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Analysing Global Research on Stock Market Anomalies: A Behavioural Finance Perspective

Hind Dheyaa Abdulrasool^{1,2}, Rafidah Othman¹

¹Azman Hashim International Business School, Universiti Teknologi Malaysia, Johor Bahru, Malaysia, ²Department of Business Administration, College of Administration and Economics, University of Al-Qadisiyah, Al Diwaniyah, Iraq

Abstract

Investors' psychology and behaviours have been known to influence the emergence of capital market imperfections. The corpus of studies on this matter is copious but conflicting as researchers approach the subject from two major perspectives. Against this background, this study aims to review and establish the global research trend in behavioural finance examining stock market anomalies vis-à-vis its opposing paradigm (i.e., the efficient market hypothesis). Based on an extensive review of the types of anomalies published by scholars over 53 years (1968 – 2021), this study generated search strings targeting the appropriate investor behaviours as responses to stock market anomalies. The study applied bibliometric analysis and drew 1,767 documents from the Scopus database, which were later reduced to 1,436 after applying the exclusion criteria. The analyses revealed that authors prefer to disseminate their research on stock market anomalies in refereed journals and also attempt to unravel the contrast between rational and behavioural dynamics of investor decision-making based on short-term observations. Also, most of the studies fall under the general economics and business subject groups, indicating authors' preoccupation with general rather than specific matters on stock market anomalies. Further, the study highlighted the global distribution of studies on stock market anomalies, the top prolific authors in the field, the top journal sources, and the Scopus profiles of selected top authors. Based on these results, recommendations for future studies were given.

Keywords: Stock Market Anomalies, Investor Behaviours, Efficient Market Hypothesis, Behavioral Finance.

Introduction

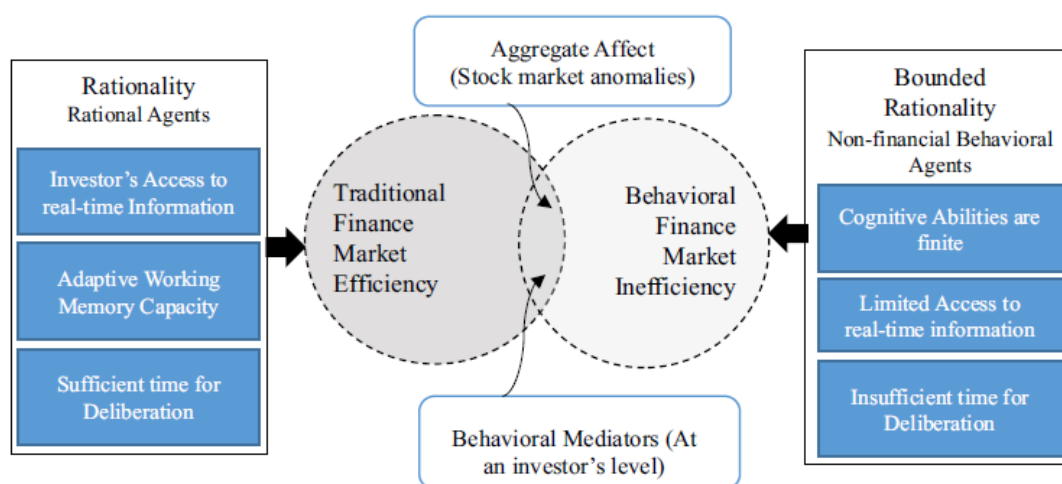
The hegemony of rationality-based stock market theories (e.g., investor heterogeneity, asymmetric information, and investor rationality theories) was challenged when they failed to explain the anomalies and inefficiencies observed in developed and emerging markets (Kahneman and Tversky, 1979; Glaser et al., 2004). This provided the impetus for the emergence of behaviour-based market theories. According to Filbeck et al (2017), the new theories focus on investor behaviours such as grounding, availability, herding, mental accountability, optimism, and overconfidence.

Stock markets pool disparate financial assets and efficiently channel them to areas of need. Thus, capital market development is critical to any country's financial development.

When it comes to scarce resources, market efficiency is paramount (Black and Gilson, 1998; Hassan et al., 2011). Stock markets act as a middleman, pooling savers' funds and channelling them to investors according to the price mechanism (Baumol and Brown, 1965). Thus, stock prices are important market signals for resource allocation in all regulated economies. Thus, behavioural finance seeks to understand why investors make logical errors when making investment decisions. It identifies flaws such as investor overconfidence, herding behaviour, and excessive optimism (Cooremans, 2011).

The EMH is widely used to study stock market behaviour. For instance, Fama (1970) used the EMH to categorise stock markets. According to Luu (2011); Samuel (1996); Zuravicky (2010), efficient stock market operation encourages people to buy and sell securities. Individual investors' earnings and long-term savings drive stock market growth. Globally, stock markets now help manage long-term capital, income, and inflation (Bradley and Teweles, 1998). However, behavioural finance focuses on market efficiency based on investor psychological dispositions and other non-EMH motives (Alfaro et al., 2004). The behaviourists believe that the potency of investors' irrational decisions is ignored by traditional financial market theories (Nigam, 2018), thereby failing to capture the reality of underlying currents driving stock market anomalous performances.

The literature on investor behaviours has reached an advanced stage of development. This calls for synthesis that presents the scholarly community with clear trends and developments in the field. Accordingly, this study seeks to map the empirical studies dealing with the investor's behaviour in the stock markets. This research perspective is captured in Figure 1, showing the confluence of rationality and irrationality in investors' behaviours accounting for stock market anomalies.



Source: Nigam et al. (2018)

Figure 1. The Rational and Irrational Investor Behaviours

According to Nigam et al (2018), investors' decisions are influenced by their psychological dispositions, which may look irrational from the perspective of purely economic motives (Figure 1). This study focuses on investor irrationality (Morente Molinera et al., 2019). Investors are capable of making irrational decisions. Hence, psychological factors influence investment decisions. Many factors other than economics influence investors' decisions (Leite et al., 2018; Prizzon et al., 2018; Chudy et al., 2020), providing avenues for investor behaviour studies. This study analyses research that sought to explain investor behaviour.

