

Puzzling behavioral mechanisms under extreme market conditions: A bibliometric and systematic literature review

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Abstract

The present study maps the academic literature on behavioral mechanisms that evolve under significant and troublesome economic circumstances in the investment arena. Academic scholars have supported a rising interest and publication thrust on behavioral biases but have limited focus on the mental inclinations and heuristics that form investment decision-making, the underlying dynamics through which opinion impacts on market unpredictability, and the ramifications for speculation procedures. Through bibliometric tools, the study analyzes 220 research papers from the Scopus database and adopts performance examination techniques that assist in identification of impactful journals, prolific authors, countries and affiliations that have contributed to the development of this sub-discipline in behavioral finance. Bibliographic and thematic mapping also generate significant perceptiveness on the intellectual and conceptual structure of the field. The research guidance provided by this review will hopefully provide a roadmap for future research endeavors.

JEL classification: G01, G40, G41.

Keywords: Financial crises, Asset Booms and Busts, Fear, Greed, Behavioral Finance concepts.

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1. Introduction

Heightened levels of fear and greed in the investment industry have rather recently re-surfaced in the global financial markets through several turbulent circumstances (Yang, 2024). These emotional components, rooted in behavioral biases, have had a profound effect on strategic planning, decision making and financial forecasting, posing impressive challenges and dispute among both practitioners and academics. Although, traditional finance theorists have based their theory building on rationality (Merton, 1985), a number of questions still remain unsettled; for instance, why emotional processes prompt investors in decision-making that cannot be supported by logical thinking, why investors' decisions are not always reason and logic-based, which factors can explain variety in decision-making from one individual investor to another, and which are the drivers for mental faults committed by investors while making decision (Baker and Ricciardi, 2014).

Since the 1990s, many research efforts have paved the way to advocate behavioral finance interpretation in the investment arena. For example, Joghee et al. (2020) cast doubts on the efficient markets theories and rationality in investors pointing to market crashes and stock bubbles. Chen et al. (2017) argue that cognitive faults are common, in contrast to rational and systematic decision-making that seems rather uncommon. Notably, in times of uncertainty there are plenty studies that conclude on persistent arrays of irrationality while making decisions (Ngoc, 2013; Chen et al., 2007; Shefrin, 2007; Nofsinger, 2001; Bernstein, 1998). In light of the most recent destructive events including the global financial crises of 2007-2008, the European debt crisis of 2009-2010 and the COVID-19 pandemic-induced crash of 2020, the essence that investor sentiment has a profound impact on market outcomes was revived (Li et al., 2022; Smales, 2016; Ahadzie et al., 2025). In fact, these crises taught us that as investors felt a great sense of uncertainty and distrust, fear prevailed and led to an escalation of market volatility and risk aversion. On the contrary, phases of greed and optimism activated behaviors of high-risk that further sabotaged markets (Hollstein et al., 2019).

Literature has predominantly examined the interconnection between market returns and investor sentiment as measured by the CBOE Volatility Index (VIX) and the recently emerged CNN Fear-Greed Index, as well as other bearish and bullish sentiment indices emphasizing on the critical roles of market optimism and pessimism in forming market dynamics and investor behavior. Tests on how fear, greed, bearish and bullish tendencies affect market extremity and asymmetry in light of shaking events have nowadays managed to capture at a greater extent the sentimental-driven market behaviors (Azimli and Kalmaz, 2024). Understanding the role of investor sentiment and its ramifications on market fluctuations under extreme events is a fundamental component particularly since financial markets are exposed to dubious human behavior, perpetual crises and the necessity for adaptability. Although studies have yielded significant insights to either the behavioral biases area or the puzzling nature of market crashes and stock bubbles, a comprehensive review addressing the joint links is still missing. The present study aims to bridge this gap and map the contextual and intellectual structure of the field by addressing the following research questions:

RQ1: Which are the prevailing research themes, the key trends and the most impactful contributors in academic literature on financial crises and investors' behavior?

RQ2: What is the role of investor sentiment and which are its implications on market fluctuations?

RQ3: Do markets exhibit structural inefficiencies and become highly prone to speculative bubbles due to investors' behavioral and psychological factors under extreme market conditions?

RQ4: What are the directions for future research?

The study engages on a systematic review, bibliometric and content analysis to address the aforementioned research questions. Typical applications of systematic review analysis entail a keyword search examination that through predetermined exclusion and inclusion criteria, leads to the identification of the proper literature (Kumar et al., 2020). Bibliometric techniques help us map the literature and draw impactful insights about publication trends, leading journals, prolific authors and influential studies (Singh and Walia,

2020). Content analysis tools assist in recapitulating findings of a plethora of studies under distinct thematic headings (Rodrigues and Mendes, 2018).

The purpose of this study is to contribute to a deeper comprehension of the behavioral biases and their pervasive impact on market dynamics which eventually lead to unessential volatility and harm by examining some of the most recent crises in several economies. Understanding the underlying psychological mechanisms in financial markets may assist investors in rational decision-making and strategic planning. A strategic development framework that encompasses behavioral biases may mitigate their adverse effects, promote the setting of predefined investment goals and encourage professional advice seeking during periods of high volatility.

The remainder of this study is as follows. Section 2 presents the data and methodology, while section 3 analyses the outcomes of the present study. Section 4 briefly discusses some important parameters involved in the literature of fear, greed and overall investor sentiment and financial bubbles and crashes. Section 5 concludes.

2. Systematic analysis

Knowledge extraction from research studies of multiple domains is frequently referred in the literature as “meta-analysis” (Glass, 1976). The present paper attempts such a meta-literature review based on bibliometric citation and content analysis (Fetscherin et al., 2010) which is now employed over a wide range of approaches on meta-analysis performance in different fields, namely management, accounting, business and finance research (Zamore et al., 2018; Patel et al., 2022). We adhere to a systematic literature review approach that emphasizes on investor sentiment during economic turbulences following a six-step protocol as originally introduced by Durach et al. (2017) to examine, distinguish and assess studies from the Scopus database (Table 1).

