

## PERFORMANCE AND NETWORK ANALYSIS OF RESEARCH IN STOCK MARKET ANOMALIES

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**ABSTRACT.** The objective of this study is to present quantitative statistics and a comprehensive review of the key influential and intellectual structure of anomalies in the stock market. The study examines 111 papers that were published in scholarly journals between 1989 and 2022 and are indexed in the Scopus database. This research applied bibliometric methods of citation analysis, co-occurrence analysis, co-authorship, and bibliographic coupling of authors and countries. As far as the authors are aware, this is the first article to discuss the bibliometric literature on stock market anomalies. This research aids in the exploration and construction of a quantitative base for the scientific advancement of stock market anomalies by academics and other researchers.

### 1. INTRODUCTION

Anomalies are events that differ from the forecasts of economic or financial models, undermining the fundamental presumptions of those models. Calendar effects are a classic example of an anomaly in the markets, which are patterns that defy the efficient market hypothesis. Psychological factors are typically what cause market abnormalities. However, once they are known to the general public, anomalies frequently vanish rapidly. There are mainly two types of anomalies. A pricing anomaly occurs when something, like a stock, is valued differently than how a model predicts it would be priced. Market anomalies, on the other hand, are distortions in returns that defy the Efficient Market Hypothesis (EMH). Market anomalies are a highly researched topic among researchers who have a great interest in the theoretical and practical aspects of behavioral finance and the stock market.

Researchers prove that market anomalies are caused by different factors. It may be due to the overreaction of investors to both good and bad news, and researchers named this phenomenon the winner or loser effect (De BOND and THALER 1985, 793-805, 1987; Hirshleifer 2002). When the stocks in the market show the tendency to continue their past performance in the following future period, it is called the "momentum effect" in the stock market (Jegadeesh and Titman 1993, 65-91; Maheshwari and Dhankar 2017, 3-22; Moskowitz and Grinblatt 2022). When the anomalies are related to a calendar, such as the day of the week, time of the month, or year, then it is termed the "calendar effect." Studies were also conducted on the January effect (Wachtel 1942, 184-193; Rozeff and Kinney Jr. 1976, 379-402; Stefanescu and Dumitriu 2023), the weekend effect, and the reverse weekend effect (Bampinas, Fountas, and Panagiotidis 2016, 549-567; Brusa, Hernandez, and Liu 2011, 817-839; Enow 2022, 322-333). Another

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research (Shanaev, Shuraeva, and Fedorova 2022) detected a new calendar anomaly named the Groundhog Day effect in the stock market of the United States and claim that country-specific superstitions can have notable market-specific effects. Furthermore, anomalies such as the market effect, value anomaly, size effect, disposition effect, equity premium puzzle, herd effect, ostrich effect, and bubbles are widely discussed research topics (Woo et al. 2020; Sharma and Jain 2020; Sharma, Kumar, and Vaish 2022, 62-81; Alkhazali, Lean, and Zoubi 2022, 102).

Recently, studies in this field have tried to examine why anomalies are decaying in recent years. (Choy, Lewis, and Tan 2023, 142-160) took efforts to examine whether the volatility of capital investment returns weakens the momentum, value, investment, and profitability of anomalies. Studies also look into the role of investor mood in explaining anomalies in the stock market (Zhang, Bissoondoyal-Bheenick, and Zhong 2023, 284-303; Abideen et al. 2023, 1-32; Salur and Ekinci 2023, 49). Researchers also explored the application of machine learning algorithms to identify the influence of different anomalies on the return of capital investments (Azevedo and Hoegner 2023, 195-230; Avramov, Cheng, and Metzker 2022, 2587-2619; Brogaard and Zareei 2023, 1431-1472). The research on oil price shocks and stock market anomalies has also gained attention (Zhu et al. 2022, 573-612). This paper's major goals are to conduct an exhaustive assessment of the literature, pinpoint any gaps, and provide potential future topics for study. The study primarily addresses the following research questions:

RQ1: What is the overall trend or pattern of knowledge advancement in stock market anomalies research?

RQ2: Which are the influential papers on stock market anomalies?

RQ3: Who are the most influential and impactful authors on this topic?

RQ4: Which institutions and nations are the most productive in this field?

RQ5: What are the main gaps and future research directions to further explore anomalies in the stock market?

These research questions are transformed into the following research objectives:

1. To figure out the trend and pattern of publications in the study of stock market anomalies
2. To identify important and prominent writers, documents, and sources in the study of stock market anomalies.
3. To determine which nations and institutions are the most successful in this area of study.
4. To fill the gap in the existing literature and suggest the future direction of this field of study.

