

## STOCK MARKET AMIDST THE COVID-19 PANDEMIC: A BIBLIOMETRIC STUDY

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### ABSTRACT

COVID-19 was declared a pandemic in March 2020 and wreaked havoc on the economy and business, including the stock market. This disruption has led various researchers to publish about the effects of the COVID-19 pandemic on the stock market. Due to the massive number of publications, this study reviews this novel research topic using bibliometric analysis. This study aims to identify thematic clusters, collaboration networks, and high-impact publications and research constituents. This study utilizes science mapping and performance analysis techniques such as co-authorship, bibliographic coupling, and citation analysis. This study merges data from Scopus and Dimensions database with R Studio *bibliometrix* package, which then are plotted using VOS Viewer and *biblioshiny*. The findings of this study are collaboration networks, thematic clusters, and a list of high-impact publications and research constituents. This study's contribution is the intellectual and bibliometric structure of the COVID-19 and stock market research field. Based on these study, COVID-19 does not only affect the stock market negatively but also reveal the connectedness between the stock market and commodities.

**Keywords:** bibliometric study, COVID-19, stock market

### ABSTRAK

COVID-19 dinyatakan sebagai sebuah pandemic pada bulan Maret 2020 dan mengacaukan seluruh elemen ekonomi dan bisnis, termasuk pasar saham. Gangguan ini memicu banyak peneliti melakukan publikasi ilmiah tentang pengaruh COVID-19 pada pasar saham. Studi ini meninjau topik penelitian baru ini menggunakan analisis bibliometrik karena jumlah publikasi yang sangat banyak. Studi ini bertujuan untuk mengidentifikasi kluster tematik, jaringan kolaborasi, dan publikasi dan konstituen peneliti yang berpengaruh besar. Studi ini menggunakan teknik science mapping dan performance analysis seperti co-authorship, bibliographic coupling, dan citation analysis. Studi ini menggabungkan data dari Scopus dan Dimensions menggunakan R Studio *bibliometrix* package yang kemudian digambarkan dengan VOS Viewer dan *biblioshiny*. Penemuan studi ini adalah jaringan kolaborasi, kluster tematik, dan sebuah daftar dari publikasi dan konstituen peneliti yang berpengaruh besar. Kontribusi studi ini adalah struktur intelektual dan bibliometrik dari bidang penelitian COVID-19 dan pasar saham. Berdasarkan studi ini, COVID-19 tidak hanya memberikan dampak buruk pada pasar saham tapi juga menunjukkan keterhubungan antara pasar saham dan komoditas.

**Kata Kunci:** studi bibliometrik, COVID-19, pasar saham

### INTRODUCTION

On March 11, 2020, World Health Organization (WHO) declared COVID-19 a pandemic (Cucinotta & Vanelli, 2020). In just two weeks before the declaration, COVID-19 cases outside China rose thirteen-fold, and the number of countries infected tripled (Cucinotta & Vanelli, 2020). The widespread of this virus affected all aspects of human life, including the stock market (Al-Awadhi et al., 2020a; Ashraf, 2020a). By looking at the data from 64 countries, Ashraf (2020) found that stock returns plunged as the number of COVID-19 cases rose. In Indonesia, the IDX Composite stock index fell to its lowest point

ever of 3,937, losing not less than 30% of its value just within two weeks of the pandemic declaration.