Table 1: Protocol of the Systematic Analysis

Step 1: Research questions or hypotheses.
H_1 : Which are the prevailing research themes, the key trends and the most impactful contributors in academic literature on financial crises and investors' behavior?
H_2 : What is the role of investor sentiment and which are its implications on market fluctuations?
H_3 : Do markets exhibit structural inefficiencies and become highly prone to speculative bubbles due to investors' behavioral and psychological factors under extreme market conditions?
H_4 : What are the directions for future research?
Step 2: Establishing a detailed protocol, involving inclusion and exclusion criteria and the essential traits of leading studies.
<i>Inclusion criteria:</i>
- Articles and reviews in academic journals. - English written publications. - Setting the period of search from 2000-2025.
<i>Exclusion criteria:</i>
- Books chapters, unpublished studies, conference papers. - Articles solely centralized on pandemic health crises, monetary and fiscal policies with no association to financial crises.
Step 3: Literature examination in selected databases based on defined keywords and accumulation of a sample of adherent literature.
- Database: Scopus - Search query: "Fear" AND "Greed" AND "Stock market" OR "Financial bubbles" AND "Financial crises" - Search within the article title, abstract and keywords
Step 4: Critical evaluation of the quality and reliability of the spotted studies with an emphasis on relevant literature.
Step 5: Analysis and integration of data acquired by the selected studies.
Step 6: Presentation and discussion of the findings, focusing on their contribution for the scientific community.

The first step involves the concise definition of the research hypotheses, based on prevailing research trends, prominent authorship, highly cited journals and publication preferences in this specific domain. In the second step, we analyze on the exclusion and inclusion criteria to guarantee the applicability and the superiority of the chosen studies. Step 3 materializes on the extent of the literature search on Scopus database, while step 4 ensures both the reliability and the quality of the selected studies by critically evaluating the latter following predetermined criteria. Data collection process was based on Scopus database as also employed in a number of studies (Baker et al., 2020; Goodell et al., 2021; Ahmed et al., 2022; Dedousi et al., 2025 among others). Scopus seems to be a frequently selected database for bibliometric analysis and there is certainly solid reasoning to support such a choice. First, its coverage in various academic disciplines (including journals, books and conference proceedings) which tests for research trends across various fields along with the access it provides on high-quality research on a global scale, offers a broader perspective on current research tendencies in all majors. Secondly, it acts as a sophisticated tool supplier for the users, as it provides advanced search capacities and plenty of features for bibliometric analysis aiding researchers at key content identification, research impact evaluation and research tendencies tracking. Thirdly, it is considered one of the top accessible databases including the most distinguished journals, specifically in the finance field as this study also applies to. Finally, it prevails over other alternatives (namely the Web of Science) because of the significant quantity of published papers that it contains.

Ensuring accuracy and reliability were the main goals this study sets; this is mainly why the keyword assortment technique is manifested in two primary steps. During the first step, we search for online glossaries and dictionaries associated with fear, greed and the emergence of market bubbles and financial crashes so as to ensure that keyword selection includes highly associated terms to this specific study. In the second step, we employ the Scopus interface and examine a variety of terms as emerged in the previous step. In fact, this acts as an experimental sub-step entailing the utilization of the Scopus keyword feature to enhance our dominant query up to the allowed number of characters as set by the Scopus search bar. During the second step a final examination of each keyword is effectuated manually. Having prepped the query, we proceed on searching based on the Title, Abstract and Keyword criteria. We then proceed into restraining the results as follows: (a) we select articles and reviews in English journals, and (b) we limit the period of search from 2000-2025. Moreover, each article is further examined so as to ensure close association to the topic studied and high relevance to the research questions originally set.

In step 5, we analyze and synthesize the sample studies to distinguish among key findings, trends in the field and research gaps. The final step (step 6) involves the presentation and interpretation of the results, underlying their involvement in encouraging scientific comprehension of psychological mechanisms under disturbed economic events.

We employ the PRISMA flow diagram (Page et al., 2021) which results in a sample of total 220 studies. Figure 1 visualizes our research framework, specifying on the involved steps to assemble the final sample of studies. The first stage involves *identification*, where based on predefined keywords, we conduct a thorough search on the selected database and yield a rather large number of studies. Then the *screening stage* discards non-relevant records and duplicate entries considering their titles and abstracts, disposing articles that do not apply to our determined criteria and have little or no relevance to our research questions. The *eligibility stage* involves a critical assessment for applicability and superiority of the sample studies, removing those that do not meet the predefined criteria, namely those associated with pandemic health crises, fiscal and monetary policies. Finally, in the *inclusion stage* we synthesize all the remaining studies into a systematic literature review.