The remaining part of this paper is arranged as follows: The next session will describe the background of the study, followed by the methodology used in this work. Section 4 presents the analysis and results, while Section 5 is reserved for network mapping of bibliometric analysis. The last section deals with the conclusions, research limitations, and future research avenues.

## 2. LITERATURE REVIEW

The prices of stocks should not be consistent for a long period of time; there will be variations in the expected return. When a model predicts a certain return based on a set of assumptions, but the actual return is different, this is called an anomaly. The term "anomaly" was first introduced by (Kuhn 1970). Anomalies are prone to sudden appearances, disappearances, and reappearances. Proper and efficient trading strategies are needed to outperform the anomalies in the stock market. Thus, paying attention to this will reward not only the investors but also the economies. The first documentation of this phenomenon is done by (Levis 1989, 675-696) through his reports on the presence of irregularities in stock price behavior in the London Stock Market. Researchers in finance concentrated on studying the different aspects of stock market anomalies. (Lauterbach and Ungar 1995, 133-147; Arsad and Coutts 1997, 455-463; Kumar and Jawa 2017, 145-160; 1-16; Hasan et al. 2022, 258-276; Zhang 2023, 41-46) identified the importance of measurement of calendar anomalies, (Haugen and Jorion 1996, 27-31; Patel

2016, 317-324; Sabahat, Rabia, and Amjad 2021; Kozłowski and Lytle 2023) point out the strong persistence of the January effect and (Cho, Linton, and Whang 2007, 736-755; Kim and Ryu 2022; Iqbal et al. 2023; Yang and Nemlioglu 2023, 93-109) found strong evidence of the Monday effect. According to (Lucey and Pardo 2005, 165-171; Hudson, Keasey, and Littler 2002, 681-686; Chong et al. 2005, 1226-1236; Njoroge and Matanda 2023, 442-478; Wei and Lin 2023), investors can make a better profit when trading strategies are applied by taking into account the holiday effect in the market while (Picou 2006, 433-445) found that ex-post-holiday reaction is beneficial for investors. If data mining or data crunching caused the abnormalities, they should quickly vanish from the data after being (Marquering, Nisser, and Valla 2006, 291-302; Jones and Pomorski 2017, 237-267; Cotter and McGeever 2018). Research was conducted on the implications of political stock market anomalies for predicting the returns (Bohl, Döpke, and Pierdzioch 2008, 323-335; Gonçalves and Oliveira 2023), influence of financial crisis on stock market anomalies (Luo et al. 2009, 199-216; Akter and Ferdous 2023; Baltais et al. 2023), and effect of pricing anomalies (Fohlin and Reinhold 2010, 75-96; Božović 2022; Jinyu Liu and Baolian Wang 2022, 563-593; Pandey and Joshi 2022, 362-378; Berggrun, Cardona, and Lizarzaburu 2023). (Chee-Jiun and Ye 2011, 3123-3137) applied closure test principle to examine stock market anomalies in South Africa and its Neighbouring Countries while (Ammann, Odoni, and Oesch 2012, 1857-1864) suggest that the alternative three-factor model is superior for measuring anomalies in the stock market.

The recent developments in this field include the impact of oil price shocks on stock market anomalies (Zhu et al. 2022, 573-612; Balakumar et al. 2022, 637-663), the performance of anomalies in the crypto market (Dong et al. 2022; Jia et al. 2022), asset growth anomalies (Lambertides 2022, 105-141; Maa, Whidbee, and Zhang 2022), etc. In addition, (Gao and Wang 2022) evaluate the exploitation of stock market anomalies by Alternative Mutual Funds. (Eidinejad and Dahlem 2022, 1855-1858) investigated the existence and evolution of holiday effect on Swedish stock market. Another research by (Choy, Lewis, and Tan 2023, 142-160) found that accounting for changes in underlying returns can help to explain why investment and profitability anomalies diminish. Furthermore, studies have been conducted to identify the explanatory capacity of investor mood in relation to stock market anomalies (Zhang, Bissoondoyal-Bheenick, and Zhong 2023, 284-303), the role of market anomalies on investment decision-making (Abideen et al. 2023, 1-32), checking the predictability of stock market anomalies using machine learning approaches (Al-Sulaiman 2022; Azevedo and Hoegner 2023, 195-230; Azevedo, Kaiser, and Mueller 2023, 419-441), discovering new anomalies (Shanaev, Shuraeva, and Fedorova 2022), and how uncertainty of energy prices impact value anomalies (Chiah et al. 2022). Another research by (Meek and Hoelscher 2023) tested the existence of day-of-the-week effects in petroleum commodities and provides evidence that the anomaly exists in energy futures, which account for the change in liquidity near expiration. The research also claims that these seasonality effects do not appear to be uniform across all petroleum products. (Caporale and Plastun 2023) try to determine if anomalies in price behavior result from witching and if they can be exploited to generate abnormal profits. The latest studies in this field tested the efficacy of machine-learning models in a global stock universe to forecast stock returns (Azevedo, Kaiser, and Mueller 2023, 419-441). Despite the fact that no previous studies addressed the literature on the persistence of anomalies in the stock market from a bibliometric perspective, the current study is a quantitative analysis and comprehensive review of the key influential and intellectual structure of stock market anomalies using bibliometric techniques.

