Stock market performance during the COVID-19 pandemic using bibliometric review

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ARTICLE INFO	ABSTRACT
	This study uses bibliometric review to assess research trends, most active contributors (subject area, source titles, countries, institutions, and authors), keywords analysis, and citation analysis of publications on stock market performance during the COVID-19 pandemic. The analyses examining the 720 Scopus publications from 2020-2022 were performed using Microsoft Excel, VOSviewer, WordSift, and Harzing's Perish or Publish. The data indicated that research trends on stock market performance rose rapidly from 2020 to 2022. China has the most articles on stock market performance during the COVID-19 pandemic. Compared to developed countries, the findings indicated that emerging countries are performing better in publications. From the expanding number of author keywords in the literature, investor sentiment, spillover effect, and uncertainty are prospective literature gaps to focus on. Future researchers and business practitioners can use the study's findings to study how unusual events affect stock market performance.

INTRODUCTION

The COVID-19 pandemic, which emerged as a global health crisis in early 2020, has had far-reaching consequences across various sectors of the economy. Among the sectors significantly impacted by the pandemic is the stock market, which has experienced unprecedented volatility and uncertainty. The outbreak of the pandemic triggered a series of economic shocks, including widespread lockdowns, supply chain disruptions, and sharp declines in consumer spending. These events rapidly transmitted to financial markets, causing significant fluctuations in stock prices and investor sentiment. As a result, scholars and researchers have directed their attention toward investigating the intricate relationship between the pandemic and stock market performance, aiming to understand the underlying dynamics and implications for investors, financial institutions, and policymakers.

Understanding the implications of the COVID-19 pandemic on stock market performance is of utmost importance due to the critical role of stock markets in driving economic growth and facilitating capital allocation. The pandemic-induced market disruptions have raised crucial questions about the resilience of

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financial systems, the effectiveness of policy measures, and the behaviour of investors during times of crisis. As such, a growing body of literature has emerged, offering valuable insights into the various dimensions of stock market performance during the pandemic.

Studies on stock market performance during the COVID-19 pandemic have examined a range of factors and dimensions, including market volatility (Baker et al., 2020), investor behaviour (Liu et al., 2020), sectoral performance (Lee et al., 2020) and the impact of government interventions (Chang et al., 2021). These investigations utilise diverse methodological approaches, including econometric analysis (Narayan et al., 2020), event studies (Alam et al., 2020), and sentiment analysis (Gondaliya et al., 2022), among others, to shed light on the multifaceted aspects of stock market dynamics during this extraordinary period.

This burgeoning field of study necessitates a road map that will aid future researchers in positioning their endeavours and locating credible literature sources. Bibliometric analysis, a common and rigorous method for investigating and analysing large volumes of scientific data, enable us to deconstruct the evolutionary nuances of a particular field and cast light on its emergent areas (Donthu et al., 2021; Khan et al., 2022). However, the bibliometric analysis of stock market performance specifically during the COVID-19 pandemic is limited. Zulfikar (2022) conducted a bibliometric analysis of the performance of the stock market during the COVID-19 outbreak and identified four clusters as the research roadmap. However, Zulfikar (2022) only focused on the year 2020 to 2021, but the peak COVID-19 period was from 2019 to 2022. In contrast, another research by Lau et al. (2022) utilises science mapping, performance analysis, and collaboration clusters for the bibliometric analysis but did not portray the publication trends and the keyword analysis of stock market performance during the COVID-19 pandemic, which will be featured in this study.

Consequently, this study is to fill this gap by conducting a bibliometric review of the research field with a few modifications. The purpose of this study is to address the following research questions:

RQ1: What are the trends of publications on stock market performance during the COVID-19 pandemic?

RQ2: Who are the most productive contributors in the research of stock market performance during the COVID-19 pandemic in terms of subject area, source titles, countries, institutions, and authors?

RQ3: What are the states of knowledge structure from the keywords in terms of collaboration and co-occurrences network in stock market performance during the COVID-19 pandemic?

RQ4: Which are the highly cited documents on stock market performance during the COVID-19 pandemic?

The paper is organized as follows: The first segment describes the evolution of the literature review in the field of stock market performance during the COVID-19 pandemic, while the second section explains the methodology adopted for this study together with the flow diagram of the search strategy. The third section describes the findings and results of the pertinent bibliometric indicators. This section contains tables and figures of the bibliometric analysis. The final section provides a summary of the discussions, the future direction of research, and the limitations of this study.

LITERATURE REVIEW

The COVID-19 pandemic has exerted a profound influence on the global economy, impacting various sectors including the stock market. Consequently, numerous scholars have conducted studies to examine the implications of the pandemic on stock market performance. An early investigation of stock market performance during the COVID-19 pandemic was undertaken by Sharif et al. (2020). Their research revealed that the perceived risk associated with the rapid spread of COVID-19 was regarded by US investors as a systematic risk, causing significant turbulence in the US stock market and elevating economic policy uncertainty indexes to unprecedented levels. The study also highlighted the substantial short-term impact of COVID-19 on US stock markets from an asset management perspective.

Another study conducted by Al-Awadhi et al. (2020) investigated the effect of the highly contagious infectious disease, COVID-19, on the Chinese stock market. Their findings indicated a significant negative relationship between stock returns and both the daily growth in total confirmed cases and the daily growth in total deaths attributed to COVID-19. In a similar notion, Ashraf (2020) utilised data on daily confirmed cases and deaths from 64 countries during the period of January 22, 2020, to April 17, 2020, demonstrating that stock markets responded negatively to the growth in COVID-19 confirmed cases.

Research of ten developed countries by Vasileiou (2021) found evidence indicating that health risk has an impact on market performance, not solely due to its adverse economic outcomes (such as economic slowdown and decreased consumption), but also due to behavioural elements like risk aversion and fear. In addition, Yu et al. (2022) revealed that the anxiety indexes related to the COVID-19 pandemic displayed fluctuations and a gradual decline across all countries. These indexes consistently remained lower than the levels observed in the initial stages of the pandemic, despite the surge in daily reported cases and fatalities during the latter half of 2020.