This global phenomenon has triggered various researchers to publish many articles on the effect of COVID-19 on the stock market. From 2020 to 2022, Scopus and Dimensions database recorded 2265 publications mentioning "stock market" and COVID-19. This growing research field requires a guideline map that will aid future researchers in positioning their endeavors and seeking credible literature sources. Arslan et al. (2021) conducted a systematic and bibliometric review of COVID-19 effects in stock markets and found the most common keywords, research constituents, and research trends. However, Arslan

et al. (2021) only included 160 publications from the Scopus database. According to Donthu et al. (2021), this small number of publications is unsuitable for bibliometric analysis purposes. Alshater et al. (2021) conducted a broader bibliometric review of business and economics research during COVID-19 and found influential research constituents, intellectual structure, research gaps, and research directions. Alshater et al. (2021) review was a broad review that did not specifically review the effect of COVID-19 on the stock market. On the other hand, Zulfikar (2022) conducted a bibliometric analysis of stock market performance during the COVID-19 outbreak and found four clusters as the research roadmap. Nonetheless, Zulfikar (2022) did not conduct the performance analysis and only included data from the Scopus dataset.

Hence, this study aims to fill this gap by reviewing the research field through bibliometric analysis with some amendments. First, this bibliometric analysis will only focus on the stock market and COVID-19. This analysis is done because a proper bibliometric analysis with broader scope has been performed by Alshater et al. (2021). Second, this bibliometric analysis will include thousands of publications for bibliometric analysis suitability. The publications will not only be extracted from the Scopus database but also the Dimensions database. Third, this bibliometric analysis will conduct both the science mapping and performance analysis.

This study's bibliometric analysis follows the guidelines for business bibliometric study by Donthu et al. (2021). Figure 3 shows the theoretical framework used in this study by Donthu et al. (2021). The bibliometric analysis consists of performance analysis and science mapping, which should be done appropriately to harness its full potential (Donthu, Kumar, Mukherjee, et al., 2021). Performance analysis examines the contributions of the research constituents (author, country, or journal). The results will be a list of highly productive and impactful research constituents. In contrast, science mapping studies the relation between these research constituents to look for intellectual and bibliometric structures (Donthu, Kumar, Mukherjee, et al., 2021). The

results will be highly impactful publications, thematic clusters, and collaboration networks.

## **METHOD**

The first step in formulating research methodology on bibliometric analysis is to determine the metrics used in performance analysis and the technique used in science mapping based on the aim of this study. Next, this study decides on the appropriate database from which bibliometric data is extracted. Lastly, this study analyzes data using a combination of tools and interprets this data to discover impactful research constituents, intellectual structure, and bibliometric structure.

### **Performance Analysis**

Performance analysis utilizes metrics as a performance proxy of a research constituent. These metrics are decided based on the aim of the bibliometric analysis (Donthu, Kumar, Mukherjee, et al., 2021). This study uses the number of publications as a metric to assess the productivity of a research constituent. Meanwhile, to measure impact, this study uses the number of citations. On some occasions, an outlier publication may possess an excessive amount of citations and will portray a skewed image of the research constituent impact. So, this study also utilizes the h-index as an overall performance metric. The h-index eliminates outlier publications and thus draws a better picture of the scientific output of a research constituent (Hirsch, 2005). This study measures journals and authors as research constituents.

### **Science Mapping**

Science mapping consists of some techniques which are entitled to their respective aims. For instance, this study uses citation analysis to find highly impactful publications. In a citation analysis, the number of citations a publication receives is a measure of its influence (Donthu, Kumar, Mukherjee, et al., 2021). Meanwhile, this study employs bibliographic coupling to look for the thematic clusters. In bibliographic coupling, two publications are related if they cite the same references—the more instances of the joint citation equal stronger ties between them (Donthu, Kumar,

Mukherjee, et al., 2021). These ties are calculated and plotted into a network of clusters from which the thematic clusters arise. Lastly, this study utilizes co-authorship analysis to discover the collaboration networks between authors. Authors become co-author when they collaborate on a publication.