### 3. METHODOLOGY

In this article, the authors use a bibliometric technique that makes use of quantitative tools to analyze both bibliometric and graphic data. Bibliometric analysis can be used for the evolution of research performance in a topic or area and the study of science as a system of communication and knowledge generation. In this study, the authors seek to infer the intellectual formation

of anomalies in the stock market by considering several bibliometric indicators such as citation analysis, co-citation analysis, the co-occurrence of author keywords, and bibliographic coupling (Donthu et al. 2021, 285-296).

**3.1. Data Collection and Refinement Process.** The data relating to the research on stock market anomalies was collected from the Scopus data repository on January 1, 2023. The rationale for this selection is that it is the largest multidisciplinary database for peer-reviewed research works in the social sciences and one of the most prestigious accessible databases, listing all or most of the reputable journals (Visser, Eck, and Waltman 2021, 20-41). Even though there are some other data bases such as Web of Science and Dimension, Scopus has broader coverage in terms of the number of indexed journals, conference papers, and other sources. Web of Science is known for its meticulous data curation and strong coverage of prestigious journals, which can appeal to researchers focused on specific high-impact publications (Falagas et al. 2007, 338-342; Franceschini, Maisano, and Mastrogiacomo 2016, 933-953; Garousi and Mantyla 2016, 56-77). The three databases exhibit varying levels of exhaustivity and selectivity, with Web of Science being selective and Dimensions providing extensive coverage. Depending on the intended use, one may prefer to use a particular database (Singh et al. 2021, 5113-5142). Since there are high correlations in the citation counts of the Dimension and Scopus databases, with Dimensions having 97% of Scopus articles with DOIs, both are viable alternatives for general citation analysis and research evaluations (Thelwall 2018, 430-435). Following is a description of the selection criteria for papers.

This methodological session is vital to ensuring the accuracy of the data collection process. The research followed the steps suggested by (Zupic and Cater 2015, 429-472) to produce the workflow for the mapping of scientific research in the field of anomalies in stock market. The mapping consists of five successive stages as presented by (Börner, Chen, and Boyack 2003, 179-255; Zabavnik and Verbic 2021, 55-75). In the first stage, the research problem is identified and research questions are defined. This bibliometric paper mainly focused on identifying the key influential and intellectual structure of anomalies in the stock market. The objective is therefore to conduct a performance analysis of the review corpus, selecting bibliometric analysis techniques of citation analysis of documents, authors, sources, institutions, and countries to know the most influential and impactful contributions in the research on stock market anomalies, co-citation analysis, which is effective for demarcating fundamental knowledge, and bibliometric coupling useful for explicating the themes in the body of knowledge. Further, the co-occurrence of author keywords is done as part of the analysis.

The second stage consist of data collection in which the researchers selected the Scopus database as it is considered the quality database for relevant papers, cited references, and citation counts compared to other alternatives including Web of Science and Dimension (Visser, Eck, and Waltman 2021, 20-41).

The search for relevant papers is based on an exhaustive list of keywords that should best describe the topic under consideration. The relevant articles were obtained by using the keywords "stock market anomalies" or "stock market anomaly" or "share market anomalies" or "share market anomaly," which brought results for 130 documents from 1989 to 2022. In the next step, the authors limited the search by applying subject areas such as "Economics, Econometrics, and Finance" and "Business, Management, and Accounting." 11 documents were removed at this stage. Again, the authors filtered the results and selected articles and review papers published in scientific journals written in English only. This remains a total of 116 documents. Again, 6 documents are deleted due to the non-availability of abstracts. The filtering finally produced 111 documents for the research on stock market anomalies.

The final three stages of the suggested workflow for the scientific mapping are data analysis, data visualization, and interpretation of the outputs (Zabavnik and Verbic 2021, 55-75; Zupic and Cater 2015, 429-472). VOSviewer, which is an effective tool for constructing and visualizing bibliometric networks (Kirby 2023, 10; Martins, Gonçalves, and Branco 2022; Tamala et al.