The primary purpose of this article is to have an insight into how the influence of psychology on the behaviour of the investors can explain capital markets imperfections. Human nature is perfectible, but it is not perfect. Investors are people with many deviations from rational behaviour and often make illogical decisions. From the global financial perspective, the significant influence of psychological factors in investment decision-making is undeniable. In light of this, the problem of this research can be presented and formulated as follows: The extent of the ability of behavioural finance to explain the investor's behaviour in the stock market in light of theoretical criticisms of efficiency and the presence of distortions? This study will present a comparative study to cover all the important items regarding investment management. Furthermore, this study will add to the methodology of the investment market. Finally, this study will provide an extensive structure of the stock market anomalies.

This study is divided into different sections, starting with an in-depth literature review, mapping the general field of behavioural finance focusing on stock market anomalies. The bibliometric analysis then maps the contributions of prolific writers in terms of their countries of origin and academic institutions. After that, the study analyses the co-authorship, co-occurrence, and co-citation, which collectively groups the authors along with specific research niches. All these are done against a summary of the identified stock market anomalies underpinning investor behaviours.

Literature Review

Effective Market Hypothesis

An important theory in capital market studies is the Efficient Market Hypothesis (EMH). An efficient market comprises profit-maximising actors who have equal access to market information upon which they base their decision (Fama, 1970). EMH supporters point out that biases do not affect the markets (Sharma and Kumar, 2019). Any anomalies will always be automatically adjusted to push stocks back to their base prices (Filbeck *et al.*, 2017; Obalade, 2019; Beikmanis and Silis, 2020). According to them, changes in the market occur for various reasons and cannot be attributed to behavioural biases. They believe that if we analyse any stock adequately and read past trends and current news, it will be easy to discover that market changes are just a matter of chance and not the product of individual behaviour.

Anomalies in Capital Markets and Thinking about Alternative Perspectives

Several studies have contradicted the EMH hypothesis, showing evidence of anomalies in security prices which the EMH failed to explain (Tadepalli and Jain, 2018; Tadepalli and Jain, 2018). The anomalies effectively defy the EMH and its assumption of investor rationality (Temelli, 2019). Further, studies have shown that investors may benefit from the anomalies (Brown, 2020; Altin, 2020). Thus, the EMH explanations that market anomalies are a sign of inefficiency remain unconvincing, leading many scholars to subscribe to the behavioural explanations of stock market behaviours. Table 1 shows some of the studies and the anomalies studied.

Table 1

Types of Anomalies Observed in Capital Markets

Effects	Authors	Findings	
Seasonal Anomalies			
	January effect	Rozeff and Kinney (1976)	In the first two weeks, the stock prices are higher in January than in the last two weeks of December.
Month-of-the Year Effect	Halloween Effect	Bouman and Jacobsen (2002)	Stock is considerably lower during summer and fall, from May to October, than in winter and spring.
	October Effect	Cadsby (1989); Szakmary and Kiefer (2004)	Decrease in stock during October than the rest of the year. This occurrence ceases after 1993.
Turn-of-the-Year Effect	Dyl (1977); Givoly and Ovadia (1983)		Larger trading, losing stocks in December.
	Guin (2005)		Tax-related problems, selling during December and buying during January.
Summer Effect	Wachtel (1942)		Rise of stock prices during summer
Month-of-the quarter effect	Penman (1987)		Firms have high rates in the first quarter.
Week-of-the month effect	Linn and Lockwood (1988); Hensel and Ziemba (1996)		Higher returns in the first week of the month rather than the last week of the month.
Day-of-the-Week Effect or Weekend Effect	Cross (1973); French (1980)		The closing price for Monday evening is less than the closing price for Friday.
	Guin (2005)		The weekend effect occurs when companies and governments realise bad news over the weekends.
	Foster and Wiswanathan (1990)		Trade increases on Friday because of the information symmetry.
Monday effect	French (1980); Barone (1990); Gibbons and Hess (1981)		Monday return prices are lower than the other days; lower stock prices on the first two days of the week.
Hour-of-the-Day Effect or End-of-the-Day Effect	Guin (2005)		Increase trading and value in the last 15 minutes of the day.
	Harvey and Huang (1991)		Higher interest rates on Thursday and Friday during the first hours.
Holiday Effect	Lakonishok and Smidt (1988); Petengill (1989)		Higher abnormal return of stock market before the beginning of public holidays.
Political-Cycle Effect	Santa and Valkanov (2003)		Higher returns during the first and last years of presidential elections
Islamic Calendar Effects			

Effects	Authors	Findings
Ramadan Effect	Jedrzej and Bialkowski (2010)	Returns tend to be lower in Ramadan than in the rest of the months in Islamic countries.
Eid-el-Fitr Effect	Guyen and Oguzsoy (2004)	The impact of higher returns on the last day of Ramadan and increased trading during Eid-el-Fitr
Ashoura Effect	Al-Ississ (2010)	The effect of declining returns on the tenth day of the first month (Muharram) in the Hijri calendar.
Fundamental Anomalies		
Value effects	Goodman and Peavy (1983)	Institutions with a low profitability multiplier have the highest returns compared to institutions with a high profitability multiplier.
Initial Public Offering	Loughran and Ritter (2004)	The companies entering the market for the first time are valued at less than their actual worth, but they give the best returns compared to the market in the short term.
Size Anomalies	Banz, (1981)	Small-cap institutions achieve greater returns than large-cap institutions.
Tincture Anomalies		
Reversal and Momentum	Debondt and Thaler (1985)	In the past three to five years, stocks with the lowest returns tend to yield the largest returns in the next three to five years.
Momentum Effects	Egadeesh and Titman (1993)	The winning stocks continue to outperform the rest of the stocks, and the losing stocks continue to perform with the same performance.
Moving Averages	Brock (1992); Josef (1992); Lakonishok <i>et al.</i> (1992)	Stocks are purchased as short-term averages increase above long-term averages, and stocks are sold when short-term averages dip below long-term averages.
Trading Range Break	Brock (1992); Josef (1992); Lakonishok <i>et al.</i> (1992)	The sale signal is generated when rates exceed the support level. Purchasing is signalled when prices rise past the last peak and selling when prices fall below the last trough.