### Data Collection

This study determines proper databases as data sources based on previous bibliometric analyses. Ultimately, the best strategy is to combine the Scopus and Web of Science databases (Aria & Cuccurullo, 2017; Donthu, Kumar, & Pattnaik, 2021). Alternatively, some publications used only either Scopus or Web of Science database (Kumar et al., 2021; Martínez-López et al., 2018). Lately, some publications have begun gathering data from alternative databases like Dimensions (García-Sánchez et al., 2019; Rusydiana et al., 2020), which is a viable alternative to Scopus and Web of Science database based on comparative analyses (Martín-Martín et al., 2021; Singh et al., 2021). Based on these findings, this study combines data from the Scopus and Dimensions databases. As the Dimensions database does not provide cited references, citation and bibliographic coupling analysis will be conducted solely on Scopus data.

This study uses [(“stock market” OR “stock exchange” OR “share market” OR “equity market”) AND (covid OR “covid-19” OR “covid19” OR pandemic)] as the query for the Scopus and Dimensions search engine. In this context, the terms stock, share, and equity have the same meaning (Maverick, 2021). Scopus search engine can search these terms in title, abstract, and keywords, while Dimensions search engine can only search in the title and abstract. This study limits results from the Scopus database to *Business; Management and Accounting; and Economics, Econometrics, and Finance* to filter unrelated publications. On the other hand, results from the Dimensions database were restricted to the subjects of *Economics; Economic Theory; Applied Economics; Econometrics; Accounting, Auditing, and Accountability; Commerce, Management, and Tourism Services; and Banking,*

*Finance, and Investment*. Data from Scopus and Dimensions databases are limited to the time range of 2020-2022 to remove publications before the COVID-19 outbreak.

### Data Analysis

Data from Scopus and Dimensions were downloaded in CSV extension and processed using the R bibliometrix package. *R* is a language and environment for statistical computing and graphics that provide a wide variety of statistical and graphical techniques and is highly extensible (R Core Team, 2022; R Studio, 2022). The *bibliometrix*, an open-source tool, is an *R* package used to execute comprehensive *science mapping* analysis of scientific literature programmed in *R* to be flexible and integrated with other statistical and graphical tools (Aria & Cuccurullo, 2017).

The steps below focus on the workflow of the *bibliometrix* package in *R studio*. This study contains an R script file to help future researchers replicate this analysis. Firstly, the *convert2df* function transforms bibliometric data from *Scopus* and *Dimensions* into data frames. Next, the *mergedDbsources* function combines and cleans these data frames from duplicate entries. Next, the cleaned data frame is transferred to *biblioshiny*, a shiny app providing a web interface for *bibliometrix*, which supports scholars in easy use of the main features of *bibliometrix* (Aria, 2016). The process of performance analysis is done with *biblioshiny*. *Biblioshiny* produces the metrics needed to assess the performance of every research constituent.

This study uses *VOSViewer* to aid *biblioshiny* in visualizing a better network for *science mapping* techniques: *citation analysis* and *bibliographic coupling analysis* (van Eck & Waltman, 2010). *Citation analysis* counts the citation number of every publication as a measure of impact, while *bibliographic coupling analysis* takes publications as the unit of analysis. *Co-authorship analysis* uses authors as the unit of analysis and *biblioshiny* to create a recognizable network visualization. The minimum number of edges for *co-authorship analysis* was set to 1, meaning that one publication co-authored by two authors is enough to form a network. However, due

to many co-authored documents, only the top 100 authors are chosen based on publications.

**RESEARCH DISCUSSION AND RESULTS**

**Performance Analysis: Highly Productive and Impactful Journals**

The merged Scopus and Dimensions data consist of 2265 publications from 843 different sources. This study uses publication count as a measure of authors’ productivity. On the other hand, in terms of authors’ impact measurement, this study utilizes citation count and h-index. Among the 843 sources, Table 1, Table 2, and Table 3 display the top 10 journals based on the number of publications, citations, and h-index, respectively.

SSRN Electronic Journal records an extremely high number of 289 publications compared to the other journals, as shown in Table 1. More than 12% of all the publications included in this study come from SSRN Electronic Journal. This phenomenon is because SSRN itself is already an extensive network of social science researchers that enables researchers to freely share their research articles with peers at no cost before even being accepted in a journal (Siering et al., 2014). Hence, academicians should remember that the quality of publication in SSRN might differ from the regular peer-reviewed journal.