FIGURE 1. Publication Trend of Research in Stock Market Anomalies

2022) that is used for data analysis and visualization based on cited references. In addition, the authors employed Microsoft Excel software for the construction of tables. This article entails the creation of multiple networks based on co-citation, co-occurrence, and bibliographic coupling. The interpretation of which is presented in the section that follows, as well as the distinguishing contributors, sources, and documents that had a great influence on the evolution of the particular research topic.

The dimensions of the analysis are as follows:

1. Bibliometric citation analysis
2. Bibliometric co-occurrence analysis
3. Bibliometric coupling analysis and
4. Bibliometric co-authorship analysis

#### 4. RESULTS AND DISCUSSION

**4.1. Performance Analysis of Research in Stock Market Anomalies.** The performance analysis of research in stock market anomalies is evaluated through publication activity, top authors, institutions and countries, journals and articles on this field of research based on their total citations and publications.

**4.1.1. Publication Activity of Research in Stock Market Anomalies.** The publication trend of research on stock market anomalies is presented in Figure 1. where the total number of articles published is mapped against their respective year of publication from 1989 to 2022. It shows that, despite the fact that research on stock market anomalies is not a new field, the productivity per year is significantly lower. There are a total of 111 publications on this topic, most of which were published after 2006. The first article on this topic is contributed by (Levis 1989, 675-696) of the University of Bath, United Kingdom, who has studied the irregularities in the prices of the London Stock Market. The graph also points out that in some years there were no studies available on this topic all around the world (1990–1994, 1999, and 2003). The growth in the publication trend in recent years is remarkable compared to 1989.

**4.1.2. Top Authors in Anomalies in Stock Market.** Table 1 presents the top authors in research on stock market anomalies. Based on the number of citations, the most productive and impactful author on this topic is Liu J, who have a total citation of 102 and total publication of 2. Followed by Hughes J. and Zaremba A. with 99 and 82 citations respectively. In terms

of publications Zarembo A. is the most productive author with 9 publications among the 224 authors on this topic. The authors contributing to the next highest number of publications are Liu J., Maio P. and Bohl M.T. with 3 publications each.

No.	Author	TP	TC
1	Liu J.	3	102
2	Hughes J.	2	99
3	Zarembo A.	9	82
4	Hudson R.	2	50
5	Keasey K.	2	50
6	Littler K.	2	50
7	Maio P.	3	45
8	Bohl M.T.	3	40
9	Wasiuzzaman S.	2	25
10	Durham J.B.	2	21

4.1.3. *Leading Organizations and Countries.* Table 2 show the most productive organizations and countries on research in stock market anomalies. Joseph L. Rotman Sch. of Management, University of Toronto, Canada and Schulich School of Business, York University, Canada are the most productive organizations on this topic with 253 citations equally followed by Yale University, School of Management, United States with 70 citations. When look on the productivity of the organizations all the top 10 institutes could produce only 1 article on this topic during the period from 1989 to 2022.

No.	Organization	TP	TC	Country	TP	TC
1	Joseph L. Rotman Sch. of Management, University of Toronto, Canada	1	253	United States	27	407
2	Schulich School of Business, York University, Canada	1	253	United Kingdom	17	403
3	Yale University, School of Management, United States	1	70	Germany	13	107
4	Rotterdam School of Management, Erasmus University Rotterdam, Netherlands	1	68	Poland	9	82
5	Anderson School of Management, University of California, United States	1	66	United Arab Emirates	5	57
6	Department of Finance, Graduate School of Management, United States	1	66	Finland	5	49
7	Fuller and Thaler Asset Management, United States	1	66	China	7	48
8	London Business School, United Kingdom	1	63	New Zealand	5	43
9	University of Bath, United Kingdom	1	58	Malaysia	5	33
10	Judge Institute of Management Studies, University of Cambridge, United Kingdom	1	57	India	5	32

Next the authors analyzed the countries with most citations and top publications on the research in stock market anomalies. From the Table 2, it can be interpreted that United States have the highest citation record of 407 from 27 documents followed by United Kingdom and Germany with 403 and 107 citations respectively. In terms of productivity also these 3 countries having the top three positions with 27, 17 and 13 publications respectively. Among

the top 10 countries based on total citations, India is in 10th position with 32 citations from 5 publications. The analysis also reveals that along with the developed countries developing countries like India, China and Malaysia are also investing in conducting research on stock market anomalies. Research on stock market anomalies not only give greater opportunities to the investors but also give long term growth through better trading decisions. The activities on the stock market finally influence monetary policies and GDP of a country.

4.1.4. *Top Journals of Research in Stock Market Anomalies.* Table 3 shows the top 10 journals that publish articles on stock market anomalies. The top 10 are selected based on their total citations. The Journal of Banking and Finance is the most impactful journal on this topic with 342 citations. followed by Applied Financial Economics and Review of Accounting Studies with 158 and 134 citations, respectively. In terms of productivity, the highest number of publications per journal during the period from 1989 to 2022 was 6, which was contributed by the Journal of Banking and Finance, Applied Financial Economics, and Finance Research Letters. Elsevier is the most productive publisher on this topic.