Nepp et al. (2022) pointed out that the occurrence of the pandemic had a discernible influence on stock markets in the period leading up to the structural shift, which coincided with the height of exaggerated excitement. The heightened attention surrounding the pandemic significantly magnified the impact of social media conversations on stock markets, particularly occurring before the peak of the pandemic. This phenomenon exhibits a greater magnitude of negative effects during the week in which the World Health Organisation officially classified COVID-19 as a pandemic (Chundakkadan & Nedumparambil, 2022). Worsening the situation, it is posited that governmental policies, while intended to alleviate the impact of the COVID-19 pandemic, yielded a greater number of adverse consequences compared to their positive outcomes (Bannigidadmath et al., 2022).

In summary, the existing body of literature on the performance of stock markets during the COVID-19 pandemic demonstrates a fluid progression of research interests and approaches. Scholars have conducted extensive research on the complex relationship between a global crisis and the intricate dynamics of financial markets.

METHODS

Bibliometric analysis is a quantitative research method used to examine and evaluate scientific publications and their characteristics. It involves the systematic analysis of bibliographic data, such as citations, to identify patterns, trends, and relationships within a specific field of study (Leydesdorff & Vaughan, 2006). By analysing publication patterns, citation networks, and other bibliographic indicators, the bibliometric analysis provides valuable insights into the scholarly communication process and the impact of scientific research (Waltman, 2016).

This study employs the online Scopus database as a primary source of literature to establish a comprehensive collection of publications focusing on stock market performance during the COVID-19 pandemic. The selection of the Scopus online database stems from its reputation as the largest index encompassing journals, book series, conferences, and proceedings, all of which are ranked based on their citation impact. Moreover, Scopus offers extensive access to a vast repository of abstracts and citations sourced from highly esteemed, peer-reviewed research literature across various academic disciplines. To provide a visual representation of the search strategy and the subsequent bibliometric analysis performed in this study, Figure 1 presents a detailed depiction of the sequential steps involved.

The search strategy employed for investigating stock market performance was conducted as follows: The topic of interest was "Stock Market Performance." The research was conducted using the Scopus database, with the search field limited to article titles. The time frame for the search spanned from 2020 to 2022, and the language of the articles was limited to English. The search encompassed all source types, with a specific focus on articles. The keywords and search string used were: "STOCK MARKET" OR

"STOCK MARKET PERFORMANCE" OR "STOCK RETURN" OR "STOCK PRICE" AND "COVID" OR "PANDEMIC" OR "CORONA." After conducting the screening process, which involved extracting data up until 22 June 2023, a total of 702 records were identified and screened. None of the identified records were removed during this screening phase. Consequently, all 702 records were included for bibliometric analysis, meeting the inclusion criteria for the study.

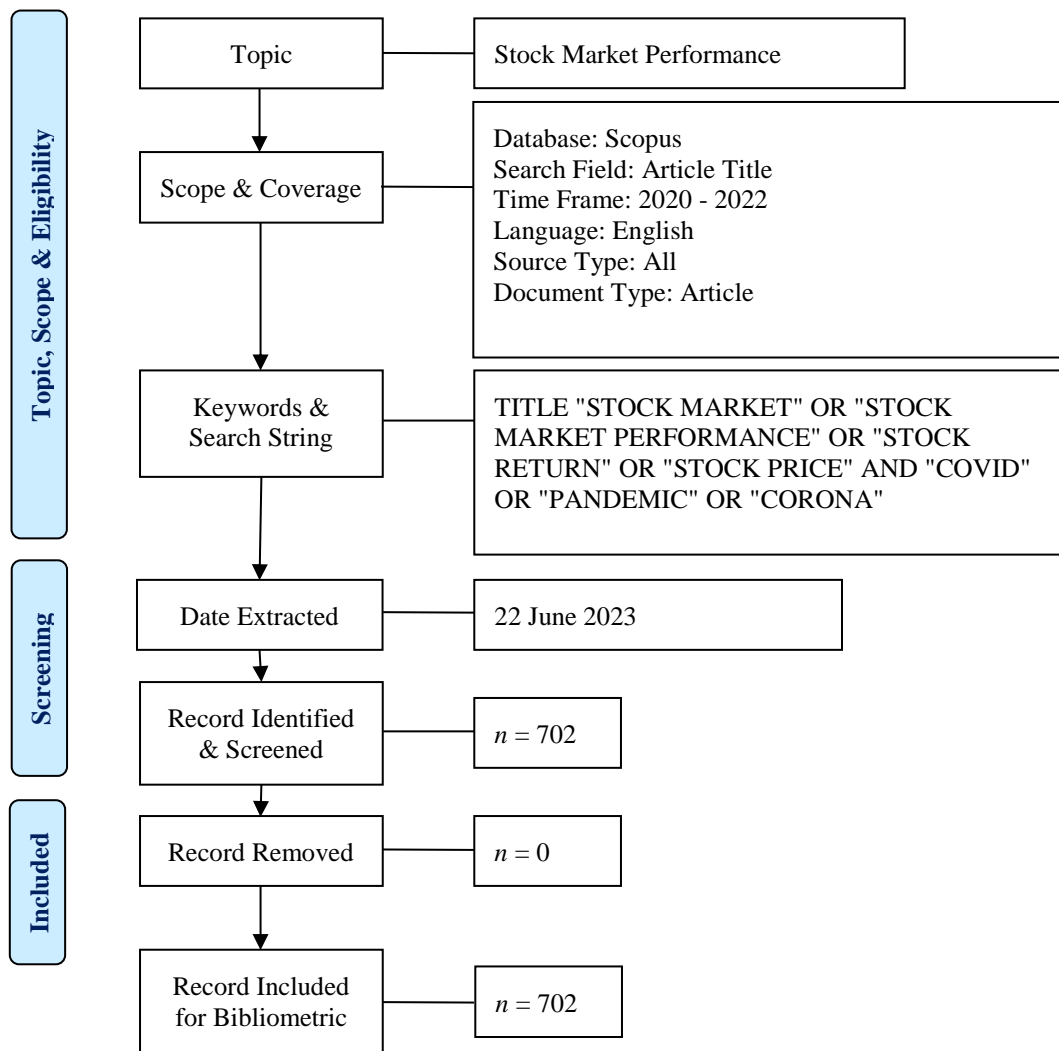Fig. 1. Flow diagram of the search strategy

Source of Figure 1: Adapted from Moher, Liberati, Tetzlaff (2009)

The research mainly utilised bibliometric analysis through the application of Microsoft Excel 2013 to determine the frequency and proportion of published materials, as well as generate relevant tables, charts, and graphs. This method was used to answer all the first and second research objectives.