Table 1. 10 Journals with Most Publications

	Journal	NP
1	SSRN Electronic Journal	289
2	Finance Research Letters	86
3	Journal of Risk and Financial Management	39
4	Arxiv	35
5	Proceedings of the 2nd International Scientific and Practical Conference	29
6	Research in International Business and Finance	28
7	International Review of Financial Analysis	27
8	Resources Policy	25
9	Investment Management and Financial Innovations	24
10	Applied Economic Letters	23

NP = number of publications  
Source: Data Analysis

Finance Research Letters, the first journal based on citation and h-index, receives significantly more citation and h-index than its runner-up. Financial Research Letters receives

3330 citations, almost twice that of the Journal of Behavioral and Experimental Finance, as shown in Table 2. Financial Research Letters also holds a 29 h-index which is a very far leap from its contender: SSRN Electronic Journal, which holds an 18 h-index, as shown in Table 3. This finding is in line with Handoko (2021), who also found Finance Research Letters to be the most influential journal during the COVID-19 outbreak. The special issue titled “COVID-19 and the Economy” published by Finance Research Letters might cause this dominance in citations and h-index (Iyer & Simkins, 2022).

Table 2. 10 Journals with Most Citations

	Journal	NC
1	Finance Research Letters	3330
2	Journal of Behavioral and Experimental Finance	1674
3	SSRN Electronic Journal	1281
4	International Review of Financial Analysis	1045
5	Research in International Business and Finance	910
6	Emerging Markets Finance and Trade	840
7	International Journal of Environmental Research and Public Health	373
8	Journal of Risk and Financial Management	239
9	Economic Analysis and Policy	238
10	Resources Policy	224

NC = number of citations  
Source: Data Analysis

Table 3. 10 Journals with Greatest H-index

	Journal	H
1	Finance Research Letters	29
2	SSRN Electronic Journal	18
3	International Review of Financial Analysis	14
4	Research in International Business and Finance	12
5	Journal of Behavioral and Experimental Finance	11
6	Emerging Markets Finance and Trade	8
7	Journal of Risk and Financial Management	8
8	Resources Policy	8
9	Applied Economics Letters	8
10	Economic Analysis and Policy	7

H = H-index  
Source: Data Analysis

Based on these findings, this study quickly selects SSRN Electronic Journal and Finance Research Letters as the most productive and impactful journals. This selection also considers that SSRN Electronic Journal and Finance Research Letters consistently appear in the top 3 journals regardless of the performance metric used. Figure 1 portrays the performance difference

between Finance Research Letters and SSRN Electronic Journal, where Finance Research Letters is better in terms of impact and SSRN Electronic Journal is better in terms of productivity.