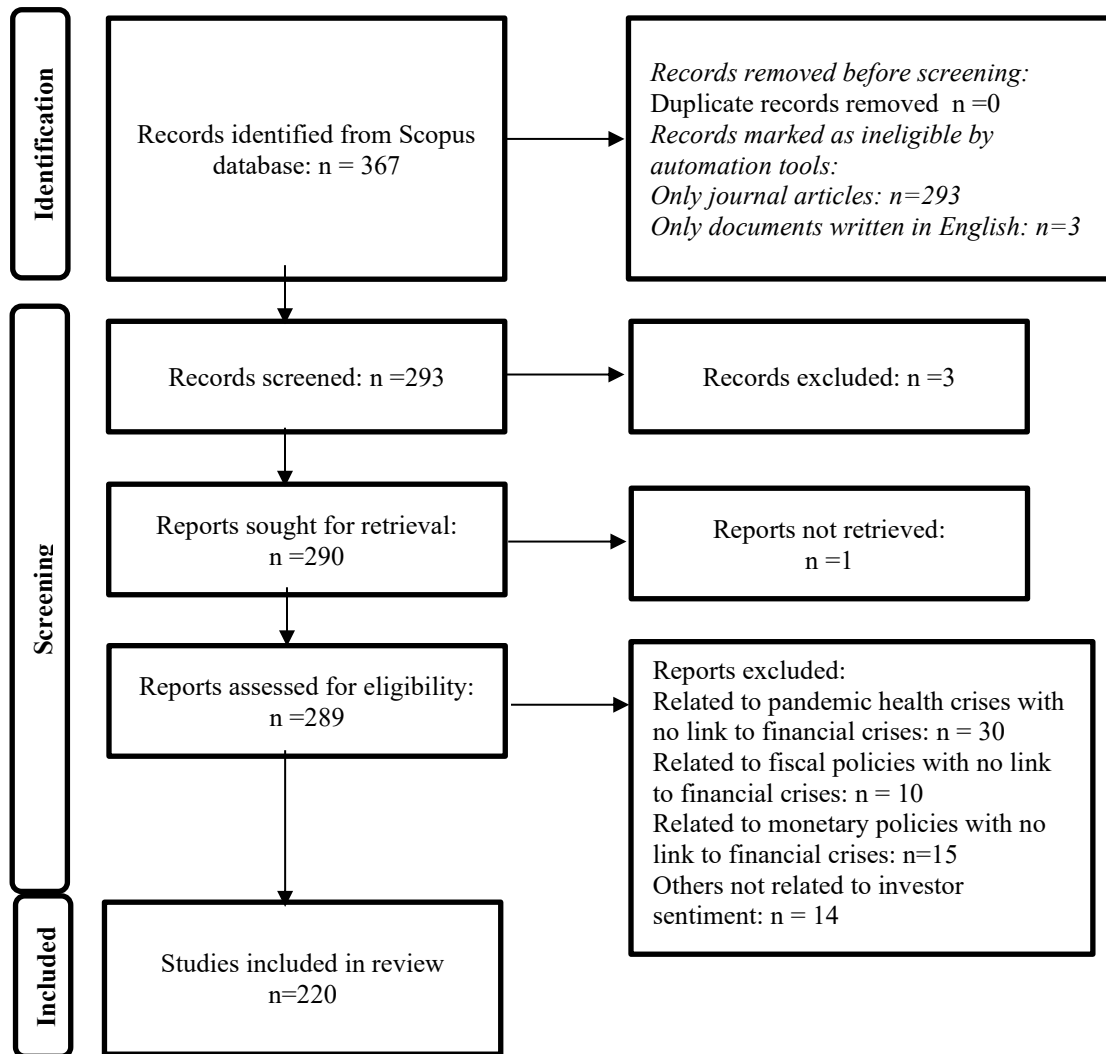


Figure 1: PRISMA framework

During the identification stage, 367 records were yielded but 74 were removed via automated instruments. In the screening stage 293 studies were investigated, while 73 of which failed to meet the applicability criteria and were thus, removed. Eventually, 220 studies formed the final sample of our analysis.

3. Bibliometric analysis

Bibliometric and scientometric analysis has been popularized over the last decade for a number of reasons; it provides researchers with comprehensive and concise knowledge over a specific research domain based on reliable and accurate outcomes (Donthu et al., 2021; Linnenluecke et al., 2020) and can also act as an intensive introductory “course” regarding scholar progress. Both performance and content analysis when combined with network analytics can upgrade the level of bibliometrics as they provide metrics over the overall academic productivity in the focused research domain, such as the universities, the countries, the authors, the subjects and topics, the journals (Alshater et al., 2020) as well as fruitful essentials associated with trend and factorial analysis, co-authorships, keyword co-occurrence and bibliographical coupling.

In the present study, we utilize all these tools to set the foundations for a well-established and compendious bridge on the role of behavioral traits in the financial domain, under the emergence of market crashes and bubbles. RStudio (Biblioshiny) and VOSviewer are used to conduct the rest of the findings and perform all

bibliometric estimations discerning as dynamic software tools that assist visualization, coupling and co-occurrence performance analysis (Van Eck and Waltman, 2010; Fetscherin and Heinrich, 2015; Aria and Cucurullo, 2017; Paltrinieri et al., 2019; Alshater et al., 2021; Koulis et al., 2025).

3.1 Performance analysis

In Panel A of Table 2 includes the ten most cited articles so as to show the most impactful and pronounced research efforts in the literature. In particular, Campello et al. (2010) have been cited 1315 times, studying credit constraints among 1,050 CFOs in the U.S., Europe and Asia during the 2008 global financial crisis. Morris and Shin (2004) have been cited 199 times focusing on the coordination failure faced by creditors of a distressed borrower and how fear of premature foreclosure may cause pre-emptive action and eventually undermine projects. Nonetheless, the highest citation per publication ratio belongs to Smales Lee A. at 59.80, while Sarwar G. follows second at 39.83. Considering studies individually, the highest number of citations is derived by Campello et al. (2010) and Morris and Shin (2004) whose papers have been cited 1315 and 199 times respectively as indicated in Panel B of Table 3. It can be logically deduced that these studies are periodically related to crises either global or national, since they chronologically coincide with turbulent financial events.

Table 2: Top 10 authors and articles as indicated by the number of citations

Panel A: Top 10 authors as indicated by the No. of citations					Panel B: Top 10 articles as indicated by the No. of citations		
No.	Author	Publications	Total Citations	Citations per Publications	No.	Article	Citations
1	Sarwar Ghulam	6	239	39.83	1	Campello et al. (2010)	1315
2	Smales Lee A.	5	299	59.80	2	Morris and Shin (2004)	199
3	Bouri Elie I.	4	141	35.25	3	Palma, J. G. (2009)	180
4	Basse Tobias	3	60	20	4	Salisu et al. (2020)	163
5	Redemann Sebastian	3	60	20	5	Lyocsa et al. (2020)	160
6	Adekoua Oluwasegun Babatunde	2	20	10	6	Smales (2017)	148
7	Bakhshi Priti	2	8	4	7	Kumar et al. (2023)	109
8	Balli Faruk	2	30	15	8	Griffith et al. (2019)	97
9	Caporale Guglielmo Maria	2	33	16.50	9	Sarwar (2012)	95
10	Economou Fotini	2	98	49	10	Bouri et al. (2018)	87

Additionally, in Figure 2, we visualize the literature growth in behavioral sentiments such as fear and greed and their association to market bubbles and crashes during the studied period. It is worthwhile mentioning that till 2007, research productivity seems rather limited, while after that point in time certain fluctuations emerge. Perhaps, this can be associated with the 2007-2009 global financial crisis that somehow revived public discussion on the behavioral factors that can interpret the momentum of crises.

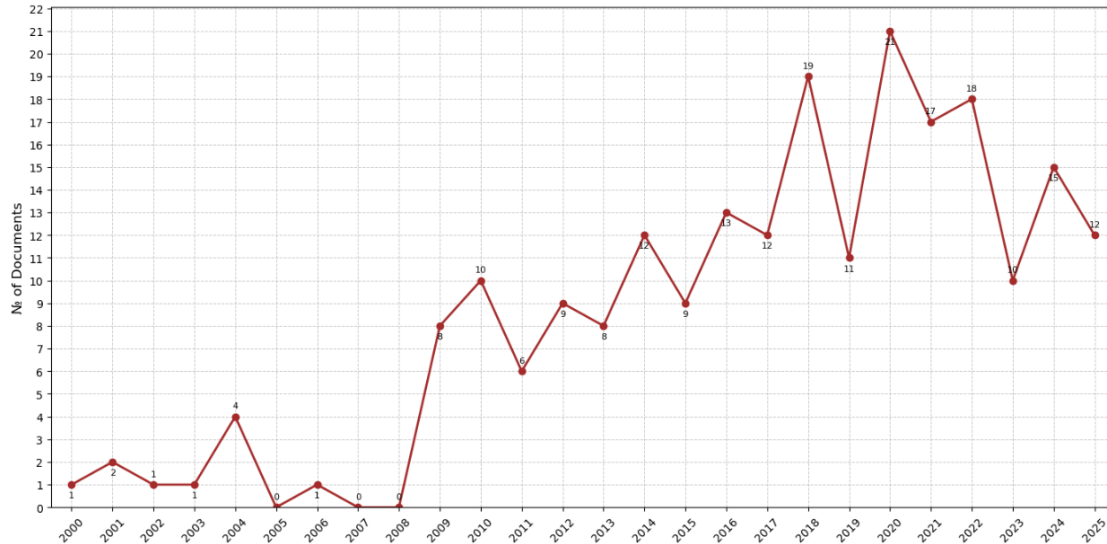


Figure 2: Literature growth on Fear, Greed and Financial bubbles and crashes for the period 2000-2025

