakis and Shepherd (2001) identify the presence of overconfidence bias among venture capitalists due to excessive information

acquisition. Reimsbach et al. (2018) confirm the assurance that sustainability information has a positive effect on professional investors. Flyvbjerg et al. (2018) confirm the presence of behavioural biases is the root cause of cost overrun in the projects of large capital investments.

Cluster 2 encompasses 44 articles centred on the Disposition effect and investment decision, which have accumulated a total of 3,415 citations based on the Scopus database. The top three cited articles in Cluster 2 are Odean (1998), Dhar and Zhu (2002), and Shapira and Venezia (2001), with 1513, 341, and 293 citations, respectively. Odean (1998) tested the presence of the disposition effect among investors, whereas Dhar and Zhu (2002) explained the differences in the disposition effect across individuals. Further, Shapira and Venezia (2001) found that in comparison to independent accounts, professionally managed accounts are more diversified and profitable.

Cluster 3 comprises 33 articles focusing on overconfidence, self-attribution bias, and virtual communities, which have accumulated a total of 576 citations. Gu et al. (2014), Park et al. (2013), and Mishra and Matilda (2015), with 65, 61, and 42 citations, stand as the top three cited articles, respectively. Gu et al. (2014) found that experienced investors are less attracted to social interactions, while this interaction increases in case of stock volatility. Park et al. (2013) discuss investors' behaviour in valuing information generated by virtual communities. Mishra and Matilda (2015) extended their study on individual investors' behaviour and analysed the impact of demographic variables on overconfidence bias and self-attribution bias.

Cluster 4 encompasses 25 articles centred on international investment and behavioural bias, which have accumulated a total of 1,067 citations. Massa and Simonov (2006), Lim and Kumar (2007), and Coeurdacier and Rey (2013), with 229, 145, and 132 citations stand as the top three cited articles, respectively. Massa and Simonov (2006) confirm the presence of familiarity bias among investors. Lim and Kumar (2007) identify the presence of behavioural biases among investors concerning uncertainties related to stocks and the market. On the other hand, Coeurdacier and Rey (2013) focus on home bias in international capital markets.

Cluster 5 comprises 23 articles focusing on Momentum, overreaction, and investment performance, which have accumulated a total of 3,237 citations. Daniel et al. (1998), Chen et al. (2007), and Daniel and Titman (1999), with 2396, 250, and 167 citations, are the top three cited articles, respectively. Daniel et al. (1998)

explained the association between overconfidence bias, self-attribution bias, and excess volatility. Chen et al. (2007) finds the significant presence of these biases in Chinese investors' investment decisions. Daniel and Titman (1999) find that overconfident investors create a momentum effect for growth stocks.

Cluster 6 encompasses three articles focusing on Investors' personalities, which have garnered a total of 70 citations. Durand et al. (2013), Dickason and Ferreira (2018), and Lai (2019) with 40, 16, and 14 citations are considered the most cited articles respectively. Durand et al. (2013) confirm that investors' reliance on behavioral biases is associated with their personality traits. Dickason and Ferreira (2018) found a connection between investors' risk tolerance levels, personality attributes, behavioral biases, and their investment choices. Further, Lai (2019) confirms the influence on investment decisions caused by the personality attributes of the investors.

Thematic Progression of Behavioural Bias and Investment Decision Research in Finance Through Co-Occurrence Analysis

This section uses co-occurrence analysis of authors' keywords to show the thematic development of behavioral biases and investment decisions research in the field of finance. The most popular search terms from 1991 to 2022 on the specified subject are shown in Table 6. According to Table 6, "Behavioral Finance" has appeared 94 times in the context of behavioural bias and investing decisions, followed by "Behavioural Biases" with 76 occurrences. "Disposition Effect" occupies the third position with 65 occurrences. Other prominent keywords in this research field are "Investment Decision", "Overconfidence", "Cognitive biases", "decision-making", "heuristics", "financial literacy", etc.