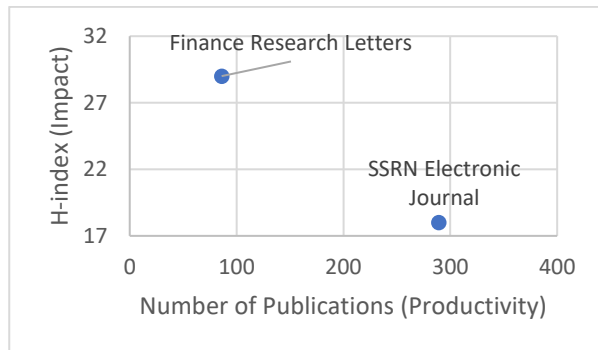


Figure 1. Impact vs. Productivity of Journals Source: Data Analysis

### Performance Analysis: Highly Productive and Impactful Authors

Table 4, Table 5, and Table 6 show the top 10 authors based on the number of publications, citations, h-index, and g-index, respectively. Table 6 shows only three variations of the h-index among the ten authors with the greatest h-index, namely 7, 6, and 5. So, this study further employs the g-index to compare the authors' impact. The g-index is the largest number such that the top g articles received together at least  $g^2$  citations (Egghe, 2006). G-index enables top-cited publications to reinforce low-cited publications. Table 6 first sorts authors' impact based on the h-index and then sort it further based on the g-index. Unlike the unanimous result of journal research constituent, author research constituent results are divided between performance metrics. Hence, this study first classifies the author into several groups based on a joint analysis of different metrics before deciding on the highly productive and impactful authors. This study does not use the APA citation style specifically for this section because this citation style only refers to one publication of an author.

The first group is the highly productive but not impactful authors, which consist of Dias R, Alexandre P, Ferreira P, Heliodoro P, Kang S, Mensi W, and Kumar A. These authors have high publication counts, as shown in Table 4, but not one appears in the top citations in Table 5 or the h-

index in Table 6. This finding implies that those many publications have little to no impact.

The second group is the authors with a few publications with high impacts, which consist of Al-Awadhi A, Davis S, Baker S, Bloom N, Ashraf B, and Aloui C. These authors receive very high citation counts, as shown in Table 5. However, they have very low h-indexes as they do not appear in Table 6. This finding means that the impacts of these authors belong to the particular few highly-cited publications and not to these authors themselves. Consequently, these authors are the authors of the highly cited publications in TABLE X.

In contrast with the first group, the third group is the highly impactful but low-productivity authors. This group consists of Demir E, Khan M, and Naeem M. These authors have moderately high h-index and g-index, as shown in Table 6, but do not appear in the top publications authors list in Table 4. These authors do not appear in Table 5 too, which means they do not have any highly cited publications.

The fourth group is much like the third group, the highly impactful but low-productivity authors. In addition, authors in the fourth group also possess a few highly cited publications that cause them to be placed in Table 5. The members of this group are Rizvi S, Yarovaya L, Cobet S, and Narayan P.

Lastly, the fifth group is the highly impactful and productive authors. These authors are listed in the top publication count in Table 4 and the top h-index in Table 6. This finding is the ultimate proof that these authors produce many publications, and most of those publications consistently earn high citations. The members of this group are Vo X, Bouri E, and Zaremba A.

Table 4. 10 Authors with Most Publications

	Author	NP
1	Dias R	23
2	Vo X	15
3	Alexandre P	14
4	Ferreira P	14
5	Heliodoro P	14
6	Kang S	12
7	Mensi W	12
8	Bouri E	11
9	Kumar A	11
10	Zaremba A	11

NP = number of publications  
Source: Data Analysis

Table 5. 10 Authors with Most Citations

	Author	NC
1	Al-Awadhi A	1130
2	Rizvi S	897
3	Davis S	855
4	Baker S	852
5	Bloom N	852
6	Ashraf B	740
7	Yarovaya L	696
8	Corbet S	666
9	Aloui C	628
10	Narayan P	624

NC = number of citations  
Source: Data Analysis

Table 6. 10 Authors with Greatest H-index and G-index

	Author	H	G
1	Bouri E	7	11
2	Narayan P	7	9
3	Vo X	6	12
4	Zaremba A	6	9
5	Demir E	6	8
6	Khan M	6	7
7	Naeem M	6	7
8	Rizvi S	5	8
9	Yarovaya L	5	7
10	Corbet S	5	7

H = h-index, G = g-index  
Source: Data Analysis

Figure 2 displays the performance difference between the three highly productive and impactful authors, Vo X, Bouri E, and Zaremba A. Bouri E is the most impactful author with a seven h-index and eleven g-index. Vo X is the most productive author with 15 publications, even though Vo X has a lower h-index than Bouri. Zaremba A has a relatively lower impact than Bouri E and lower productivity than Vo X. Compared to Bouri E and Vo X, Zaremba A is only a runner-up.