Additionally, Table 3 lists the top ten finance journals that have published documents of this context, including Finance Research Letters, Applied Economics and the International Journal of Finance and Economics as the most centered journals in this domain. It is striking how Finance Research Letters and Applied Economics stand out regarding publications of this content, while at the same time they pursue supplementary research endeavors related to pure finance and economic research problems. Again, this information may prove fruitful to researchers who wish to enter this research domain, as well as academics who intend to gain familiarity with recent intellectual developments of similar content.

Table 3: Top ten academic journals

No.	Sources	Articles
1	Finance Research Letters	12
2	Applied Economics	11
3	International Journal of Finance and Economics	9
4	International Review of Financial Analysis	5
5	Applied Financial Economics	4
6	Economic Modelling	4
7	Journal of Behavioral and Experimental Finance	4
8	North American Journal of Economics and Finance	4
9	Research in International Business and Finance	4
10	Review of Behavioral Finance	4

In terms of institutional engagement, Table 4 (Panel A) illustrates the relevant findings. It is evident that the California State University, Curtin University and Cardiff Business School rank among the top three institutions that focus research resources on issues related to behavioral drivers as far as market bubbles and crashes are concerned. Panel B of Table 4 signifies that the U.S.A. and China are the most cited countries, followed by the U.K. However, several countries in Europe, South America, parts of Asia as well as Africa retain a geographical dropout as they are marginalized, signaling the necessity of research inclusiveness. This may prove a useful piece of information for students interested in academic programs of this sort, fellow researchers that are eager to dive into the field and also funding organizations.

Table 4: Top 10 institutions and countries as signified by the number of publications

Panel A: Top ten institutions and countries				Panel B: Top ten countries	
No.	Institution	Country	Publications	Country	Publications
1	California State University	U.S.A.	9	U.S.A.	17
2	Curtin University	Australia	6	China	15
3	Cardiff Business School	U.K.	5	U.K.	14
4	London School of Economics and Political Science	U.K.	5	India	9
5	City University of London	U.K.	4	Germany	8
6	Gottfried Wilhelm Leibniz Universität Hannover	Germany	4	France	8
7	Universidad Miguel Hernandez De Elche	Spain	4	Pakistan	5
8	Massey Business School	New Zealand	4	Turkey	3
9	Pontificia Universidad Catolica Do Rio De Janeiro	Brazil	4	Australia	3
10	Bahria University	Pakistan	4	Spain	3

Figure 3 below presents the dominant vocabulary that includes financial crises, stock market, vix, financial market and (implied) volatility. This is an additional, more powerful indication that research has been more intensified over the economic and/or financial traits of constitutional crises that troubled economies worldwide, and has rather overlooked the behavioral and/or sentimental impact as well as the association of these events in the investment and generally practitioner's daily challenges.

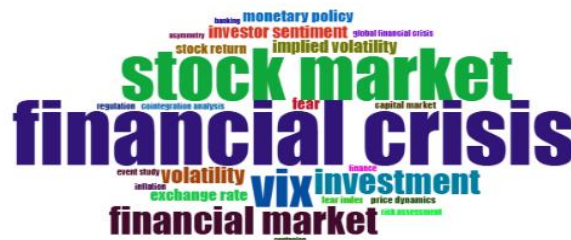


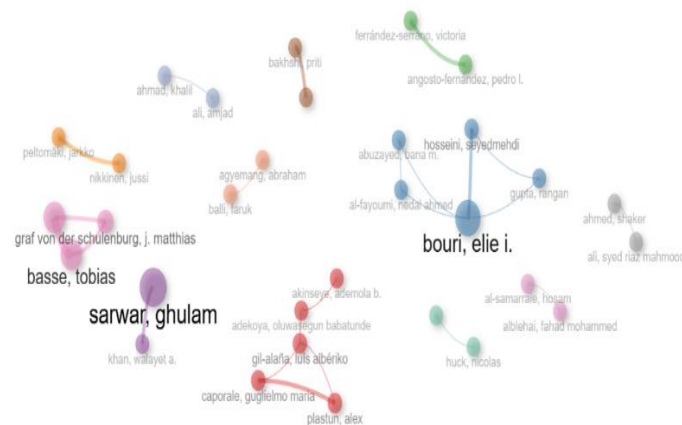
Figure 3: Word cloud analysis

3.2 Citation and network analysis

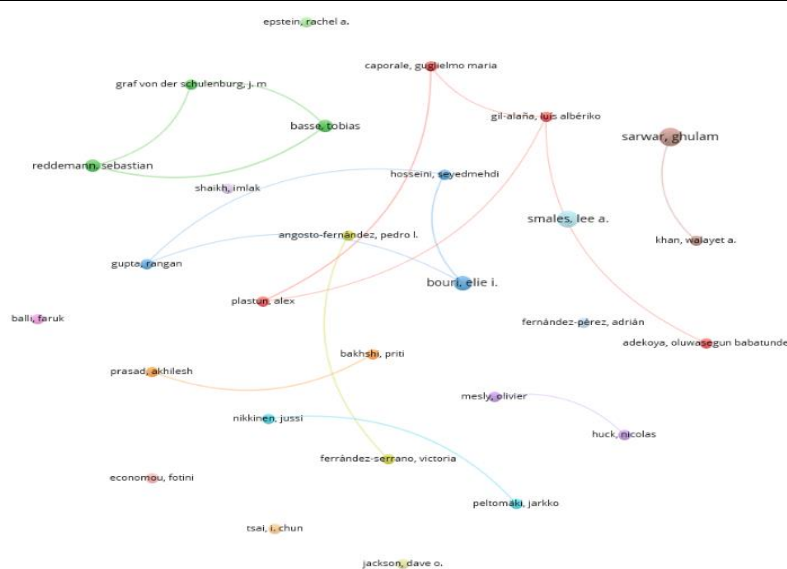
In this section of our study, we exploit the dynamics in Citation and Network Analysis so as to reveal intellectual patterns in investor sentiment under extreme market conditions. We recognize impactful authors and research cores by examining some pivotal metrics. Co-citation and co-authorship analysis consists key hubs in bibliometrics as far as academic journalism is concerned. Co-citation analysis involves articles' citations of each other, typically because they are related in terms of context or topic (Kim and McMillan, 2008), wherein co-authorship analysis is more centered on visualizing the relationships between researchers based on their shared publications (Liu et al., 2005). Analysis of this sort aids in (a) the identification of research collaborations, (b) understanding of the structure of scientific networks, and (c) the disclosure of influential researchers and institutions in the field (Liu et al., 2005; Piette and Ross, 1992). We additionally focus on *bibliographic coupling* which identifies research clusters, maps research fronts, identifies conceptual similarities and visualizes the intellectual landscape of the studied field.