No.	Journals	Publisher	TP	TC
1	Journal of Banking and Finance	Elsevier	6	342
2	Applied Financial Economics	Taylor&Francis	6	158
3	Review of Accounting Studies	Springer	3	134
4	Journal of Business Finance and Accounting	Wiley	3	84
5	Finance Research Letters	Elsevier	6	80
6	European Journal of Finance	Routledge	5	54
7	Journal of Financial and Quantitative Analysis	Cambridge University Press	5	41
8	Journal of Behavioral and Experimental Finance	Elsevier	5	36
9	North American Journal of Economics and Finance	Elsevier	3	28
10	Financial Review	Wiley	3	20

4.1.5. *Top Articles of Research in Stock Market Anomalies.* The top cited articles on research in stock market anomalies are presented in Table 4.

The most-cited paper on stock market anomalies is (Cao and Wei 2005, 1559-1573), which has 253 citations. The study investigates how temperature influences investor behaviour and, as a result, stock returns. The second-most impactful article on this topic is (Thomas and Zhang 2008, 909-940), with 70 citations, in which the authors focused on studying the market anomaly resulting from intra-industry information transfers and its effects on stock price movements. The third most influential article in this field is (Marquering, Nisser, and Valla 2006, 291-302), which received 68 citations by analysing the persistence of anomalies in several stock markets. The research focuses on evaluating the relationship between predictable market returns and predictable analyst forecast errors (Hughes, Liu, and Su 2008, 266-291) the impact of the January effect (Haugen and Jorion 1996, 27-31), (Dimson and Mussavian 1998, 91-103) summary of the origin and interlinkages in the concept of market efficiency, and (Levis 1989, 675-696) report on the presence of irregularities in the stock market. Furthermore, the studies circulated around different aspects of market anomalies such as "calendar effects" (Arsad and Coutts 1997, 455-463), "stock market overreaction hypothesis" (Dissanaike 1997, 27-50), and "monday effects" (Cho, Linton, and Whang 2007, 736-755).

No.	Author	Article	TC
1	Cao and Wei (2005)	Stock market returns: A note on temperature anomaly	253
2	Thomas and Zhang (2008)	Overreaction to intra-industry information transfers?	70
3	Marquering, Nisser, and Valla (2006)	Disappearing anomalies: A dynamic analysis of the persistence of anomalies	68
4	Hughes, Liu, and Su (2008)	On the relation between predictable market returns and predictable analyst forecast errors	66
5	Haugen and Jorion (1996)	The January effect: Still there after all these years	66
6	Dimson and Mussavian (1998)	A brief history of market efficiency[We have be]	63
7	Levis (1989)	Stock market anomalies. A re-assessment based on the UK evidence	58
8	Arsad and Coutts (1997)	Security price anomalies in the London International Stock Exchange: A 60 year perspective	57
9	Dissanaike (1997)	Do stock market investors overreact?	57
10	Cho, Linton, and Whang (2007)	Are there Monday effects in stock returns: A stochastic dominance approach?	52

**4.2. Network Visualization of Research in Stock Market Anomalies.** In this section, the authors analyse the Scopus data set of 111 documents of research on stock market anomalies using VOSviewer software. The stock market anomalies literature is analysed through bibliometric citation data by applying co-citation, bibliographic coupling, and co-occurrences of author keywords with the objective of knowing the influence and association of journals, publications of authors, institutions, countries, and keywords.

Co-citation analysis draws conclusion on the assumption that works that are frequently referenced together have overlapping themes. The analysis can be used to show the intellectual hierarchy of a topic of study (Donthu et al. 2021, 285-296; Hjørland 2013, 545-557). Figure 2 and Figure 3 show the co-citation map of journals and authors respectively. It is analyzed that Journal of Finance, Journal of Financial Economics are the most influential journals on the stock market anomalies publications. The Journal of Finance is Published by The American Finance Association from 1946 onwards and is concentrated on promoting knowledge about financial economics. The Association of Business School (ABS) rate it as a world elite journal (4\*) and Australian Business Deans Council ranked it as A\* category Journal. The Journal of Financial Economics also focuses on publishing empirical and theoretical papers in the field of financial economics and has the ratings of 4 and A\* according to ABS and ABDC rankings. In terms of the co-cited authors Fama, E.F; French, K.R; and Titman, S. are the most influential authors in this topic. Eugene F. Fama was awarded the Nobel Prize in economic sciences in 2013 and is known as the “Father of Modern Finance” for his groundbreaking contributions to the academic world. He is currently working as Professor of Finance at University of Chicago. Kenneth Ronald Ken French is also a distinguished Professor of Finance, working at the Amos Tuck School of Business, New Hampshire. He is most known for his asset pricing work alongside Eugene Fama. Sheridan Titman is another influential researcher in the field of Financial Economics, currently serving as Professor of Finance at the University of Texas, Austin.