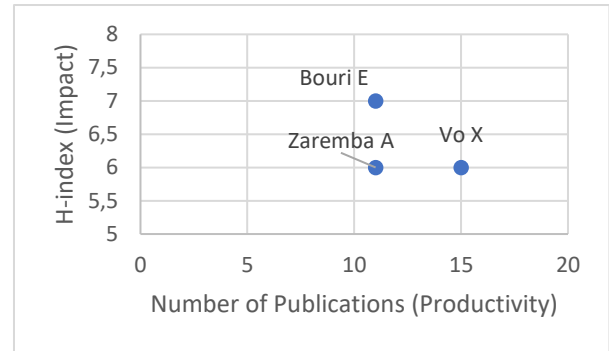


Figure 2. Impact vs. Productivity of Authors  
Source: Data Analysis

### Science Mapping: Citation Analysis

In citation analysis, this study uses the number of citations as a performance metric to measure publications' impact. Table 7 shows ten publications that receive the most citations among the 2265 publications included in this citation analysis. There are no extreme variations in citation count between the ten publications in Table 7. The publication with the most citations is the *COVID-19 pandemic, oil prices, stock market, geopolitical risk, and policy uncertainty nexus in the US economy: Fresh evidence from the wavelet-based approach*. Therefore, this publication is said to be the most impactful based on citation analysis.

Aloui C and Yarovaya L are two of the three authors who write the most impactful publication in Table 7. Hence, Aloui C and Yarovaya L owe their position as top-cited authors to this publication. This phenomenon also occurs in most of the remaining publications in Table 7. Almost all of the publications in Table 7 are written by one or more authors in Table 5. This finding strengthens the argument that authors belonging to the second group in the performance analysis do not possess high personal impacts; a few of their publications do.

Table 7. 10 Publications with Most Citations

	Publication's Title	NC
1	COVID-19 pandemic, oil prices, stock market, geopolitical risk, and policy uncertainty nexus in the US economy: Fresh evidence from the wavelet-based approach	581
2	Death and contagious infectious diseases: Impact of the COVID-19 virus on stock market returns	565
3	The Unprecedented Stock Market Reaction to COVID-19	560
4	Stock markets' reaction to COVID-19: Cases or fatalities?	442
5	The contagion effects of the COVID-19 pandemic: Evidence from gold and cryptocurrencies	330
6	The COVID-19 Outbreak and Affected Countries Stock Markets Response	326
7	Coronavirus (COVID-19) — An epidemic or pandemic for financial markets	305
8	Economic uncertainty before and during the COVID-19 pandemic	292
9	Country Responses and the Reaction of the Stock Market to COVID-19—a Preliminary Exposition	286
10	Infected Markets: Novel Coronavirus, Government Interventions, and Stock Return Volatility around the Globe	281

NC = number of citations  
Source: Data Analysis

**Science Mapping: Thematic Cluster**

This study uses bibliographic coupling analysis to identify thematic clusters. Bibliographic coupling discovers 6 clusters, each shown in a different color in Figure 4. Each node in Figure 4 represents a publication labeled with the first author's name. Bigger nodes equal more citations of the publication, while thicker edges equal more instances of bibliographic couples. To aid readers in understanding the clusters, Table 10 shows the complete title of each publication and their respective clusters. This study synthesizes thematic clusters by studying the title of every publication in all clusters. From the six clusters in Table 10, this study identifies five thematic clusters and considers one cluster, cluster three, as not specific. Table 8 lists the clusters and the essence of their respective themes.