VOSviewer was also used to evaluate 702 articles saved in *.ris format. VOSviewer is a widely used tool for visualising and analysing bibliometric networks. While VOSviewer primarily serves the purpose of analysing bibliometric networks, it possesses the capability to generate, depict, and investigate maps derived from diverse forms of network data (Van Eck & Waltman, 2019). It uses advanced techniques such as co-citation and co-authorship analysis to uncover patterns and relationships in large bibliographic datasets. The fractional counting method was used to extract the authors' keywords and the countries of the articles. The results of the evaluation of interconnected terms will be visualised in the form of a network visualisation map. VOSViewer had helped answer the third research objective.

To visually illustrate the prominent terms utilised by the author, the study employed a WordSift tool, which generates a graphical depiction of the words that appear most frequently inside a given text. The author keywords from each publication were entered by the researchers into the WordSift programme, and the resulting visualisations were utilised to enhance comprehension of the primary themes and subjects addressed in the literature. WordSift was also used in the keyword analysis, which is under the third research objective.

Another tool has also been used, by using Harzing's Publish or Perish (PoP). PoP is a well-established software application that retrieves and analyses academic citations. It is intended to assist individual academicians in demonstrating their case for research impact, even if they have very few citations. It is also very suitable for conducting bibliometric research (Harzing, 2010). This software was used to conduct the citation analysis of the research, helping to answer the fourth research objective.

This study made good use of Microsoft Excel, VOSviewer, Harzing's Publish or Perish, and WordSift tools to answer the research questions.

RESULTS

Document and Source

Table 1 provides an overview of the types of publications related to stock market performance during the COVID-19 pandemic from 2020 to 2022. The table reveals that most publications (87.89%) were in the form of articles, totalling 617 publications. Conference papers accounted for 7.55% of the publications, for a total of 53 papers. Book chapters constituted 2.28% of the publications, with 16 chapters identified. Additionally, reviews comprised 1.28% of the publications, with nine reviews identified. A small proportion of the publications included letters (0.85%, 6 letters) and editorials (0.14%, 1 editorial).

Table 1. Document type

Document Type	Total Publications (TP)	Percentage (%)
Article	617	87.89
Conference Paper	53	7.55
Book Chapter	16	2.28
Review	9	1.28
Letter	6	0.85
Editorial	1	0.14
Total	**702**	**100.00**

Source of Table 1: Author's own data collection

The dominance of article publications in this research area reflects the academic community's preference for disseminating research findings through peer-reviewed journals. The inclusion of conference proceedings indicates the importance of academic conferences as platforms for sharing research related to stock market performance during the COVID-19 pandemic. The presence of book chapters underscores the significance of comprehensive and specialized studies that contribute to a deeper understanding of the topic. The inclusion of reviews, letters, and editorials indicates a variety of perspectives and commentary on the

subject matter. The table's data helps to inform researchers, scholars, and practitioners interested in studying and staying updated on stock market performance during the COVID-19 pandemic.

Evolution of Published Studies

Table 2 and Figure 2 illustrate the distribution of publications related to stock market performance during the COVID-19 pandemic across the years 2020 to 2022.

Table 2. Year of publications

Year	Total Publications	Percentage (%)
2020	70	9.97
2021	248	35.33
2022	384	54.70
Total	**702**	**100.00**

Source of Table 2: Author's own data collection

The table shows that in 2020, there were 70 publications, representing 9.97% of the total. In 2021, the number of publications increased significantly to 248, accounting for 35.33% of the total. The year 2022 witnessed the highest number of publications, with 384 papers making up 54.70% of the total.
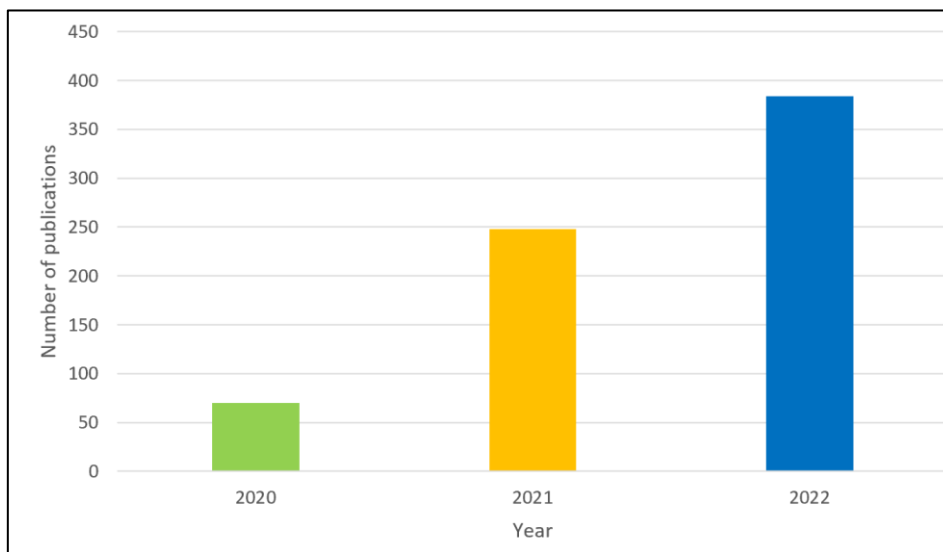
Fig. 2. Total publication by year

Source of Figure 2: Author's own data collection

The data indicates a substantial growth in research output over the three years, with a notable surge in publications from 2020 to 2021 and further expansion in 2022. This trend likely reflects the increasing interest and attention given to studying stock market performance during the COVID-19 pandemic as the global financial markets grappled with the unprecedented challenges posed by the crisis.