Panel A: Authors' collaboration network.

Notes: The size of each node is indicative of each author's overall impact based on h-index.



Panel B: Co-authorship of authors.



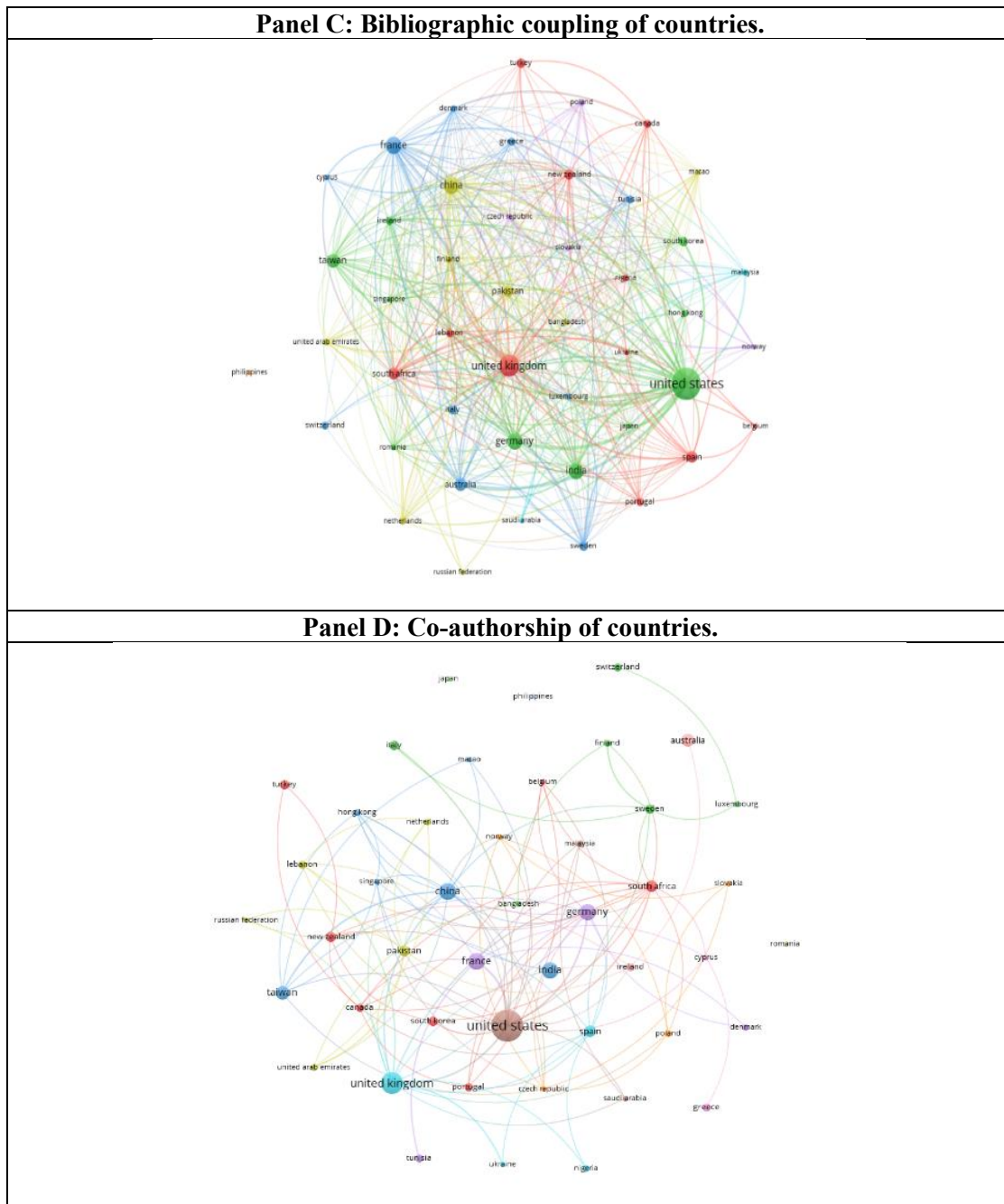


Figure 4: Bibliographic Coupling Analysis

Panel A in Figure 4 reveals that 477 authors yielded 220 publications, out of which only 66 studies are single-authored, while international co-authorship reaches 26.82%, signifying authors' encouraging interconnectivity and established collaboration. Panel B depicts the network map of the published articles, identifying 9 linked groups and essentially implies context-related patterns that emerge via the identification of specific research groups in investor sentiment mechanisms under turbulent events. Remarkably, 154 studies are affiliated, with the top seven demonstrating the most association robustness.

Our total sample of 220 studies stems from 53 countries, the first six of which have contributed the 55% of the sample with more than three notable publications each. The U.S.A. , China and the U.K. are primary

Also, we explore via the help of VOSviewer a cartography analysis. In particular, Panel B of Figure 5 reveals several keywords such as financial crisis, stock market, vix, investment, volatility and fear that fellow researchers could use in their search queries to efficiently identify published work of similar content. It also clarifies that words such as financial crises, stock market, volatility, investor sentiment and fear were the original keywords that set the development of this literature. Finally, the formation of three clusters emerges; the green dot involves around financial markets, crises and investment, the red dot centralizes on stock markets, volatility issues and investor sentiment including fear, while the blue dot is inclusive of financial crises, exchange rate and monetary policies context.