Table 8. Cluster Number and its Theme

Cluster Number	Theme
1	The impact of COVID-19 on the stock market globally
2	The impact of COVID-19 on the stock market in a more specific context; nationally or sector-based
3	-
4	The nexus between COVID-19 and commodities
5	COVID-19 and the stock market crash
6	The contagion effect of COVID-19

\*Cluster three is not specific and hence is not included as a thematic cluster.  
Source: Data Analysis

The first thematic cluster, cluster number one, talks about the impact of COVID-19 on the stock market globally. The leading publication with the most citation by Ashraf (2020b) examined COVID-19 data and stock market returns from 64 countries. Another highly cited publication by Phan & Narayan (2020) commented on the stock price reaction to different stages of COVID-19's evolution in various countries. Ali et al. (2020) also discuss the financial market's reaction to COVID-19 regarding its decline and volatility.

The second thematic cluster, cluster number two, discusses the impact of COVID-19 on the stock market in a narrower context, nationally or sector-based. Al-Awadhi et al. (2020), the most cited publication, studies the impact of COVID-19 on the stock market, specifically in the Chinese stock market. He et al. (2020) even went further with their study by looking at the performance and response trends of different industries in China. Baek et al. (2020) did the same thing but with the context of the US industries.

The third thematic cluster, cluster number four, studies the nexus between COVID-19 and commodities. Salisu et al. (2020) provide preliminary estimates about the behavior of the oil-stock nexus during the COVID-19 pandemic. Adekoya & Oliyide (2021) also incorporate gold commodities and the US dollar in studying how COVID-19 drove connectedness between them. On the other hand, Salisu, Akanni, et al. (2020) examined the predictive power of the COVID-19 global fear index towards the commodity price returns.

The fourth thematic cluster, cluster number five, talks about COVID-19 and the stock market crash. Mazur et al. (2021) investigated the US stock market crash in March 2020 triggered by COVID-19, while Liu et al. (2021) did the same on the Chinese market. Lyócsa et al. (2020) made a different approach to studying the crash. Lyócsa et al. (2020) used the Google search volume activity as a measure of panic and fear. They even coined the term “corona crash”.

The fifth thematic cluster, cluster number six, discusses the contagion effect of COVID-19. Okorie & Lin (2021) investigated the fractal contagion effects of COVID-19 on the stock market in 32 countries, while Corbet et al. (2020) investigated the contagion effect exclusively in the Chinese financial market. Surprisingly, the contagion effect of COVID-19 covered not only physical and financial aspects but also identity. In a very intriguing publication, Corbet et al. (2021) explained how some companies with corporate identities related to the name COVID-19 received unique influence from the virus outbreak.

We can draw insights about COVID-19 and the stock market from these five thematic clusters. First, COVID-19 proved to do a negative effect on the stock market globally and regionally. Second, COVID-19 reveals connectedness between the stock market and commodities. Third, the COVID-19 effect on the stock market has spillover and contagion elements.

### Science Mapping: Collaboration Networks

This study uses co-authorship analysis to find collaboration networks. Of 2265 publications included in this analysis, there are 4408 unique authors identified. Of the 4408 unique authors, 4010 co-authored at least one publication. Figure 5 shows 40 authors with the highest impact forming nine collaboration clusters. Each cluster is represented with different node colors. Bigger nodes equal more impact on the authors, while thicker edges equal more instances of the co-authored publications. Table 9 compiles the complete list of every collaboration cluster and their respective authors.

Table 9 Collaboration clusters and their authors

Collaboration Cluster	Authors
1 - Red	Dias R, Alexandre P, Helidoro P
2 – Blue	Vo X, Kang S, Mensi W, Bouri E, Naeem M, Hasan M, Shahzad S
3 – Green	Ferreira P, Khan M, Aslam F
4 – Purple	Kumar A, Ashraf B, Corbet S, Hassan M, Kumar S, Hu Y
5 - Orange	Zaremba A, Demir E, Kizys R
6 - Brown	Huynh T, Wang J, Zhang Y, Lu X, Jiang Y, Liu Z, Wang M
7 - Pink	Yousaf I, Ali S, Umar Z, Yarovaya L, Adekoya O, Tiwari A
8 - Grey	Narayan P, Rizvi S, Wang H
9 – Turquoise	Li X, Liu Y