Subject Area

Table 3 presents the subject areas of publications related to stock market performance during the COVID-19 pandemic from 2020 to 2022.

Table 3. Subject area

Subject Area	Total Publications	Percentage (%)
Economics, Econometrics, and Finance	448	63.82%
Business, Management, and Accounting	209	29.77%
Social Sciences	99	14.10%
Computer Science	77	10.97%
Mathematics	50	7.12%
Engineering	47	6.70%
Energy	40	5.70%
Environmental Science	40	5.70%
Decision Sciences	34	4.84%
Physics and Astronomy	26	3.70%
Medicine	21	2.99%
Multidisciplinary	21	2.99%
Psychology	15	2.14%
Arts and Humanities	6	0.85%
Biochemistry, Genetics, and Molecular Biology	5	0.71%
Pharmacology, Toxicology, and Pharmaceutics	4	0.57%
Agricultural and Biological Sciences	3	0.43%
Earth and Planetary Sciences	3	0.43%
Health Professions	3	0.43%
Materials Science	3	0.43%
Neuroscience	2	0.28%
Chemical Engineering	1	0.14%
Chemistry	1	0.14%
Immunology and Microbiology	1	0.14%

Source of Table 3: Author's own data collection

The table reveals that the subject area with the highest number of publications is Economics, Econometrics, and Finance, accounting for 448 publications, or 63.82% of the total. The second most prominent subject area is Business, Management, and Accounting, with 209 publications, or 29.77% of the total. The subject area of Social Sciences follows with 99 publications, representing 14.10% of the total. Computer Science is the fourth most prominent subject area, with 77 publications, or 10.97% of the total, and Mathematics with 50 publications, constituting 7.12 % of the total.

Moreover, other subject areas that have also received considerable research interest include Engineering, Energy, and Environmental Science, each accounting for a varying percentage of the total publications. It is worth noting that the multidisciplinary nature of the topic is evident, as reflected by the inclusion of subject areas such as Psychology, Arts and Humanities, Biochemistry, Genetics, and Molecular Biology, among others, although these areas have relatively fewer publications in comparison.

These findings highlight the diverse disciplinary perspectives and interdisciplinary approaches taken by researchers to examine the stock market's performance during the COVID-19 pandemic. The emphasis on subjects like Economics, Econometrics, and Finance signifies the significance of understanding the economic implications and financial dynamics associated with the pandemic. The inclusion of other subject areas indicates the multidimensional nature of the topic and the need for a comprehensive analysis from various disciplinary lenses to gain a holistic understanding of the subject matter.

Most Active Source Titles

Table 4 provides insights into the most active source titles in the research on stock market performance during the COVID-19 pandemic.

Table 4. Most active source titles

Source Title	Total Publications	Percentage (%)
Finance Research Letters	50	7.12%
International Review of Financial Analysis	17	2.42%
Applied Economics	14	1.99%
Investment Management and Financial Innovations	13	1.85%
North American Journal of Economics and Finance	13	1.85%
Economic Research Ekonomska Istrazivanja	12	1.71%
Emerging Markets Finance and Trade	11	1.57%
Research in International Business and Finance	11	1.57%
Applied Economics Letters	10	1.42%
Economic Analysis and Policy	10	1.42%
International Journal of Energy Economics and Policy	10	1.42%
Resources Policy	10	1.42%
Frontiers in Public Health	9	1.28%
Physica A Statistical Mechanics and Its Applications	9	1.28%
Energy Research Letters	8	1.14%
Journal of Behavioral and Experimental Finance	8	1.14%
ACM International Conference Proceeding Series	7	1.00%
Frontiers in Psychology	7	1.00%
Heliyon	7	1.00%
Journal of Asian Finance Economics and Business	7	1.00%
Asian Economic and Financial Review	6	0.85%
Borsa Istanbul Review	6	0.85%
Financial Innovation	6	0.85%
International Journal of Monetary Economics and Finance	6	0.85%
Journal of Risk and Financial Management	6	0.85%
Pacific Basin Finance Journal	6	0.85%
Complexity	5	0.71%
Current Issues in Tourism	5	0.71%
International Journal of Environmental Research and Public Health	5	0.71%
International Journal of Financial Studies	5	0.71%
Risks	5	0.71%
Sustainability Switzerland	5	0.71%

Source of Table 4: Author's own data collection

Topping the list is "Finance Research Letters," with a total of 50 publications, representing 7.12% of the overall research output. Following closely is the "International Review of Financial Analysis" with 17 publications, accounting for 2.42% of the total. "Applied Economics" and "Investment Management and Financial Innovations" both have 14 publications each, contributing 1.99% and 1.85%, respectively.

Other notable source titles include "North American Journal of Economics and Finance," "Economic Research Ekonomska Istrazivanja," and "Emerging Markets Finance and Trade," each with a considerable number of publications and corresponding percentages. These active source titles represent diverse academic journals and platforms that have significantly contributed to the literature on stock market performance during the COVID-19 pandemic.

The wide range of source titles reflects the interdisciplinary nature of the research, incorporating perspectives from finance, economics, management, and related fields. Researchers have sought to publish their work in reputable and influential journals covering various aspects of financial analysis, economic policies, and emerging market dynamics. The distribution of publications across multiple source titles demonstrates the breadth of scholarly engagement and the dissemination of research findings through diverse academic platforms.

Geographical Distribution of Publications - Most Influential Countries

Table 5 presents the top 20 countries that have made significant contributions to the publications on stock market performance during the COVID-19 pandemic from 2020 to 2022. The table provides insights into the distribution of publications across different countries and their respective contributions.