3.3 Associating keywords on behavioral mechanisms under periods of booms and busts: mapping out some distinct context-dependent aspects

Clusters 1 and 2 (green and red dots respectively) centralize on financial markets in crises regimes and converge in research streams that involve the impact on investment activity and investor sentiment. In fact, the principal core of the included financial studies is the effect of investor sentiment on price dynamics. One can even distinguish two primary strands in the examined literature; studies that examine the negative relation between investor sentiment and expected returns (Baker and Wurgler, 2007; Schmeling, 2009) and studies that focus on the volatility of returns and investor sentiment (Kling and Gao, 2008; Yu and Yuan, 2011).

Behavioral finance bridges comprehension and analysis on both the volatility and the emergence of financial crises according to investor sentiment anticipation. The role of behavioral biases, namely loss aversion (Agarwal, 2008), extrapolation, herding and overconfidence (Redhead, 2008) has been intensively researched in an attempt to interpret both the subprime and the dot.com financial crises. Seemingly, Zouaoui et al. (2011) argue that even the probability of a potential financial crisis is severely affected by the belief, the mood and the feeling of the market participants. Redhead (2008) studies the extensive increase and decrease in prices prior and post the dot.com crisis, and embraces the role of behavioral biases on the momentum that followed. Hirshleifer (2001) also supports that investor behavior has a powerful follow-trait (herding bias) since acquired stocks can send a message or useful information to other investors (informational cascade) about the course of future prices.

Ultimately, Cluster 3 (blue dot) relates financial crises to exchange rate and monetary policies and is diverged by the other two clusters. It primarily comprises of studies that address monetary policies and their alleviating effect after crises on market distress, inflation stabilization and output boost. A widespread literature stream debates on the very effectiveness of monetary policies to help economies recover in the aftermath of a crisis (Bouis et al., 2013; Pain et al., 2014). Meanwhile, literature also argues whether fiscal policies need to be more rigorously implemented, or whether we need to accept slow-moving improvements after financial crises as a stylized fact given the limited capacity for monetary policy practices (Rajan, 2005; Jimenez et al., 2014). Besides, monetary policy transmission can be affected by a plethora of traits exhibited by crises, such as low confidence of market participants, exorbitant financial markets distress, high levels of uncertainty and macroeconomic volatility, and considerable balance sheets alignments of households and enterprises (Reinhart and Rogoff, 2008; Bouis et al., 2013; Valencia, 2017). Given the controversial impact of monetary practices as measures of handling and even reviving from crises, we can inferentially justify the magnitude of empirical questions of this context.

4. Discussion

Financial crises have timelessly puzzled economists, policy makers, businesses and households due to their high social costs and their troublesome nature. Times of financial distress along with critical banking system issues are related to downturns of almost 5.5% of real GDP and output losses that magnify extremely when distress climaxes into a full-scale crisis. Also, the median fiscal costs regarding the resolution of insolvent banks during crises reach 16% of GDP for the majority of the 100 banking crises that have been globally reported since 1980 (Galomiris and Jaremski, 2023; Baron et al., 2021). Consequently, key players are massively motivated not only to comprehend but possibly even forestall financial crises.

Literature on these issues is divided into two distinctive strands. The majority of authors emphasize on the accelerated factors that usually lead to a crisis, such as financial innovation, political extremities (i.e. wars) and fraud. However, such peculiar histories are of little use about the future since totally identical crises are never replicated. Another strand of literature focuses on retrieving one single factor to blame for all crises regardless of their unique traits. Based on this approach, financial crises are an integral part of a boom-and-bust cycle that mirrors fluctuations between exorbitant pessimism (fear) and exorbitant optimism (greed). At this point, allow us to note that in the present study we adopt a broad definition of financial crises as periods in time when the market valuation of risky assets unexpectedly alters and that often contemplates on an alteration in the prediction of risk and its pricing. That way we manage to encompass a layout of incidents influencing several classifications of risky assets. Unlike assets are impacted by unlike crisis episodes, and many demonstrate dissimilarities in timing, dissimilarities in the market dynamics for spreading the impacts and totally dissimilar results, without necessarily entailing that those dissimilarities are associated with leading-to-crises factors that are essentially dissimilar. Put differently, if we restrict the analysis to let's say banking crises, that will also restrict our capacity to distinguish shared traits across crises involving unlike types of assets (bonds, options, land, loans and currencies).

The intimate association of crises with crucial components of political and economic sustainability and progress (involving a nation's improvement capacity over competition with other nations, satisfaction of political restraints put in effect by overpowering electorate and information about "golden opportunities") along with their high costs have been attributed to their persistence and puzzling emergence. The typical course of action to handling crises involves a number of reforms that both economists and politicians pronounce that will eventually guarantee the non-emergence of such another disturbing event. However, evidence proves that these promises are problematic in nature not only due to the ineffectiveness of the reforms, but also because the fundamental roots of crises lie in evolving traits that are essential to the political and economic endurance of societies and their governments. Therefore, human sentiment (either greed, fear, optimism or pessimism) is an adherent and tricky component that can adversely affect the momentum of a crisis.

4.1 Recent examples of crises behaviorally explained

The following sub-section attempts to link several financial crises and bubbles to the behavioral finance literature and its various theories by presenting the most indicative of those events in a timeline framework commencing from the most recent.

4.1.1 The Banking crisis of 2008

The banking crisis of 2008 was a crisis that originated not only in the U.S. but also in the U.K. and Spain. The years prior to 2008 were characterized by unprecedented macroeconomic stability, low risk pricing in the developed nations and a moderately invariant progress in the U.S. economy. Another profound characteristic of those years is the unemployment, inflation and short-term interest rates that were kept low on the developed economies; according to Jordà et al. (2018) this was a decisive factor that led to the housing boom and bust. The political pressures regarding the subsidization of lending risk in housing has been argued as the final contributor of the crisis that followed. Behavioral finance theorists support that human irrationality along with cognitive biases led to exorbitant risk-taking and poor decision-making by both institutions and individuals. The housing bubble, the subprime lending and several complex financial instruments collectively fueled the magnitude of the crisis.

More specifically, greed and over-optimism generated a risky housing bubble propelled by not highly regulated credit and lending frameworks, particularly for subprime borrowers. The popularized belief that housing prices would follow an upward trend indefinitely, led individuals, investors and lenders to risk underestimation, that eventually took on more debt and invested in even more complicated financial products. At the beginning, the general consensus was favoring a booming market, so investors and financial institutions pursued similar decisions to other key players (herd behavior) heading to immoderate financial risks and the escalation of risky assets (such as mortgage-backed securities). Also, in pursuit of larger profits (greed), lenders were incentivized to issue subprime mortgages, while financial institutions

further packaged these highly risky assets into complex derivatives, disregarding their implicit perils (wishful thinking). People thought of a downturn possibility to be unlikely (availability bias) but when the decline in 2008 materialized, fear and panic-selling prevailed. The amalgamation of the aforementioned behavioral biases resulted in an extremely vulnerable financial system that mirrored the inadequacy of regulatory oversight, the widespread lack of accountability and the breakdown of risk management systems. The enormous bank failures and the global financial recession became unavoidable.