Investments have made irrational decisions due to investment naivete or herd behaviour (Jawadi et al., 2018). Shleifer (2000) called them *noise traders* who fail to diversify their portfolios or sell winning stocks and hold losing stocks, increasing their tax liabilities. Noise traders make choices based on personal experiences and social influences. They rely on unreliable information, rumours, and investors' psychological states (Jaiyeoba and Haron, 2016). They copy trends and overreact to both good and bad news. Studies have shown that such investors cause financial market bubbles to form and recur throughout history (Neal, 1993). This led behavioural finance advocates to conclude that human emotions influence investment decision-making (Heaton, 2002). Thus, behavioural finance explained what traditional financial theories failed to explain, especially in light of the recurring stock market crises (Shah et al., 2018).

The Behavioural Finance as An Alternative Approach

The EMH is based on the idea that the market is influenced by external factors and the decisions of rational agents seeking to maximise their returns on invested capital. The EMH sees human emotions as irrational factors distorting market decision structures. However, behavioural finance scholars countered the idea that buying and selling stocks are inherently human choices and largely dependent on investors' psychological dispositions. Thus, behavioural finance scholars investigate market anomalies caused by the non-EMH investor behaviours, which later impact stock market performance (Sewell, 2007). These scholars draw on Adam Smith's two influential works: *Theory of Moral Sentiments* (1759) and *Wealth of Nations* (1776). Smith (1776) posits that investors' morality informs all significant economic, social, and investment decisions. Further, Smith (1759) argues that egotism, shame, insecurities, pride, and psychological limitations shape investors' rationality. However, to avoid excessive emotions in economic decisions, Bentham (1789) emphasises the role of psychological unity.

For researchers in behavioural finance, investor psychology is crucial to the economic decision-making structure. Early Gustave le Bon's (1896) work affirmed that stock price is influenced by the investor's psychology and personal attitude. Simon (1955) also emphasises that individual rationality is constrained by information availability and the investor's cognitive limitations. Festinger's (1956) notion of "cognitive dissonance" approximates Simon's position, which refers to the unsettling feeling of unease influencing investor decisions. Thus, the behavioural perspective on stock market behaviours is more realistic than the propositions of the EMH. A factor widely studied in behavioural finance is risk-aversion. For instance, Pratt (1964) contends that a risk-averse investor will always be risk-averse either on local or global stock markets. Another idea at the core of behavioural finance is the prospect theory which explains investors' behaviours when evaluating gains and losses, influencing investor decisions through availability heuristics (Tversky and Kahneman, 1974). In general, behavioural bias in investment decisions is classified as cognitive or emotional. Table 2 shows studies that instantiate behavioural biases in investment decisions.

Table 2

Divisions of Behavioural Biases

Author and Year	Behavioural Biases
Kahneman and Riepe (1998)	<ol style="list-style-type: none"> 1. Judgment biases: overconfidence, excessive optimism, late cognition, overreacting. 2. Preference errors: nonlinear weight of probabilities, the shape and attractiveness of the betting, value function. 3. Buy price as a reference point: framing, gambling, short and long view. 4. Living with the consequences of a decision: regret for neglect and wrongdoing. Regret and risk tolerance.
Shefrin (2002)	<ol style="list-style-type: none"> 1. Prompt acting: Gamblers fallacy, overconfidence, anchoring, avoiding ambiguity, cognitive emotion perception. 2. Tire reliability: loss avoidance, mental accounting, emotion, avoid regret.
Pompian (2006)	<ol style="list-style-type: none"> 1. Cognitive biases: overconfidence, representation, focalisation, cognitive dissonance, availability, the illusion of control, mental accounting, framing, and avoiding ambiguity. 2. Emotional prejudices: loss aversion, remorse avoidance, excessive optimism, self-control.
De Bondt et al (2008)	<ol style="list-style-type: none"> 1. Investor Passion: Focused acting, availability, overconfidence. 2. Investor preferences: loss aversion, mental accounting, nearsightedness, self-control, remorse avoidance.
Waweru et al (2008)	<ol style="list-style-type: none"> 1. Heuristic factor: Overconfidence, anchoring, availability 2. Prospect factors: Loss aversion, regret aversion, mental accounting
Acker and Deaves (2010)	<ol style="list-style-type: none"> 1. The theory of probability: avoidance of loss, framing, mental accounting. 2. Means: The familiarity bias, ambiguity avoidance, possession bias, status quo bias, acting, availability, anchoring. 3. Overconfidence: excessive optimism, the illusion of control. 4. Emotional elements: anger, fear, sorrow, remorse, happiness.

Prospect Theory and Behavioural-Directional Decision-Making

Prospect theory is also known as expectancy theory (Tversky and Kahneman, 1979). It is a widely used theory for explaining how investors draw on probabilities in making decisions when faced with uncertainty. Risky decision-making is a choice between expectations and gambling (Zeelenberg, 1999; Schiebener and Brand, 2017; Zaleskiewicz and Traczyk, 2020; Bolomope et al., 2020). According to prospect/expectancy theory, people hate losing more than winning (Lejarraga and Hertwig, 2017). Investors are predisposed to give more weight to investment choices they perceive as risk-minimal to avoid losses (Chankong and Haines, 2008). According to Liu et al (2011); Young et al (2012); Peng and Dai (2017), the investor is risk-averse when it comes to earnings but risk-seeking when it comes to losses.

When stock price rises, investors feel happy. However, it is not the price rise that ultimately motivates investors to sell their stock. It is the prospect that the same stock prices may fall and they will sustain losses that push them to sell. The inverse is also assumed. The investors assume that if they do not sell the stock whose price is currently falling, they will lose the gain, so they sell it. This is the pattern of investors' risk avoidance and risk-seeking

behaviours (Zahera and Bansal, 2018). Figure 2 illustrates the gain/loss psychology of investors. In the first case, the investor avoids taking risks, while in the second case, the investor takes their chances and takes risks.