Table 6: Author Keywords Used in Behavioural Bias and Investment Decision Research in Finance

Keyword	Occurrences	Keywords	Occurrences
Behavioural Finance	94	Personality Traits	10
Behavioural Biases	76	Self-Attribution Bias	10
Disposition Effect	65	Emerging Markets	9
Investment Decision	53	Home Bias	9
Overconfidence	39	Risk Tolerance	9
Cognitive Biases	29	Institutional Investors	8
Decision Making	19	Investor Behavior	8
Individual Investors	18	Momentum	8
Heuristics	16	Mutual Funds	8

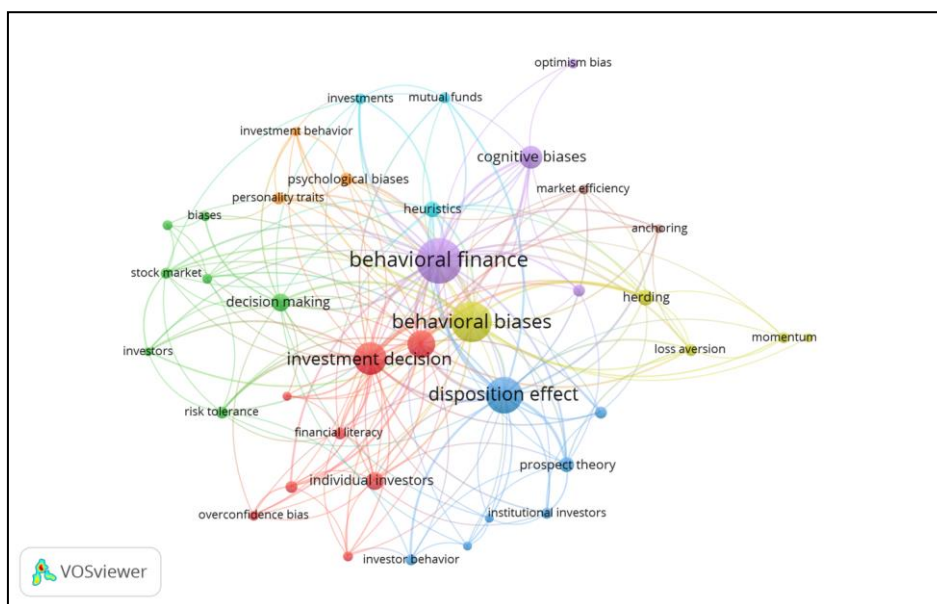
Keyword	Occurrences	Keywords	Occurrences
Herding	15	Stock Market	8
Investments	15	Biases	7
Prospect Theory	14	Covid-19	7
Psychological Biases	11	Household Finance	7
Financial Literacy	10	Market Efficiency	7
Loss Aversion	10	Optimism bias	7

Notes: The table represents the top thirty keywords used in “behavioral bias” and “investment decision” research articles and their occurrences.

Source: Complied with data extracted from the Scopus database

Figure 3 illustrates the network representation of the co-occurrence analysis conducted on author keywords. The study identifies 39 keywords, 8 clusters, 199 links, and 457 total link strengths. The resulting image is shown in Figure 3, where each cluster represents a theme, the description of which is given below.

Figure 3: Network Representation of Co-Occurrence of Keywords



Source: Prepared using VOS viewer with the data extracted from the Scopus database

Cluster 1: Behavioral biases and financial knowledge in investment decisions. This cluster has been marked in red. The most significant keyword in this cluster is "investment decision", with 53 occurrences, followed by "overconfidence" (39); other significant keywords of this cluster are "financial literacy", "individual investors", etc. One of the most prominent ideas of this cluster is the role of

psychological biases and financial knowledge in making investment decisions (Madaan & Singh, 2019).

Cluster 2: Investors' risk tolerance and stock market investment. Green has been used to indicate this cluster. "Decision making" is the most prominent keyword in this cluster, appearing 19 times, and is followed by "risk tolerance." The cluster also includes terms associated with biases, investments, stock market, and COVID-19. The cluster examines the variations in financial market investments during the COVID-19 era (Mishra & Mishra, 2023).

Cluster 3: Disposition effect and investors' behaviour. This cluster is identified with blue. The keyword "disposition effect" dominates this cluster with 65 numbers of occurrences, followed by "prospect theory," "home bias," and "investor behaviour." Recently, a notable rise has been observed in research focusing on the disposition effect's impact on mutual fund performance, stock market trading, initial public offerings (IPOs), and investment transparency (Bharandev & Rao, 2021; Danbolt et al., 2022).

Cluster 4: Behavioural biases and psychology of investment. This cluster has been marked in yellow. In this cluster, "behavioural biases" has the highest occurrences (76), followed by "herding". Other keywords in this cluster include "investor sentiment", "loss aversion", and "momentum". The idea of this cluster can be divided into two categories: firstly, momentum in the stock market concerning investor sentiment (Hao et al., 2018; Woo et al., 2020), and secondly, investment decisions under the influence of various behavioural biases (Sabir et al., 2019).