Bibliographic coupling is a strategy for examining the connections between cited works to comprehend the timeline or current evolution of themes in a research field (Donthu et al. 2021, 285-296).

Figure 4 and Figure 5 show the bibliographic coupling of authors and countries respectively.





FIGURE 2. Co-citation of Journals Regarding Research in Stock Market Anomalies

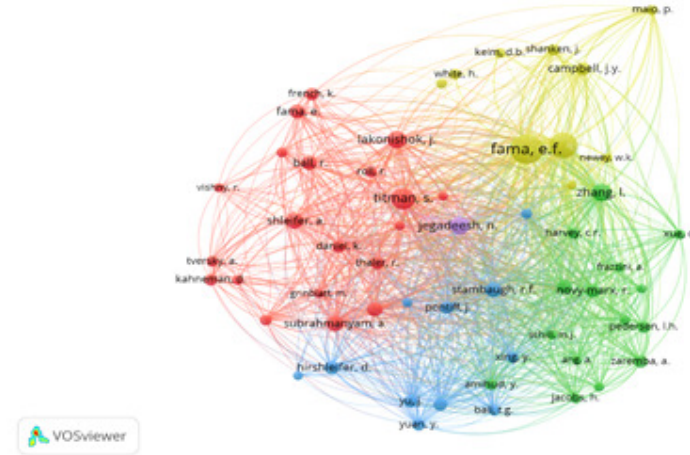


FIGURE 3. Co-citation Map of Authors on Research in Stock Market Anomalies

By analyzing bibliographic coupling of authors of research in stock market anomalies, it is interpreted that Liu J; Hughes J; and Zaremba A. are the three most influential authors on this topic. The author, Jinyu Liu is an Assistant Professor of Finance at the School of Banking and Finance at the University of International Business and Economics. Her principal research interests are empirical asset pricing, behavioural finance, and the Chinese capital market. John S Hughes is a Professor of University of California, Los Angeles (UCLA). His research encompasses both theoretical and empirical investigations in to capital markets and industrial organizations. The third influential author is Adam Zaremba, who is working at Montpellier Business School and is interested in the research areas of financial markets, asset pricing and investments. The results of bibliographic coupling of countries reveals that United Kingdom, United States and Canada are the three most productive countries in the research on stock market anomalies.

Co-occurrences of author keywords are presented in Figure 6. The authors used the widely regarded VOSviewer software for the co-occurrence analysis (Zhang et al. 2019).