4.1.2 The Spanish banking crisis of 2008

Adopting the euro currency in 1999, Spain experienced substantial economic growth. The country could borrow at significantly lower interest rates and experienced capital inflows that helped construction and increased land prices. Spain also underwent an unprecedented development in real estate lending; in fact, according to Baudino et al. (2023) mortgage growth to Spanish households surpassed 250%, while lending to the real estate sector reached 513%. Literature additionally documents the interconnection between political favoritism of risky borrowers and the expansion of savings banks' mortgages (Santos, 2017). The housing credit boom owes its renaissance to securities' issuance (particularly covered bonds) and mortgages' securitization.

The ongoing increase in housing prices along with the establishing belief that there would be a continuation to this, left individuals, businesses and institutions to herd together (herding behavior), fueling an inordinate credit growth and investment in real estate (irrational exuberance). Moreover, market participants underestimated involved risks and overlooked structural vulnerabilities of the economy (overconfidence and optimism bias). At the same time, poor governance in savings banks gave room for exorbitant risk-taking (moral hazard), while valuations of real estate were embedded to past price growth, making borrowers and lenders totally ignorant of rudimentary economic components that further impelled the bubble (anchoring bias). When the global financial crisis of 2008 hit, the Spanish banking sector faced a severe liquidity crunch that could not be endured. With the bubble burst, house prices experienced a significant downturn while investors exhibited great reluctance to sell their failing assets (thus, they hold on to losses-disposition effect).

4.1.3 The U.S. subprime crisis

The subprime mortgage crisis of 2007-2010 is originated in an earlier expansion of mortgage credit. Lenders funding mortgages made available high-risk mortgages by redesigning them into new financial products sold to investors. Private-label mortgage-backed securities (PMBS) were popularized in the mid-2000s since they provided most of the funding of subprime mortgages. DiMartino and Duca (2007) support that PMBS were considered low risk products and enabled first-time homebuyers to acquire mortgages; thus, homeownership increased unexpectedly. When house prices climaxed though, selling and refinancing households could not counteract on mortgage debt settlement, and thus rates on mortgage loss rose enormously for both investors and lenders.

The facts above entail that once again, overconfidence magnified a belief in everlasting housing price growth that resulted in an expansion of risky subprime lending. An informational cascade that was created by the collective practices of financial institutions and investors led many to herd, magnifying jeopardous behaviors and generating a feedback loop that intensified the bubble. Also, financial institutions lied on the presumption that governments or large institutions would offer a safety net in times of need, which further encouraged them to riskier practices (moral hazard). Finally, once again the pursuit of greater profits (greed) fueled exorbitant risk-taking, while the emotional compulsion to home ownership directed many to non-affordable mortgages, leaving them exposed to predatory lending actions (wishful thinking).

4.1.4 The dot-com bubble of 2000

The dot-com bubble stems from the frenzy in early 2000s in purchasing internet-based stocks due to the nature of this high-growth industry. Investors and financial institutions invested into dot-com stocks regardless of their actual value or profitability, swayed by the excitement of this new world wide web era, and of course out of fear of not missing out. Valuations placed on these companies were ludicrous, while

increases in share prices were the result of an overwhelming demand. Eventually, the burst of this bubble was unpreventable and led to a market crash with massive sell-offs of stocks and layoffs in the sector of technology.

In particular, the bubble burst when it became apparent that these companies lacked in profitability and sound business modeling which initiated panic-selling and market collapse. Other than herd mentality, investors overestimated their capacity to select winners and forecast the future of the sector, manifesting a cycle of hype and inflated expectations (overconfidence and overoptimism). Additionally, they became anchored to the initial breakthrough of early internet companies, unable to make adjustments when the market environment altered (anchoring bias). Finally, emphasizing on aggressive growth and market capture rather than profitability, prompted massive expenditures on advertising and marketing for the sake of dominance establishment, that devalued sound financial management (“get big fast” mantra).

4.1.5 The Asian Financial Crisis (1997)

The Asian financial crisis is a crisis emerged by the collapse of the currency exchange rate and hot money bubble. It involved Thailand, Korea and Indonesia at most, although it also expanded in Singapore and Malaysia. Those countries in the late 1980s and early 1990s became globally known as the “Asian Economic Miracle”. Since they achieved a massive economic expansion of an 8% to 12% increase in their GDP. Export growth and foreign investments were the main drivers of these developments, thus hot money was attracted via high inherent rates and fixed currency exchange rates (tightened to the U.S. dollar). However, export growth and foreign investments were devastated by an appreciation of the US currency in the mid-1990s that also dragged other currencies pegged in the US dollar. That shock led to a sudden collapse of asset prices which were leveraged by large amounts of credits. Panic-selling and fear prevailed in this crisis too, leaving the Asian countries involved, stranded.

During the crisis, investors faced significant losses due to economic instability and currency depreciation that instead of holding on so as to potentially benefit from a recovery, they withdrew their funds as a protection measure of their remaining capital (loss aversion and prospect theory). Prior years that led up to the crisis, cultivated the belief that this growth could be ongoing, leading to an undervaluation of the true risks of investments and the accumulation of vast amounts of foreign-denominated debt (irrational exuberance). Finally, irrational overreaction and panic were the result of information asymmetries and lack of transparency in these emerging economies. Market participants essentially remained opaque of the underlying economic fundamentals and were thus unable to form a pragmatic viewpoint.

Ultimately, behavioral finance is an interpretation tool towards comprehending the degree at which psychological biases amplify structural and policy-related vulnerabilities, converting different types of localized problems into full-scale regional financial crises.

4.2 Integrating behavioral components into financial regulation and supervision

Financial regulation and supervision often present a short-sighted attitude towards the role of behavioral elements in shaping market dynamics (Khan, 2018). Behavioral finance literature has turned the spotlight into behavioral abnormalities and their intrinsic ramifications into markets, but there still seems to be room for the development of practical approaches that permit regulatory authorities to address decision-making and the involved risks more comprehensively. In particular, there can be three primary streams into which financial regulators and supervisors could incorporate behavioral knowledge so as to assist their efforts into forestalling an upcoming turbulent market event; those streams refer to (a) research, (b) supervision and (c) policy-regulation.