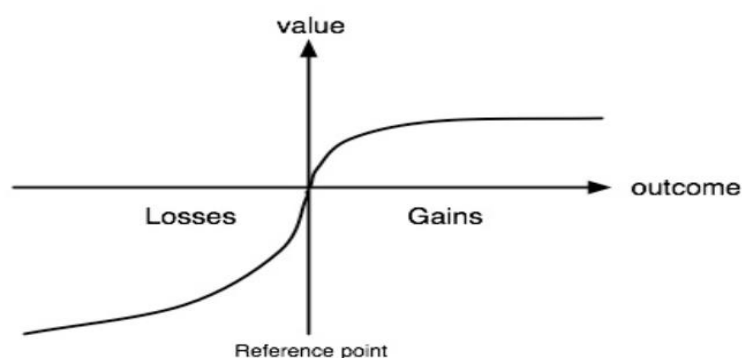


Figure 2. The Value Function of Human Risk Evaluation (Kahneman and Tversky, 1974:11)

Interpretation of Anomalies Capital Markets According to Behavioural Perspective

Shiller (2000) explains that the speculative bubble is a condition that occurs when the news of price increases ignites investors' enthusiasm which is spread by psychological contagion. Additionally, this process might justify the increase in prices. This would attract a larger class of new investors. The investors will be attracted despite their scepticism about the true value. They will be motivated by their envy of others' successes, on the one hand, and excitement of the gambling involved, on the other hand. This is what spreads the investment contagion, thereby mimicking the theory of the bigger idiot. After the bubble burst, this same contagion feeds the rapid collapse of stock markets, causing prices to fall, more investors leaving the market, and amplifying negative news about the economy. In such situations, the psychological contagion implants a psychological belief that high prices are usually justified. Thus, participation in the bubble becomes almost rational, but it is not. Utkus (2011) summarised the stages of bubble formation to burst from a behavioural finance perspective, as shown in Table 3.

Table 3

The Bubble Is a Form of Behavioural Finance Theory

Stage	Behavioural Indicators	Properties
Initial prediction	Representativeness	Investors make initial asset price forecasts depending on wrong statistical inferences at this stage.
Overconfidence	Overconfidence and excessive extrapolation	Future predictions become overly optimistic and tend toward positive adoption of the recent positive experiences.
Transmission / amplify the group	Group thinking and collective polarisation	Individual predictions are transmitted widely among group members and bear High levels of risk.
Re-assay	Collective polarisation	Predictions are frayed in the experience of reality, and the values are rapidly reflected backwards.

Source: Utkus (2011)

Fama (1998) argued that not all investors are psychologically primed to react to market changes in response to proponents of behavioural finance. Fama (1998) maintains that the market can remain efficient by relying on two fundamental assumptions. The first assumption is that irrational investors cannot influence prices. This is because transactions in the market are randomly and individually cancelling each other, thereby leaving the market efficient. The second assumption is based on the arbitrage process. The intense competition between speculators in the stock market usually leads to loss for the weak party, thus leaving the market for the rational investor. The outcome ultimately restores balance to the market, a proposition supporting the EMH.

Methodology

Search Strategy

Several databases exist that could be used as sources of bibliometric data. They include Elsevier's Scopus (Belussi et al., 2019), Web of Science (WoS), and Google Scholar (GS). The comparison of Scopus, WoS, and GS in prior studies revealed qualitatively similar findings (Vieira et al., 2009; Amara et al., 2012; Belussi et al., 2019). The Scopus database was used in this study because of its extensive amount of available literature on financial databases and financial management (Fahimnia et al., 2015; Martinez Lopez et al., 2018; Abdul Rassol & Othman, 2020; Baas et al., 2020). Several scientometric studies have used the database to anchor their bibliometric analysis. The adoption of the systemic approach proposed by Tranfeld et al (2003) helped the current study establish clear goals and a comprehensive overview of the phenomenon under study and analysis (Rousseau et al., 2008) for reproducibility of the study.

The search strategy entails using different keywords related to the concept of stock market data, and the financial management sector was explored in the current study's search queries. All keywords were segmented according to their similarities and relevance to the study. Firstly, all keywords related to the concept of stock market data were grouped: "Islamic calendar effect", "tinctures anomalies", "seasonal anomalies", and "fundamental anomalies". The second segment grouped all keywords related to the financial stock market sector, including financial assets and any additional miscellaneous keywords: "emerging market", "bonds", "currencies", "equity markets", "exchange traded fund", "real estate investment trust", "mutual funds", "explanations", "sources", "firm size", "capital investment", "market states", and "investor sentiments".

Methods of Bibliometric Analysis

Considering the analytical nature of the current study, bibliometric analysis was selected. This approach consists of various methods that identify the journal structure in terms of authors, the scope of the study, and the field of study (Dzikowski, 2018). There are different methods available to analyse specific corpora of scientific knowledge. Bibliometric analysis quantitatively analyses academic literature. Integrating objective scientific measures in this analysis minimises the potential bias inherent in subjective assessment (Appio et al., 2014, Md Khudzari et al., 2018). The bibliometric analysis can construct a bibliometric map for a specific domain, supporting the interpretation of the latest and historical information in literacy data (Ceretta et al., 2016). Besides that, the analysis also offers significant theoretical evidence and insights into the conceptual relationships, resulting in new findings.

There are several common methods of bibliometric analysis: (1) direct citation method (a paper is directly cited in another paper); (2) co-citation method (several papers are cited in

another paper); (3) bibliographic coupling method (a paper is cited in several papers). These methods reflect potential relationships between the content of documents. A few prior studies reported that the bibliographic coupling method marginally outperformed the co-citation method in terms of analysis accuracy and identified the direct citation method as the least accurate mapping tool (Klavans et al., 2010; De Carvalho et al., 2019). The current study opted for co-citation and bibliographic coupling methods of analysis of the relationships between the content of documents.

Bibliometric Maps

This study used VOSviewer (version 1.6.7, Centre for Science and Technology Studies, Leiden University, The Netherlands) as a software tool for developing and visualising bibliometric maps, which consisted of the extracted details of all 4,678 articles (e.g., citations, bibliography, and authors). The constructed maps using this software tool incorporate key elements under study for the analysis, such as the countries, authors, or keywords. A positive value denotes the strength of a relationship between any two elements; a strong relationship records a higher (positive) value (Khudzari, 2018). Taking the case of the analysis of co-authorship, the number of publications by co-authors of two countries reflects the strength of the relationship between countries. In contrast, the total strength of the co-authorship linking the country with other countries reflects the overall strength of the relationship. On a similar note, when it comes to the co-occurrence analysis, the number of publications with two keywords occurring together reflects the strength of the relationship between author keywords. The features of the VOSviewer are described in the user manual (Taskin & Akca, 2016).