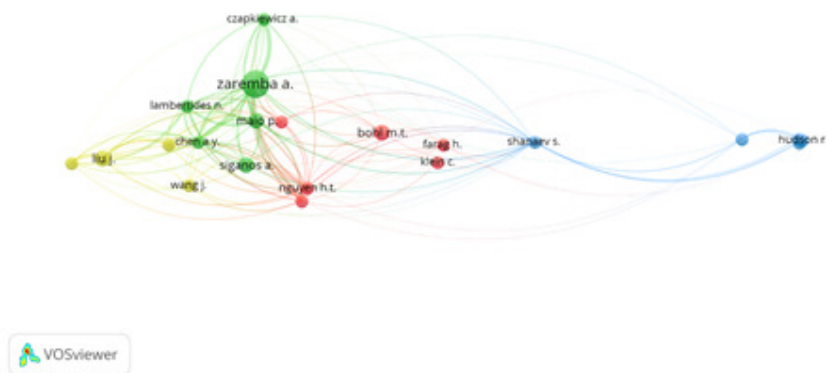


FIGURE 4. Bibliographic Coupling of Authors Publishing in Stock Market Anomalies

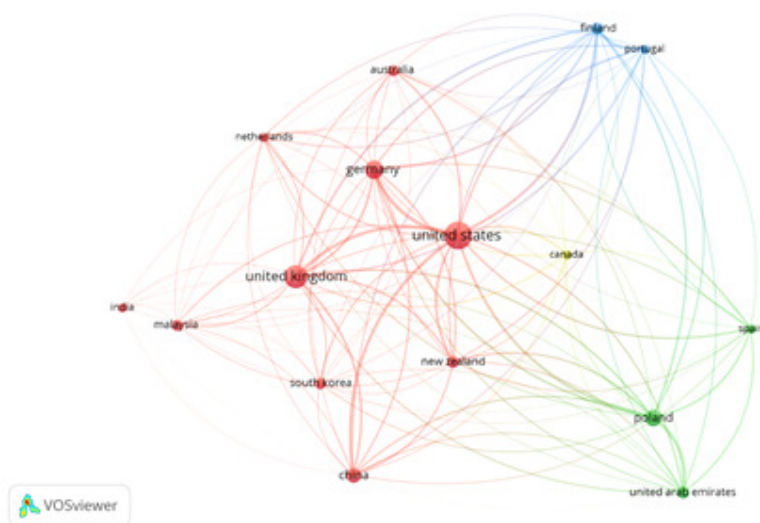


FIGURE 5. Bibliographic Coupling of Countries Publishing in Stock Market Anomalies

The text mining function of the VOSviewer was utilized to extract the keywords from cited documents (van Eck and Waltman 2011, 50-54). This function generates a two-dimensional network of keyword co-occurrences and displays it on a map. When two keywords appear in the same title/abstract or citation context, it is said that they co-occur. Keyword distance is inversely proportional to similarity, with higher co-occurrence rates causing closer clusters. The VOSviewer includes a clustering function that allocates keywords to clusters according to their co-occurrence (Bornmann, Haunschild, and Hug 2018, 427-437; van Eck and Waltman 2017, 1053-1070; Jalal 2019, 57-64; Kirby 2023, 10; Lis 2018, 47-66). The size of the bubble represents the total number of highly cited articles, whereas the thickness and color of the lines represent the link strength and clustering, respectively. A threshold of 5 was applied for the 111 cited articles, which resulted in 9 keywords out of 318 author keywords. In addition to stock market



FIGURE 6. Co-occurrences of Author Keywords in Published Documents on Stock Market Anomalies

anomalies (33 times), other commonly occurring keywords are market efficiency (13 times), stock market anomaly (12 times), anomalies (9 times), asset pricing (7 times), behavioural finance (6 times), momentum (6 times), return predictability (6 times), and mispricing (5 times).

**4.3. Co-authorship Analysis of Authors.** The social links and interactions among writers, as well as their affiliations and related effects on the advancement of the study area, are examined through co-authorship analysis (Donthu et al. 2021, 285-296). The analysis can highlight scholarly study that has been grouped together, and the contributions of various scholars can help a particular research field become clearer and more insightful (Tahamtan, Afshar, and Ahamdzadeh 2016, 1195-1225). The co-authorship analysis visualizes the maximum number of authors by using VOSviewer software. The data set contained 217 total number of authors. The VOSviewer generates a network of authors who have co-authorship with another author and the largest set of connected items consist of 11 authors. Figure 7 indicates the network map of co-authorship. The map indicates that Zaremba A. has the highest number of co-authorship with different set of authors in this data set and his research works are mainly concentrated on price anomalies, investor sentiments, momentum effect etc.

## 5. CONCLUSION

Investigating different kinds of anomalies and the causes and impacts of anomalies in the stock market is an emerging and interesting field of research among scholars in finance, as it affects investment behavior, thus leading to capital formation and economic development. Stock market anomalies are distortions in return that contradict the efficient market hypothesis. When the actual stock return deviates from predictions made by the model, the phenomenon is known as a stock market anomaly. The term was first introduced by (Kuhn 1970).

The purpose of this paper is to provide quantitative statistics as well as a comprehensive review of the key influential and intellectual structure of stock market anomalies. The study examines 111 articles and review papers published in scientific journals indexed by the Scopus database from 1989 to 2022 to answer research questions such as identifying a trend or pattern of knowledge development in the area of anomalies in the stock market, influential and impactful papers, authors and journals, productive institutions and countries in this topic, and a gap

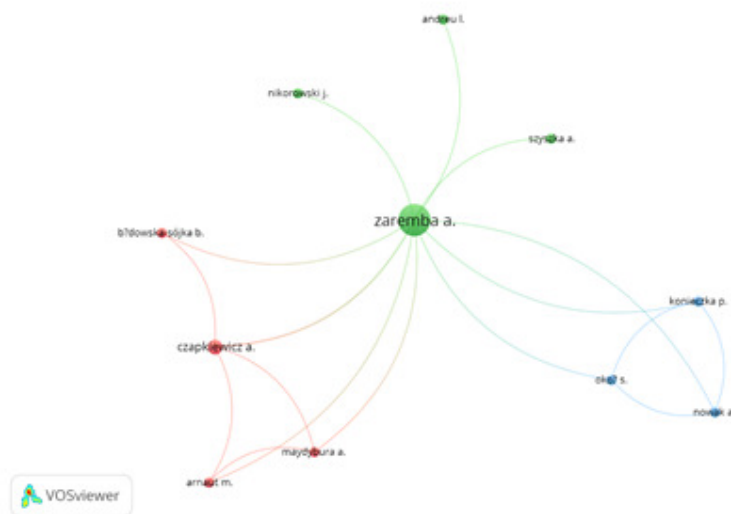


FIGURE 7. Co-authorship analysis of authors in Research in Stock Market Anomalies

in the existing literature. VOSviewer and Microsoft Excel software are used to analyse the collected data.