In reference to research, manifesting a conducive environment to research conduct that delves more into behavioral aspects and their intrinsic effect into the financial sector particularly when exorbitant events are being constructed, could yield suitable approaches to transcend the operational level of regulation and supervision. For instance, Lombardelli et al. (2002) examine the case of decision-making in uncertain settings and conclude that group decisions are superiors in quality compared to similar individual processes. Similarly, Brazier et al. (2006) manage to form a heuristics-based inflation forecasting model that advocates the inadequacy of the monetary policy directives in economic stabilization; their proposed model though

preserves economic balances more effectively. Additionally, corresponding to regulatory capture and negligence in financial markets, the list of exemplary studies include the papers by Veltrop and De Haan (2014) and Ehrmann and Jansen (2012) that highlight the rise of various biases in judgement-based supervision and vividly support the prerequisite to enhance comprehension of market participants' choices, demands and overall mentality through further research on primary data.

Behavioral supervision entails prompt identification of behavioral risks that could act as a critical component in a more extensive risk management approach. Analyzing and evaluating behavior that holds the potential to act as early warning of frugal risks is key. The Central Bank of the Netherlands (De Nederlandsche Bank-DNB) and its 2009 published policy stands as an exceptional paradigm; notably, DNB adopted a number of behavioral traits that were added to the more standardized controls (including primarily capital and liquidity measures, as well as corporate governance related mechanisms) and related to enforcement, transparency, feasibility, openness to discussion, leading by example, balanced and consistent actions, abidance to the spirit of law and responsibility-accountability. The Bank ever since promotes and vigorously discusses the four focus areas that every financial institution should address, namely sound judgement, critical dialogue organization, flexibility in leadership style and actions to improve attention on behavior and group dynamics.

Finally, there is an inherent difficulty in regulation drafting that manages to encompass behavioral aspects. The World Bank through its report in 2015 stand as the first international effort that outlined the necessity to commence with policy development (Khan, 2018). The report characteristically states that "Paying attention to how humans think can improve the design and implementation of development policies and interventions that target human choice and action (behavior)" (p. 2). Anti-corruption regulations is a typical example that highlights the relevance in people's behavior comprehension. Feldman (2017) for instance, underlines that directives on corruption and conflicts of interest could be composed in a manner that minimizes the impediments to misconduct. He argues that people working in groups are more prone to wrongdoing practices compared to individual behavior patterns. Corruption is blamed for non-transparent agreements, unsustainable borrowing, and poor loan quality. Another significant field where behavioral elements are highly relevant is the remuneration policy. Regulators need to be equally worried about both monetary and nonmonetary rewards since the latter are harder to resist, particularly by good people (Lessig, 2011; Kwak, 2014; Veltrop and Da Haan, 2014). Short-term gains that reinforce excessive risk can be tied to remuneration. Overall, excessive, poorly structured remuneration as well as corruption have contributed to financial crises via nurturing irrational risk-taking, decaying trust and misinterpreting market incentives. In fact, they have led to national financial instability and corporate collapses in a plethora of financial crises and stand as one of the primary elements of state capture (that is, high-level political corruption) in the systemic malfunctions of oversight, regulation and disclosure (Krambia-Kapardis, 2016).

These suggestions compel us to surpass the perspective of a utility-maximizer individual who is often a rational egoist, a steward of a commercial entity or a powerful reciprocator, and embrace a broader human-behavior theory in our practices (Gintis et al., 2005). The effectiveness of currently dominant economic theories and subsequent policies is jeopardized due to their uprooting of norms of trust and reciprocity, the limitation on ethical issues' conversations with people who are impacted and the restriction on experimentation required to create effective institutions. Those ascertainments pave the way for the establishment of behaviorally aspired regulatory and supervisory measures that will ensure accountability and will hopefully set appropriate barriers to a future crisis' prevention. Remuneration policies, board composition and assessments, as well as internal controls (incorporating risk management) substitute some of the areas that are already engaged in recognizing, attenuating and tracking the consequences of individual behavior and therefore could effortlessly be amplified.

5. Conclusion

The essential role of behavioral finance in the decision-making process of individual investors, but also investment advisers is particularly reinforced at times of extreme market volatility and economically stressful conditions in the markets. The present structured review aims to highlight the critical role of behavioral biases that emerge when emotions like fear, greed, hope and regret become important drivers of investor behavior and impact market dynamics. We present a structured review of the most recent cases of financial crises along with the behavioral complexities and irrationalities that prevailed by applying both bibliometric and content analysis. We have thus attempted to retrieve publication trends, the most fruitful organizations, countries and authors and the principal keywords that further established the development of this research domain.

Based on Scopus database, we have examined 220 studies in total, during the most recent twenty-five year period. Our results show that after 2007, the field began to rise significantly with many authors joining this sub-discipline of behavioral finance, expanding the work by more thorough examination of the behavioral factors and psychological mechanisms under extreme market conditions. There is a significant number of review based impactful papers that have been published in the past few years. The geographic dispersion of the established work is primarily located in Northern America and Western Europe with highly prominent publications, that also yield the greatest contribution to the area. East Asia and Southern Asia though are not far behind. The highest number of publications is derived by California State University, leaving Curtin University, Cardiff Business School and London School of Economics and Political Science behind. The topmost prolific journals are Finance Research Letters, Applied Economics and International Journal of Finance and Economics.

The contribution of the study can be summarized as follows: (a) content analysis assists in the identification process of several mature and emerging topics related to financial crashes and behavioral biases literature, (b) it provides a roadmap into different stages of emotional escalation during economically worrisome events, and explores the psychological factors that affected market movements, and (c) to the best of our knowledge, it is the first study that encompasses the behavioral drivers of each crises through systematic methodology, bibliometric and content analysis and further outlines the knowledge structure of this sub-discipline. However, it suffers from a couple limitations. Our search is not inclusive of the “grey literature”, that is non-peer reviewed journals, books and conference proceedings. Also, we solely employ Scopus database. Additional resources could potentially offer valuable insights.

Overall, acknowledgment and management of emotions and prejudices may prove crucial for investors particularly in strategic decision-making processes under puzzling market circumstances. Mitigating the adverse ramifications of emotional investing, managing the complexities in investor mood, and cultivating more stable and robust financial markets are yet debatable concepts that require a multidisciplinary strategy, integrating the fields of Economics, Finance and Psychology.

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