Analysis of Co-Authorship

The analysis of co-authorship in this study included all 83 countries affiliated with 127 authors. The affiliated countries were grouped into five continents of Africa, America, Asia, Europe, and Oceania.

Analysis of Co-Occurrence

The co-occurrence analysis in this study included a total of 1,767 keywords of authors, resulting in a total of 715 articles. However, only 395 articles were retained due to the lack of details on the authors' keywords. Synonymous single terms and congeneric phrases were identified before all data were exported to VOSviewer. This study set five cases as the minimum occurrence of a keyword for evaluation in VOSviewer. The average year of release, the number of occurrences, and the intensity of relationships between keywords were examined through the overlay visualisation mode. The colour of each keyword in Figure 3 denotes the average year of the keyword appearing in the published articles.

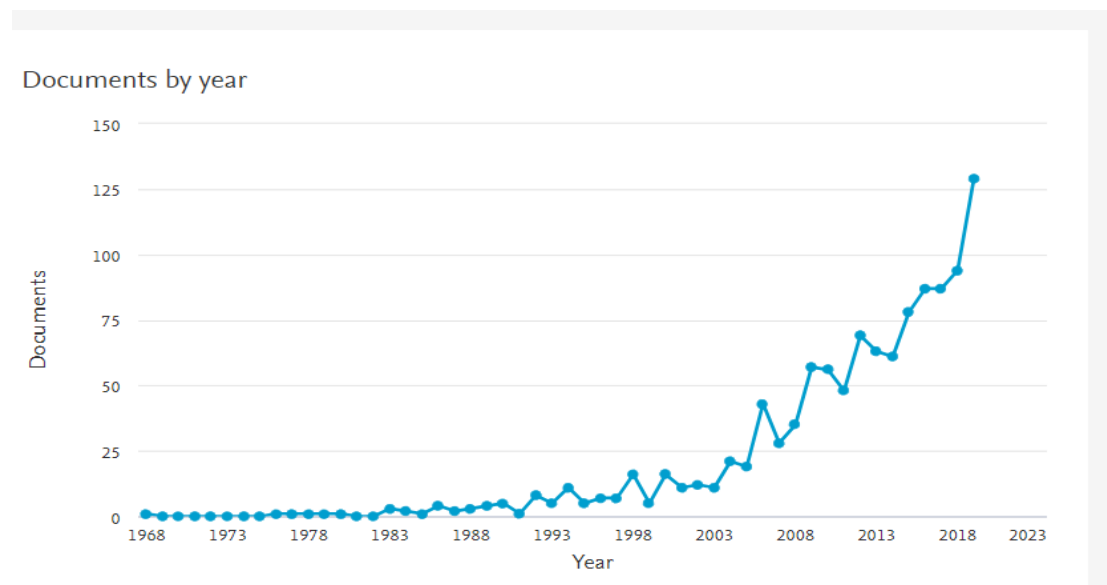


Figure 3. Annual and cumulative numbers of articles on stock market anomalies in the Scopus database from 1968 to 2021

Stock Market Anomalies

This study compared the trends of search outputs between the central theme (keyword co-occurrence) and sub-theme (total publication). For instance, when it comes to stock market anomalies for the application, all keyword co-occurrence for “stock market anomalies” in VOSviewer were calculated, and countries with the highest number of publications for “stock market anomalies” were determined.

Results and Discussion

Distributions of Search Results By Document Type and Subject Areas

The distribution of the search results by type of document is depicted in Figure 4. The search results cover 53 years of scholarship (1968 – 2021), with 1,436 articles on stock market anomalies curated in the Scopus database. The earliest curated work was by Kreči (1968). By 1989, 106 articles were published. About 126 journals are published annually on the subject matter, with a continuous increase in articles on stock market anomalies. This suggests researchers’ increasing interest in exploring and identifying stock market behaviours and stock market anomalies in particular. The researchers overwhelmingly preferred the article (86.7%) as the channel of choice for publishing their scholarly works. Meanwhile, conference papers represented 6.8% of the total documents, followed by review papers (2.8%).

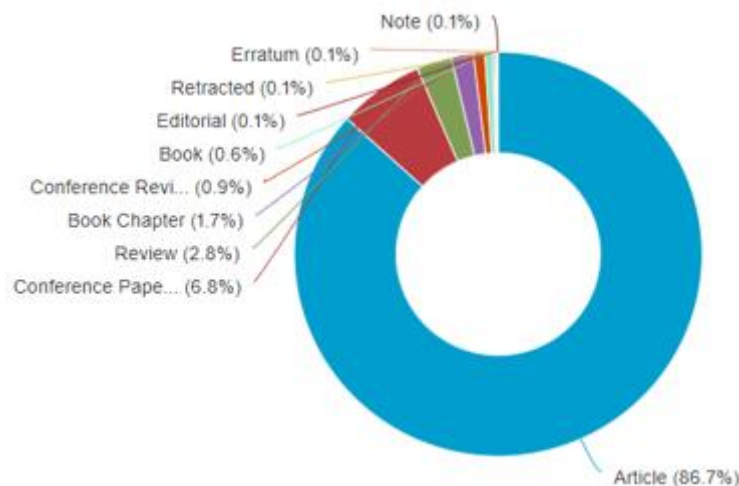


Figure 4. Categories of Publications by Type

Further analysis of the 1,436 documents by subject area, as depicted in Figure 5, revealed that most of the scholarly works appropriately fall under the economics and econometrics (46.0%) and business and management (28.2%) subject areas, collectively accounting for 68.2% of the documents from Scopus on stock markets and stock market anomalies.