Cluster 5: Behavioral finance and cognitive biases. This cluster has been marked in violet. Based on the number of occurrences, behavioural finance (94) is the core concept of this cluster, and cognitive biases (29) are a distinctive part of the entire behavioural finance discipline. Various studies have identified the presence of irrational behaviour among stock market investments (Kuranchie-Pong & Forson, 2022) and hence analyse the influence of cognitive biases in making such investment decisions (Chen et al., 2022).

Cluster 6: Heuristics in investment strategy. This cluster has been marked in a light blue line. The most significant keyword in this cluster is "heuristics" in decision-making, a set of beliefs that eases decision-making when no other information is available (Tversky & Kahneman, 1974). Recent studies examine how heuristics affect investing decisions on IPOs, the housing market, and other topics (Hsu & Shiu, 2010).

Cluster 7: Personality traits and investment behaviour. This cluster has been marked in orange. The most prominent keyword of this cluster is “psychological biases” (11) followed by “personality traits” and “investment behaviour”. The underlying concept of this cluster is how personality trait influences behavioural biases and investment decisions (Baker et al., 2021).

Cluster 8: Behavioural biases and efficient market. This cluster has been marked in purple. Market efficiency and "anchoring bias" are the two most important keywords in this cluster. Several studies examined "market efficiency" in the context of behavioural biases and concluded that investment decisions were influenced by cognitive heuristics (Croonenbroeck & Matkovskyy, 2014; Woo et al., 2020).

Discussion and Conclusion

Traditional finance theories used to believe that stock prices fully incorporate all market information and that investors consistently make rational choices grounded in fundamental and technical analysis. Yet, real-world situations reveal that in times of uncertainty, investors often resort to decision-making shortcuts, potentially resulting in less-than-optimal results. Behavioural finance investigates this irrational investment behaviour through the lenses of behavioural biases. Recognising these biases holds global significance as they significantly sway investment decision-making processes. This research endeavours to thoroughly examine and clarify the developing patterns in published studies concerning specific behavioural biases and their influence on investment decisions. The present study observes a notable increase in publications on behavioural biases and investment decisions after 2008. This can be motivated by the identification of financial market abnormalities since the 2007 crisis. In analysing the most productive and influential authors, institutions, and countries in the area of behavioural finance, T. Odean tops the list with 1641 total citations in terms of the most cited authors. McKinsey and Company, working as a global business consultancy firm with 556 citations, tops the list, followed by the University of California, United States, with 464 citations. The United States, Australia, and China are the fastest-growing nations based on highly influential publications. In the process of identifying the top journals in this field “Management Science” appeared as the most cited journal. The study also identifies that “Investor Psychology and Security Market under- and Overreactions” by Daniel et al. (1998) stands first in the list of most cited articles. The co-citation analysis of references shows that research on behavioural biases and investment decisions is significantly related to an efficient market, behavioural biases, trading frequency, disposition effect, etc. Along with the help of bibliographic coupling, the present study identifies

six thematic clusters in the research domain where information processing, disposition effect, overconfidence, momentum, and overreaction in the market are the most dominant themes. Finally, the study identifies “behavioural finance” as the most prominent keyword in the review corpus, followed by “behavioural biases”. The present study aims to provide a detailed understanding of how behavioural biases influence investor behaviour with an analysis of the trends, methodologies, and key findings in existing research studies. This analysis not only synthesises existing knowledge but also identifies gaps and emerging trends in the study of behavioural finance. By bridging insights from academia to industry practice, this research offers valuable insights for policymakers, financial professionals, and investors aiming to navigate the complexities of decision-making under uncertainty and behavioural influences in financial markets. However, the comprehensive review of current literature reveals a predominant use of quantitative research methodologies. Therefore, future studies could benefit from integrating both quantitative and qualitative approaches. This study utilizes the Scopus database, but future research could leverage on multiple databases to further enhance understanding. Moreover, future investigations could expand into exploring financial literacy, personality traits, optimism bias, momentum effect, and risk tolerance, alongside examining the roles of Artificial Intelligence (AI), Machine Learning (ML), and Robo-advisory systems in shaping investment strategies within the field of behavioural finance.

Declaration of Conflicting Interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and publication of this article.

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