The first research question was, what is the overall trend or pattern of knowledge advancement in stock market anomalies research? By analysing the growth in the topic, it is found that there is a slow growth in papers that were published on stock market anomalies when compared with 1989. The results indicate that the research field of stock market anomalies still remains a less explored area, as there are only 111 papers in the Scopus data repository for the last 33 years. Research questions two, three, and four deal with identifying the influential and impactful research papers, most productive authors, institutions and nations on the topic stock market anomalies. By conducting bibliometric citation analysis of authors, documents, sources, organizations, and countries, the authors found that Liu J. is the most influential and impactful author, with a total citation of 102 and a total publication of 2. In terms of publications, Zaremba A. is the most productive author with 9 publications among the 224 authors on this topic. In this topic, the most productive institution, university, and country are Joseph L. Rotman School of Management, University of Toronto, Canada, and Schulich School of Business, York University, Canada, both of which have 253 citations, while the United States has the highest citation record of 407 from 27 documents and is the most productive country. The Journal of Banking and Finance is the most impactful journal on this topic with 342 citations. In terms of productivity, the highest number of publications per journal during the period from 1989 to 2022 was 6, which was contributed by the Journal of Banking and Finance, Applied Financial Economics, and Finance Research Letters. The most-cited paper on stock market anomalies is (Cao and Wei 2005, 1559-1573), which has 253 citations.

Through this quantitative and comprehensive review, it is also found that, along with the developed countries, developing countries like India, China, and Malaysia are also investing in conducting research on stock market anomalies. Research on stock market anomalies not only provides investors with more opportunities, but also provides long-term growth through better trading decisions. The activities on the stock market finally influence the monetary policies and GDP of a country. The fifth research question seeks to fill research gap in this particular subject. There is a gap in the existing literature in that most of the studies are focusing on the impact of a particular anomaly, while there is less focus on developing models and theories for explaining the anomalies and developing strategies to tackle the anomalies. Finally, the authors note that this review is useful to academics for their studies of stock market anomalies

for identifying the most influential and impactful authors, articles, and other contributors like journals, organizations, and countries.

## 6. FUTURE RESEARCH DIRECTIONS

The current study also contributes to the scope of further research in the area of stock market anomalies. The content analysis, systematic literature review, and meta-analysis can be conducted by taking the literature of the past few decades to analyze the major themes in this field of research and the major tools used to measure this phenomenon. Future studies can be conducted by using advanced bibliometric tools and software such as BibExcel, Gephi, R Studio, Cite Space, UCInet, Pajek, etc. Analysis of Bibliometric data based on the evolution of the theme, ‘anomalies in the stock market’ over each decade is also a potential area of future research. It is also possible to conduct a comparative analysis of various databases, such as Scopus, Web of Science, and Dimension, on the topic of ”stock market anomalies.” Researchers can evaluate and visualize the difference in them. As the literature indicates that numerous studies have been conducted on specific anomalies such as calendar effect, day of the month effect, seasonal anomaly, etc., researchers are able to conduct a systematic review or bibliometric analysis of a specific anomaly.

## 7. ORIGINALITY AND VALUE

To the best of the authors’ knowledge, this is one of the first papers to address the literature of anomalies in the stock market from a bibliometric perspective. This helps the researchers and other academicians to explore and build a quantitative base relating to the scientific development of anomalies in the stock market. This study makes significant contributions by consolidating fragmented literature in this area and highlighting significant sources, authors, and documents in the field of research.

## 8. RESEARCH LIMITATIONS

The current research has a few limitations. First, the study is a bibliometric analysis, and hence limitations related to such studies are applicable. Even though it is regarded as a reliable quantitative indicator of scientific quality and output, there are a number of issues with using citation analysis to evaluate scientific performance, including measurement issues and multi-authorship concerns. Second, the data for the study is limited to the Scopus database, and similar databases such as Web of Science and Dimension databases are not considered here. Third, the study used only some of the bibliometric analysis tools like citation and co-citation analysis, co-occurrence, and co-authorship analysis. The study can be expanded by employing all performance evaluation and science mapping techniques. Fourth, the scope of the study was limited to journal articles and review papers; analysis of other categories of publications, such as books and conference proceedings, was beyond the purview of this study.

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