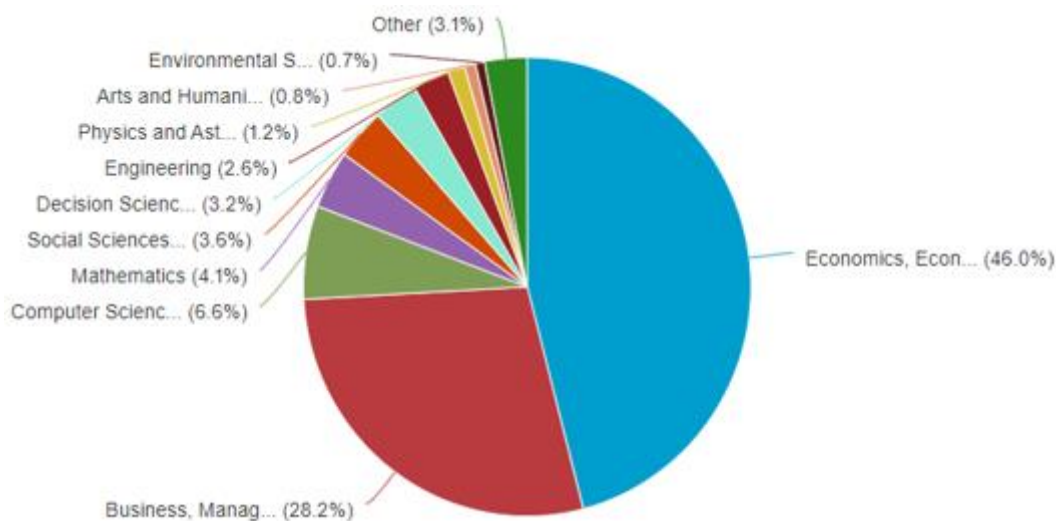


Figure 5. Distribution of Publications by Subject Areas

Journal Cite Score and Top 10 Journals in Stock Market Anomalies Studies

CiteScore affects the decision of particular authors in their selection of the appropriate journals for their work. As an alternative to the Clarivate Analytics Impact Factor, CiteScore, which focuses on citation data of the Scopus database, can be used to examine the impact of journals. Nonetheless, CiteScore should not be solely considered in assessing the impact of journals. Apart from CiteScore, authors should evaluate the capacity of the journals to communicate their work to the right audience and contribute to the advancement in the target field. The top 30 journals on stock market anomalies of CiteScore are presented in Table 4 for reference.

Table 4

List of the ten most journals on the stock market anomalies

Journal	Articles Total No:	H index	Cite Score	Impact Factor	Duration Span
Journal of Financial Economics	32	240	8.7	5.731	1974-2022
Journal of Banking and Finance	29	148	3.8	2.269	1977 - 2021
Applied of Financial Economics	26	52	1	0	1991 - 2014
Pacific-Basin Finance Journal	25	52	2.8	2.382	1993 - 2020
International Review of Financial Analysis	24	49	3.8	2.497	1992 - 2021
Investment Management and Financial Innovations	22	15	0.9	1.2	2004-2021
Managerial Finance	19	35	1.2	1.9	1996-2021
Journal of Empirical Finance	18	69	2.9		1993-2021
Applied Economics Letters	17	47	1.3		1994-2021
Journal of Accounting And Economics	17	143	7.1	3.723	1979-2021

Leading countries, academic institutions, and international collaboration

Only the US (60.9%), UK (43.4%), and Spain (26.3%) recorded more than two-thirds of single-country publications (SCP), suggesting strong international collaboration. On the other hand, Finland recorded the lowest SCP at 12.7%, where 56 out of 76 articles were affiliated with 20 different countries. An international collaboration expands the network, promotes knowledge and expertise exchange, and boosts ranking strategies. On a similar note, six academic institutions made into the list of top 100 best universities based on the World University Rankings QS 2019: (1) University of Cambridge (ranked ^{sixth}); (2) University of California Berkeley (ranked 27th); (3) The University of Toronto (ranked 28th); (4) Delft University Technology (ranked 52nd); (5) Zhejiang University (ranked 68th); (6) Lund University (ranked 92nd). This reaffirms the growing research interest in stock market anomalies among leading academic institutions. Figure 6 shows the distribution of countries per region.



Figure 6. Top 15 most productive countries and academic institutions for publications on stock market anomalies. Notes: TPC denotes total publications of a given country; TPI denotes total publication of a given academic institution; SCP denotes single-country publications.

A thick line and the close distance between countries in VOSviewer suggest a strong relationship (Figure 7). In this case, the region of Europe (35) recorded the highest number of countries per region, followed by other regions: Asia (16), America (7), Africa (9), and Oceania (2). The obtained results of co-authorship demonstrated the US as the most affiliated country (linked to 63 countries and 636 co-authorships), followed by the UK (linked to 59 countries and 517 co-authorships), Germany (linked to 36 countries and 249 co-authorships), Italy (linked to 36 countries and 219 co-authorships), the Netherlands (linked to 38 countries and 217 co-authorships), China (linked to 37 countries and 215 co-authorships), Australia (linked to 46 countries and 184 co-authorships), Canada (linked to 35 countries and 136 co-authorships), and Taiwan (linked to 23 countries and 88 co-authorships). Besides that, two-thirds of the listed countries in this study had international collaborative publications with less than ten countries. Numerous potential factors promote the sustainability of international collaboration, such as the diversity of research collaborators, high involvement of foreign researchers or visiting scholars, the availability of research funding, and the presence of a solid research policy.