Table 5. Top 20 countries contributed to the publications

Country	Total Publications	Percentage (%)
China	160	22.79%
India	98	13.96%
United States	57	8.12%
Indonesia	47	6.70%
Malaysia	45	6.41%
Pakistan	41	5.84%
Australia	39	5.56%
Vietnam	37	5.27%
United Kingdom	29	4.13%
Saudi Arabia	26	3.70%
Turkey	26	3.70%
France	23	3.28%
Tunisia	23	3.28%
Nigeria	18	2.56%
South Korea	17	2.42%
United Arab Emirates	17	2.42%
Japan	14	1.99%
Spain	14	1.99%
Thailand	14	1.99%
Italy	12	1.71%

Source of Table 5: Author's own data collection

China emerges as the leading contributor, with 160 publications accounting for 22.79% of the total publications in the datasets. This substantial representation suggests the active involvement of Chinese researchers and scholars in studying and analysing stock market performance during the COVID-19 pandemic. India follows closely behind with 98 publications, representing 13.96% of the total. The significant contribution from India indicates the country's research interest and engagement in investigating the impacts of the pandemic on stock markets.

The United States ranks third with 57 publications, constituting 8.12% of the total. This highlights the involvement of American researchers in studying the stock market performance during the pandemic, albeit to a lesser extent compared to China and India. Other notable contributors include Indonesia with 47 publications (6.70%), Malaysia with 45 publications (6.41%), and Pakistan with 41 publications (5.84%). These countries demonstrated active participation in research related to stock market performance during the COVID-19 pandemic.

It is important to note that the contributions from countries such as Australia, Vietnam, the United Kingdom, Saudi Arabia, Turkey, France, Tunisia, Nigeria, South Korea, United Arab, Japan, Spain, Thailand, and Italy also hold significance, albeit to varying degrees. These countries have made notable contributions to the body of knowledge on the topic.

The diverse representation of countries in the top 20 list indicates the global interest in understanding and analysing the stock market dynamics during the COVID-19 pandemic. The research contributions from these countries collectively contribute to a comprehensive understanding of the topic from various perspectives.

Most Influential Institutions

Table 6 shows the most influential institutions in terms of their contributions to the field of stock market performance during the COVID-19 pandemic from 2020 to 2022. These institutions have demonstrated their research prowess by publishing a minimum of six publications, indicating their significant presence and impact in the field.

Table 6. Most influential institutions with minimum of six publications

Institution	Total Publications	Percentage (%)
University of Economics Ho Chi Minh City	16	2.28%
Universiti Utara Malaysia	11	1.57%
Deakin University	9	1.28%
Zhongnan University of Economics and Law	9	1.28%
Taylor's University Malaysia	9	1.28%
Iqra University	7	1.00%
University of Ibadan	6	0.85%
South Ural State University	6	0.85%
Southwest Jiaotong University	6	0.85%
Monash University	6	0.85%
University of Évora	6	0.85%
FSEG Sfax - Faculté des Sciences Économiques et de Gestion de Sfax	6	0.85%
Monash Business School	6	0.85%

Source of Table 6: Author's own data collection

The University of Economics Ho Chi Minh City stands out as the most influential institution, with 16 publications, accounting for 2.28% of the total publications. This institution's high research output suggests its strong commitment to studying the stock market performance during the pandemic.

Following closely behind is Universiti Utara Malaysia with 11 publications, making up 1.57% of the total. The substantial number of publications reflects the institution's dedication to investigating and analysing the effects of the COVID-19 pandemic on stock markets.

Deakin University, Zhongnan University of Economics and Law, and Taylor's University Malaysia all share a similar number of publications with nine each, representing 1.28% of the total. These institutions have made noteworthy contributions to the understanding of stock market performance during the pandemic.

Additional influential institutions include Iqra University with seven publications, University of Ibadan, South Ural State University, Southwest Jiaotong University, Monash University, University of Évora, FSEG Sfax - Faculté des Sciences Économiques et de Gestion de Sfax, and Monash Business School, each contributing six publications. These institutions have demonstrated their research capabilities and have made significant contributions to the field.

Authorship

Table 7 presents the most productive authors in the field of stock market performance during the COVID-19 pandemic from 2020 to 2022. These authors have made significant contributions to the literature on this topic, as reflected in the number of documents they have authored and their respective percentages.

Table 7. Most productive authors

Author's Name	No. of Documents	Percentage (%)
Narayan, P.K.	7	1.00%
Vo, X.V.	6	0.85%
Ashraf, B.N.	5	0.71%
Aslam, F.	5	0.71%
Ferreira, P.	5	0.71%
Huynh, T.L.D.	5	0.71%
Bouri, E.	4	0.57%
Chang, C.P.	4	0.57%
Kang, S.H.	4	0.57%
Lee, C.C.	4	0.57%
Mahata, A.	4	0.57%
Mensi, W.	4	0.57%
Nurujjaman, M.	4	0.57%
Rai, A.	4	0.57%
Sadiq, M.	4	0.57%
Supriyanto	4	0.57%
Tiwari, A.K.	4	0.57%
Al-Mohamad, S.	3	0.43%
Alexandri, M.B.	3	0.43%
Baek, S.	3	0.43%

Source of Table 7: Author's own data collection

The most productive author in this context is Narayan, Paresh Kumar who has authored seven documents, accounting for 1.00% of the total publications. Narayan's extensive contribution suggests a strong research focus on stock market performance during the pandemic. Vo, Xuan Vinh follows closely behind with 6 documents, representing 0.85% of the total. The substantial number of publications indicates Vo's active engagement in investigating and analysing the effects of the COVID-19 pandemic on stock markets.

Other highly productive authors include Ashraf, B.N., Aslam, F., Ferreira, P., Huynh, T.L.D., Bouri, E., Chang, C.P., Kang, S.H., Lee, C.C., Mahata, A., Mensi, W., Nurujjaman, M., Rai, A., Sadiq, M., Supriyanto, Tiwari, A.K., each contributing five to four documents. These authors have demonstrated significant research output and have made notable contributions to the understanding of stock market performance during the pandemic. The presence of multiple authors with similar numbers of publications emphasizes the collaborative nature of research in this field. Their combined efforts contribute to a more comprehensive understanding of the topic by incorporating diverse perspectives and expertise.

Keywords Analysis

This study began by creating a word cloud for the author's keywords with WordSift (https://wordsift.org). Figure 3 shows the result of a word cloud with a maximum of 100 words and a scale setting. The top 100 words used in the published article, as shown in the figure, are stock and market.