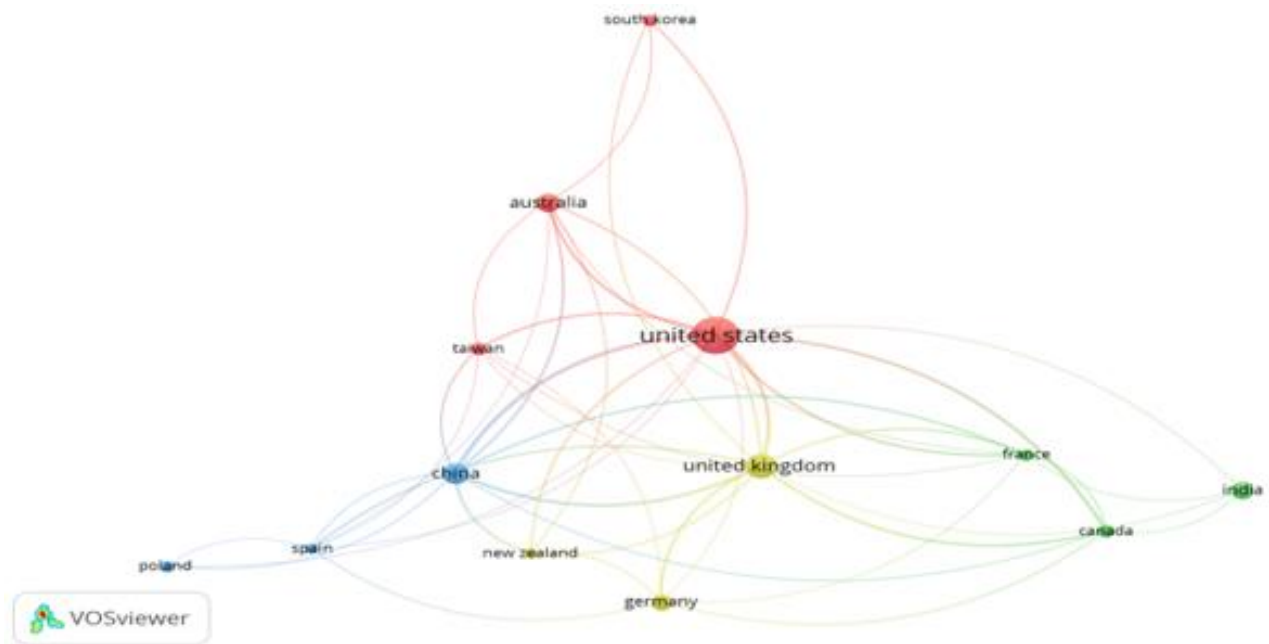


Figure 7. Screenshot of the bibliometric map created based on co-authorship using the network visualisation mode. Notes: The following URL link can be used to access VOSviewer—<http://bit.ly/3d0d3MA>.

Prolific Author Profiles

Table 5 presents the 10 top prolific authors in the research area of stock market anomalies. In particular, the UK (two authors) was at the top of the list, followed by other countries like Poland (one author), Germany (one author), India (one author), Taiwan (one author), Canada (one author), US (one author), Greece (one author), and Ukraine (one author). All authors served as the first author of earlier publications from 1980 to 2011. As there are no specific guidelines on the order of authors for publication, most cases of authorship suggest links to seniority and supervisory role.

Table 5

List of the ten most prolific authors on stock market anomalies

SN	Author	Scopus Author ID	1st Pub. Year*	TP	H-Index	TC	Current Affiliation	Country
1	Zaremba, Adam	37121242800	2011*	77	9	206	Poznań University of Economics and Business,	Poland
2	Plastun, Alex	36069907200	2009*	40	9	214	Sumy State University	Ukraine
3	Caporale, uglielmo Maria	7006610953	1992*	231	26	2607	Department of Economics and Finance	United Kingdom
4	Sehgal, Sanjay	35189667500	198**9	58	10	326	University of Delhi	India
5	Papanastasopoulos, Georgios A.	16241947600	2002*	21	5	81	University of Piraeus	Greece
6	Wing-Keung Wong, Wing-keung	57025339400	1990*	198	31	3304	China Medical University Taichung	Taiwan
7	Ziemba, William T.	6701417446	1991*	160	22	1446	University Of Alaska Anchorage	Canada
8	Ball, Ray	24371709600	1980*	78	27	6568	The University of Chicago Booth School of Business	US
9	Belatreche, Ammar	15043716600	1997*	74	16	928	University of Northumbria	UK
10	Bohl, Martin T.	7004920724	1996*	73	1137	64	Westfälische Wilhelms-Universität Münster	Germany

Figure 8 presents the list of top authors based on their publications in the Scopus database. It should be noted that authors with the most cited articles (in Table 5) are not necessarily featured in Figure 8, unless the authors demonstrated prolific publication records—for instance, A. Zaremba, A. Plastun, G. M. Caporale, and S. Sehgal. Meanwhile, Figure 9 and Figure 10 show examples of individual author profiles as they appear on the Scopus database.

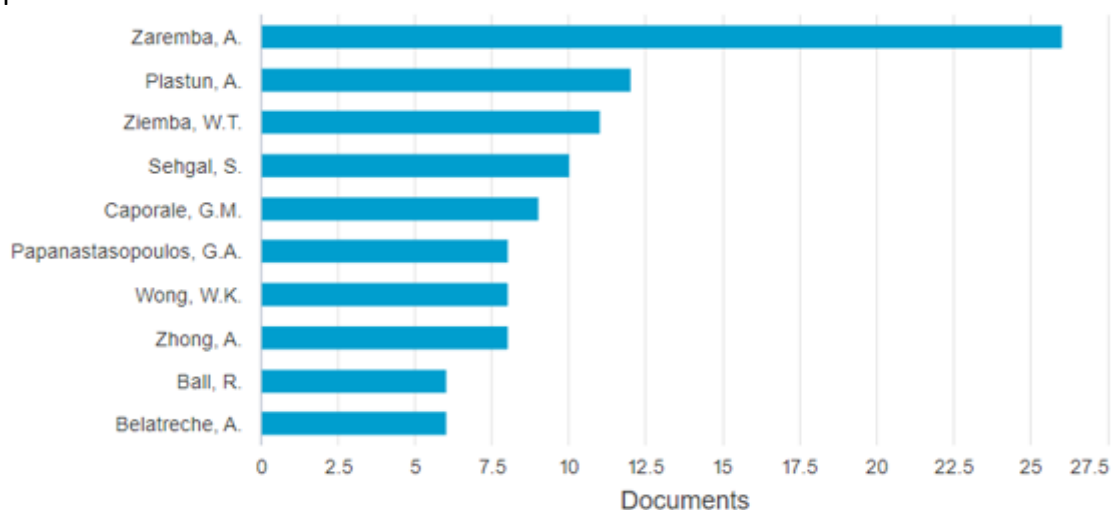


Figure 8. List of top authors based on publications in the Scopus database

Zaremba, Adam

[Poznań University of Economics and Business, Poznan WP., Poland](#) [Show all author info](#)
 37121242800 <https://orcid.org/0000-0001-5879-9431>

[Edit profile](#) [Set alert](#) [Potential author matches](#) [Export to Scival](#)

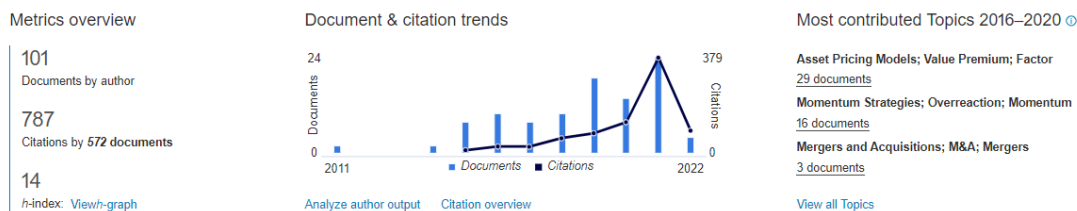


Figure 9. Scopus Profile of First Author in Table 5

Plastun, Alex

[Sumy State University, Sumy, Ukraine](#) [Show all author info](#)
 36069907200 <https://orcid.org/0000-0001-8208-7135>

[Edit profile](#) [Set alert](#) [Potential author matches](#) [Export to Scival](#)

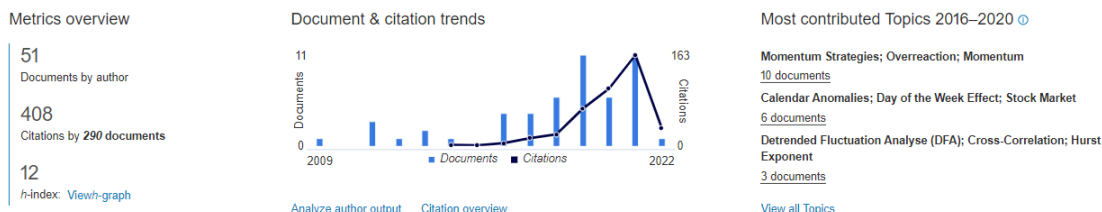


Figure 10. Scopus Profile of Second Author in Table 5

Co-occurrence of Keywords

The frequent co-occurrence of keywords in articles implies the close relationships of the concepts related to these keywords. The outcomes of the co-occurrence analysis include a network of themes and their potential relationships that reflect the underlying concept of the research area or field. This study used the VOSviewer and re-set the minimum occurrence of a keyword to nine cases for the search of articles. Figure 10 presents the visual representation of similarities and categories of themes regarding their prevalence within a particular timeframe. The colours in the bibliometric map in Figure 11 represent the average years of publications for a given article with the particular keyword of interest.



Figure 11. The constructed bibliometric map uses authors' keywords as co-occurrence using the overlay visualisation mode. Notes: This study set five cases as the minimum occurrence of a keyword. The following URL link can be used to access VOSviewer—<http://bit.ly/3d0d3MA>.

Connectivity of Authors as Research Team

Apart from the results in Table 5, the current study performed bibliometric analysis to evaluate the connectivity of authors as a research team. Figure 11 shows the connectivity and networking among the authors.

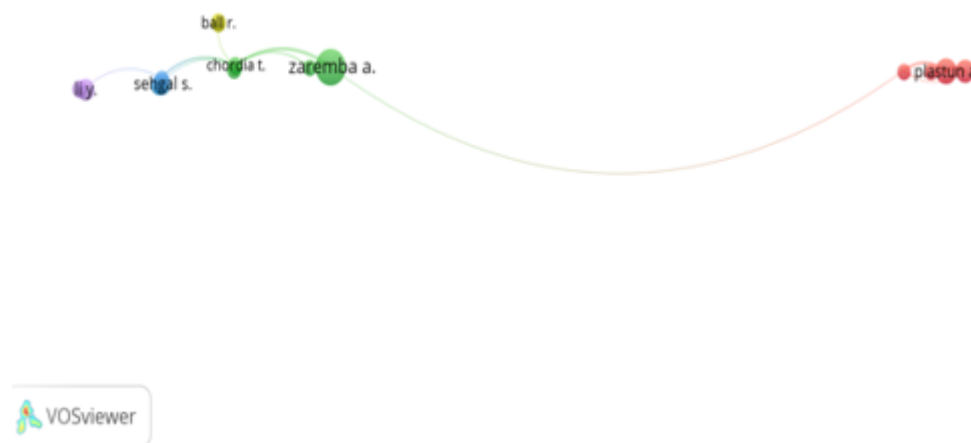


Figure 11. Screenshot of networking and connectivity of authors. Notes: Most authors built a research team that kept them connected. The following URL link can be used to access VOSviewer—<http://bit.ly/2w5bEUA>.

Conclusions

From the perspective of behavioural finance, the current study explored stock market anomalies. Investors' underreaction due to conservatism bias is linked to a form of anomaly, which is discussed as short-term momentum. On the contrary, investors' overreaction due to representativeness bias is linked to the long-term reversal anomaly and the weekend anomaly. Another form of anomaly includes value premium anomaly, which is attributed to

the optimism towards the stock growth and pessimism towards the stock value. This study focused on behavioural biases that cause stock market anomalies, which classical financial theories have overlooked. With that, this study performed bibliometric analysis on stock market anomalies, specifically science mapping, to gain a better understanding of this domain.

This study consisted of several limitations. Firstly, this study employed a comprehensive, quantitative approach, specifically science mapping, to achieve the stated objectives. However, this approach cannot be relied on as an alternative to the conventional analysis methods to obtain empirical evidence. Besides that, this study focused on articles from indexed journals in the Scopus database. This study did not consider other repositories like WoS. Therefore, the findings on stock market anomalies may not represent full coverage of literature in this research area. Such limitation was addressed by using table analysis of co-citation, which included the review of all articles. Thus, a much more comprehensive set could be captured than contained in Scopus.

The current study demonstrated that most of the published articles on stock market anomalies were from English-, German- and Spanish-speaking regions despite the global research interest, suggesting significant literature disproportion.

Based on the results of the co-citation analysis in this study, research on stock market anomalies can be divided into two clusters. The first cluster dealt with criteria and obstacles to the stock market anomalies process. The second cluster focused on strategy and sustainability during stock market anomalies. This study also found that most authors used general business models to address their research issues. Based on the obtained findings, it is evident that there has been no specific knowledge base on stock market anomalies. Thus, it is recommended that future research explore the specific methods researchers used in explaining stock market anomalies and determine which methods are most appropriate to a given research context.

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