Fig. 3. Word cloud of the author keywords

Source of Figure 3: Author's own data collection

The size of each word represents the total number of occurrences of the keywords. Other than the keyword that was used to search the title of the document, the word cloud depicts other keywords such as Returns, Pandemic, COVID, Analysis, Spillover, Financial, Economics, and Volatility. Other keywords, despite their small size, have been used to accommodate the topic of stock market performance for the years 2020-2022.

Figure 4 shows a network visualisation of the author keywords, each of which had at least ten occurrences. The authors' keywords were mapped using VOSviewer, a software tool for creating and visualizing bibliometric networks. The relationships between keywords are represented by the colour, circle size, font size, and thickness of the connecting lines. Keywords with the same colour, for example, are frequently listed.
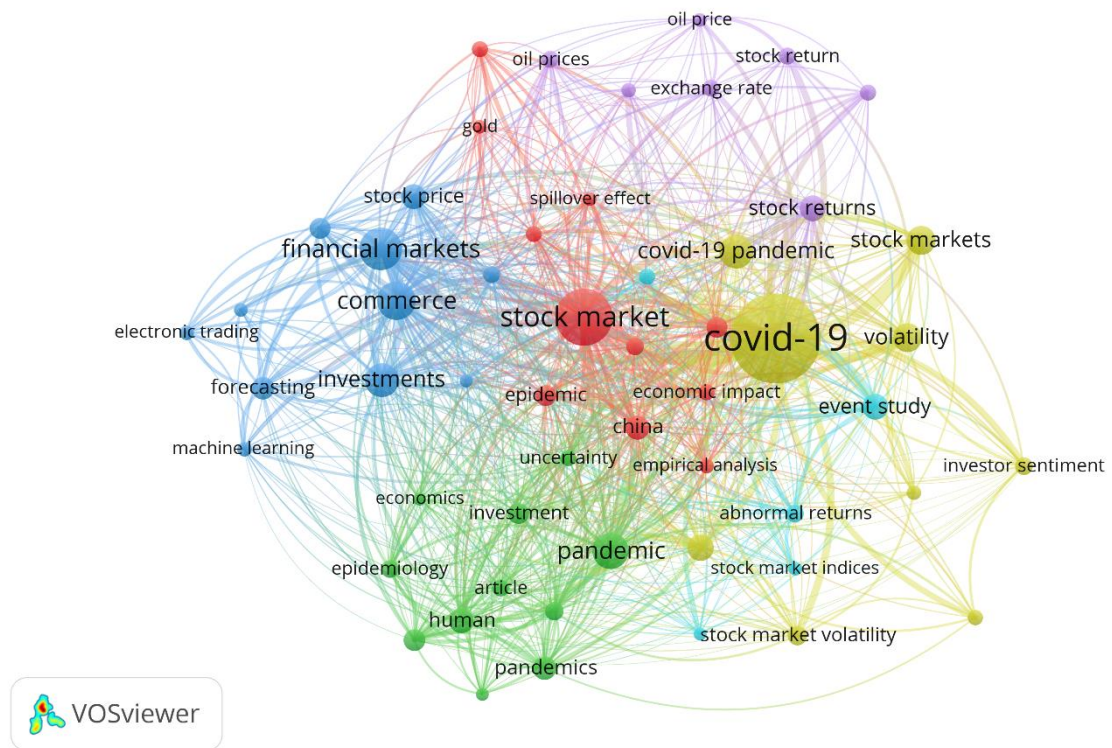
Fig. 4. Network visualisation map of the author keywords

Type of Analysis: Co-occurrence
Counting method: Fractional counting
Unit of Analysis: All keywords
Minimum number of occurrences of a keyword: 10
Number of keywords to be selected: 54

Source of Figure 4: Author's own data collection

From the visualisation, four main groups of six clusters were generated. The first cluster comprises COVID-19, volatility, investor sentiment, and stock markets, while the second cluster includes the stock market, economic impact, spillover effect, epidemic, empirical analysis, gold, and China. The third cluster links financial markets to commerce, investments, stock price, forecasting, electronic trading, and machine learning. The fourth cluster in green puts together pandemic, human, uncertainty, investment, epidemiology, economics, and article. The fifth cluster networks the stock returns, exchange rate, and oil prices whereas event study, abnormal returns, stock market indices, and stock market volatility make up the final sixth cluster.

Table 8 provides an overview of the top keywords used in publications on stock market performance during the COVID-19 pandemic from 2020 to 2022. These keywords reflect the key areas of focus and research interests within the field.

Table 8. Top keywords

Author Keywords	Total Publications	Percentage (%)
COVID-19	411	58.55%
Stock Market	182	25.93%
Financial Markets	103	14.67%
Commerce	85	12.11%
Pandemic	76	10.83%
Investments	64	9.12%
COVID-19 Pandemic	58	8.26%
COVID-19	57	8.12%
Stock Markets	48	6.84%
Volatility	47	6.70%
Coronavirus	41	5.84%
Event Study	38	5.41%
Stock Returns	38	5.41%
Stock Price	35	4.99%
China	33	4.70%
Human	33	4.70%
Pandemics	31	4.42%
Forecasting	29	4.13%
Humans	27	3.85%
Epidemic	26	3.70%

Source of Table 8: Author's own data collection

The most frequently used keyword is "COVID-19", which appeared in 411 publications, representing 58.55% of the total. This reflects the central role of the pandemic in shaping stock market performance and the extensive research conducted to understand its impact.

"Stock Market" is the second most prevalent keyword, appearing in 182 publications (25.93%). This keyword highlights the specific focus on analysing the performance, trends, and dynamics of stock markets during the pandemic. Other significant keywords include "Financial Market" (14.67%), "Commerce" (12.11%), "Pandemic" (10.83%), and "Investment" (9.12%). These keywords further emphasize the central theme of the pandemic and its impact on stock market performance.

Additionally, keywords such as "Volatility," "Event Study," "Stock Returns," and "Coronavirus" indicate the focus on understanding the specific factors influencing stock market performance during the COVID-19 pandemic. These keywords highlight the attention given to market volatility, the analysis of specific events and their impact on stock prices, and the examination of the relationship between the pandemic and financial markets.

The inclusion of keywords related to specific countries and regions, such as "China" and "United States," demonstrates the global scope of research on stock market performance during the pandemic. Scholars have investigated the unique characteristics and dynamics of stock markets in different geographical contexts, contributing to a comprehensive understanding of the global impact of COVID-19 on financial markets.
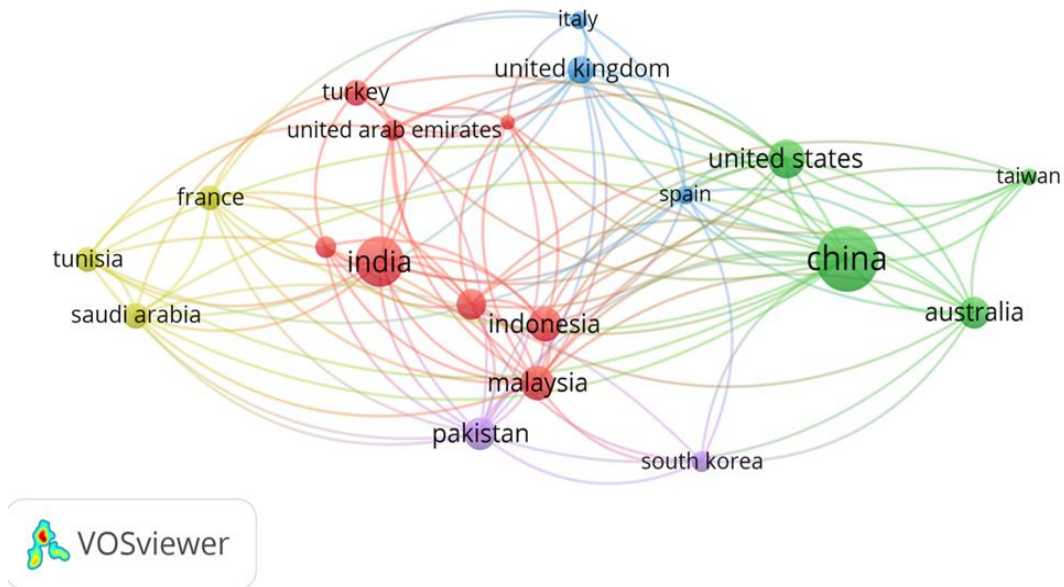
Fig. 5. Network visualisation map of the co-authorship

Unit of analysis = Countries
Counting method: Fractional counting
Minimum number of documents of a country = 3
Minimum number of citations of a country = 5

Source of Figure 5: Author's own data collection

Five clusters of co-authorship by countries have been identified in research on a similar topic. The first cluster includes India, Indonesia, Malaysia, Turkey, and the United Arab Emirates while the second cluster comprises China, the United States, Australia, and Taiwan. Thirdly, France, Tunisia, and Saudi Arabia were under the same cluster, and the fourth cluster consists of the United Kingdom, Italy, and Spain. Pakistan and South Korea made up the fifth cluster. International cooperation demonstrates a desire to comprehend and analyse the dynamics of the stock market during the COVID-19 pandemic.

Citation Analysis

Citations don't merely show a paper's influence but can also skew tales about academics, journals, and research topics (Harzing, 2010). The productivity of researchers can also be measured by the number of citations and citations per year. Table 9 summarises the citation metrics for the retrieved documents as of June 2023.

Table 9. Citations metrics

Metrics	Data
Publication years	2020 - 2022
Citation years	3 (2020 – 2022)
Papers	702
Citations	15094
Citations/year	5031.33
Citations/paper	21.5
Citations/author	6061.69
Papers/author	298.03
h-index	56
g-index	106

Source of Table 9: Author's own data collection

The productivity of researchers can also be measured by the number of citations and citations per year. Table 10 summarises the citation metrics for the retrieved documents as of June 2023. Table 10 shows the total number of citations with average citations per year for all retrieved documents. As indicated, there are 15094 citations reported in three years (2020 - 2022) for 702 retrieved articles, with an average of 5031.33 citations/year.

Table 10 presents the top ten highly cited articles related to stock market performance during the COVID-19 pandemic from 2020 to 2022. The articles have been ranked based on the number of citations they have received and the average number of citations per year. The list includes the authors, title, year of publication, total number of citations, and average citations per year as per the Scopus database.

Table 10. Highly cited articles

No	Authors	Title	Year	Cites	Cites per Year
1	A. Sharif, C. Aloui, L. Yarovaya	COVID-19 pandemic, oil prices, stock market, geopolitical risk, and policy uncertainty nexus in the US economy: Fresh evidence from the wavelet-based approach	2020	741	247
2	A.M. Al-Awadhi, K. Alsaifi, A. Al-Awadhi, S. Alhammadi	Death and contagious infectious diseases: Impact of the COVID-19 Virus on stock market returns	2020	674	224.67
3	B.N. Ashraf	Stock markets' reaction to COVID-19: Cases or fatalities?	2020	590	196.67
4	S.R. Baker, N. Bloom, S.J. Davis, K. Kost, M. Sammon, T. Viratyosin	The unprecedented stock market reaction to COVID-19	2020	583	194.33
5	S. Ramelli, A.F. Wagner	Feverish stock price reactions to COVID-19	2020	397	132.33
6	D.H.B. Phan, P.K. Narayan	Country Responses and the Reaction of the Stock Market to COVID-19—a Preliminary Exposition	2020	372	124
7	M. Mazur, M. Dang, M. Vega	COVID-19 and the March 2020 stock market crash. Evidence from S&P1500	2021	366	183
8	H. Liu, A. Manzoor, C. Wang, L. Zhang, Z. Manzoor	The COVID-19 outbreak and affected countries' stock markets response	2020	364	121.33
9	M. Topcu, O.S. Gulal	The impact of COVID-19 on emerging stock markets	2020	326	108.67
10	P. He, Y. Sun, Y. Zhang, T. Li	COVID–19's Impact on Stock Prices Across Different Sectors—An Event Study Based on the Chinese Stock Market	2020	301	100.33

Source of Table 10: Author's own data collection

The most cited article by Sharif et al. (2020) with 741 citations highlights the time-frequency relationship between the COVID-19 outbreak, oil price, geopolitical risk, economic uncertainty, and the

US stock market, while the second most cited article from Al-Awadhi et al. (2020) with 674 citations discusses the contagious infectious diseases affect stock market outcomes in the Chinese stock market. The third most cited article by Ashraf (2020) with 590 citations, highlights the stock markets' response to the COVID-19 pandemic in 64 countries.

DISCUSSIONS AND CONCLUSION

Through bibliometric analysis, it is possible to gain an understanding of the literature on the stock market performance during the COVID-19 pandemic. The first research objective was to identify the trends in publications on stock market performance during the COVID-19 pandemic. This research topic has experienced an increasing trend for the past three years of the pandemic and is most likely to continue to increase. This trend likely reflects the growing interest and focus on analysing stock market performance during the COVID-19 pandemic, when global financial markets were confronted with unprecedented challenges brought on by the crisis. The greatest number of publications indexed in the Scopus database were journal articles emphasizing the significance of empirical research and in-depth analysis of stock market performance during the COVID-19 pandemic.

The second research objective was to discover the most productive contributors in the research of stock market performance during the COVID-19 pandemic in terms of subject area, source titles, countries, institutions, and authors. As for the subject area, the emphasis was on Economics, Econometrics, and Finance which demonstrates the importance of comprehending the economic ramifications and financial dynamics of the pandemic. The variety of source titles reflects the interdisciplinary character of the research, which incorporates perspectives from finance, economics, and management, among other disciplines. Researchers have sought to publish their work in reputable and influential journals covering various facets of financial analysis, economic policies, and the dynamics of emerging markets.

The geographical distribution of the literature demonstrates that China has the most publications compared to other countries, followed by India, the United States, Indonesia, and Malaysia. The highest publication is from China, most probably because COVID-19 originated from there and they faced the earliest impact from the virus, prompting a quick response from the research community. Moreover, the vast and influential institutions demonstrate their dedication to researching the performance of the stock market during the pandemic. The highest were from the University of Economics Ho Chi Minh City and Universiti Utara Malaysia. Zooming into individual authors, Paresh Kumar Narayan and Xuan Vinh Vo have been identified as the most productive authors on this topic. Generally, the findings showed that emerging countries are at an advanced level in terms of publications as compared to developed countries on this topic.

The third research objective focused on the analysis of the keywords. The research has identified six themes from the co-occurrence of the author's keywords. The clustering of related keywords can indicate emerging areas of interest or popular subjects that researchers are currently focusing on. Keywords analysis through WordSift and VOSViewer has highlighted investor sentiment, spillover effect, and uncertainty to be areas with low co-occurrence, indicating potential gaps in the literature. These gaps can present opportunities for new research or areas where further investigation is needed.

Five clusters of co-authorship by countries were also found in research on a similar topic. The collaboration between countries indicates a global interest in comprehending and analysing the dynamics of the stock market during the COVID-19 pandemic. The research contributions from these nations collectively contribute to a multifaceted comprehension of the topic from a variety of perspectives.

The fourth research objective is citation analysis. The findings illustrate the top three highly cited papers have presented fresh evidence or novel insights about the impact of the COVID-19 pandemic on various aspects, such as oil prices, stock market returns, and the reaction of stock markets to different COVID-19 metrics. The use of specialized and advanced methodologies, such as wavelet-based approaches

or econometrics, can enhance the credibility and uniqueness of the research, leading to higher citations. Hence, new and valuable findings tend to be cited more frequently.

RESEARCH IMPLICATIONS AND LIMITATIONS

The bibliometric analysis research on the performance of the stock market during the COVID-19 pandemic is advantageous in multiple ways. It assists researchers and stakeholders in identifying the most prevalent and influential research themes, mapping the field's overall landscape, and disclosing collaborative networks and centres. Researchers can determine the significance and influence of individual contributions by evaluating the impact of specific studies and authors via citation counts and h-index.

Additionally, the analysis identifies emergent research areas, thereby guiding investigation into potentially fruitful topics. In addition, it offers insights into international collaboration patterns, promoting the global exchange of knowledge in this interdisciplinary field. Researchers can target influential publications for their work by identifying prominent journals. In addition, monitoring citation patterns over time reveals the impact and reception of research in this field. In addition, the bibliometric analysis highlights inter-disciplinary connections, thereby facilitating collaborations between finance, economics, and related fields. It ultimately contributes to the advancement of knowledge on stock market performance during the pandemic by identifying research gaps and trends, thereby assisting researchers and policymakers in making informed decisions.

Like other research, this study has inherent limitations. Scopus is the only database utilised for the study. Even though Scopus is regarded as one of the largest and most trustworthy databases, there are still journals that are not indexed that cannot be ignored. In addition, selecting Scopus as the sole database may restrict the scope of the study inquiry. Future researchers are strongly encouraged to utilise other database sources, such as WOS, Google Scholar, etc. when assessing the research trends for pertinent studies. Even though the search strategy for this study took title, keywords, and abstracts into account, the researchers cannot guarantee that the search query is 100 percent accurate. Due to the possibility of false positive and false negative results, it is impossible to guarantee that every published article on the issue in question has been covered. The total number of publications and citations is therefore considered accurate only at the time of the inquiry. Additionally, the present investigation focuses exclusively on the bibliometric analysis of stock market performance during the COVID-19 pandemic. This investigation neither focuses on a particular industry nor a specific country. Consequently, future research may concentrate on industry-specific performance or even compare the performance between countries. Hence, future research could evaluate the stock market performance during the post-COVID period. All quantitative, qualitative, and experimental research on stock market performance has the potential to yield significant findings in this field.

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CONFLICT OF INTEREST STATEMENT

The authors agree that this research was conducted in the absence of any self-benefits, commercial or financial conflicts.

AUTHORS' CONTRIBUTIONS

Syukriah conceptualised the central research idea and carried out the research. Rosliza wrote and revised the article. Chaleeda anchored the review, revisions and approved the article submission.

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