Source: Data Analysis

Figure 5 shows how several authors bridge the connection between pink, blue, orange, and green clusters. While Zaremba A and Umar Z connect cluster orange and cluster pink, Ali S, Yousaf I, Mensi W, Kang S, and Bouri E form intertwined connections between clusters pink and blue. On the other side, Bouri E, Shahzad S, and Ferreira P bridge the connection between blue and green clusters. Bouri E is an exceptional bridging author in this context because Bouri E simultaneously connects three clusters. Besides this joint cluster of pink, blue, orange, and green, all other clusters are not connected.

### CONCLUSION

This study aims to discover high-impact and productive research constituents via performance analysis. Regarding journal research constituents, all performance metrics lead to a unanimous decision to pick SSRN Electronic Journal and Finance Research Letter as the most high-impact and productive journals. The decision on the most high-impact and productive authors involves a more prolonged analysis. After grouping authors based on their performance, this study selects Vo X, Bouri E, and Zaremba A as authors with the most impact and productivity.

This study also explores the science map through citation analysis, bibliographic coupling, and co-authorship analysis. By a tight match, *COVID-19 pandemic, oil prices, stock market, geopolitical risk, and policy uncertainty nexus in the US economy: Fresh evidence from the wavelet-based approach* is the most cited publication.



Meanwhile, synthesizing the bibliographic coupling results, this study compiles five thematic clusters discussing various sub-topic COVID-19 and the stock market. Lastly, this study also discovers nine author collaboration networks, where four of them are inter-connected.

The results of this study, especially the thematic clusters, encourage future researchers to investigate various sub-topic of COVID-19 and the stock market, namely the global and sectoral impact, the nexus to commodity, the market crash, and the contagion effect. This endeavor might be in the form of systematic literature reviews on the existing body of literature or empirical research on the relations of some variables.

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**APPENDIX**

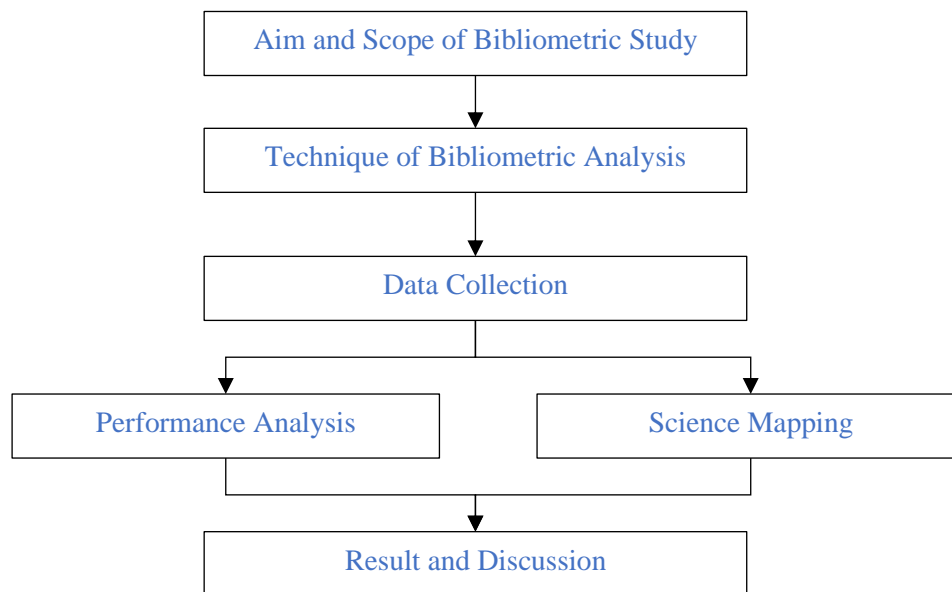


Figure 3 Theoretical Framework. Adapted from Donthu et al. (2021)

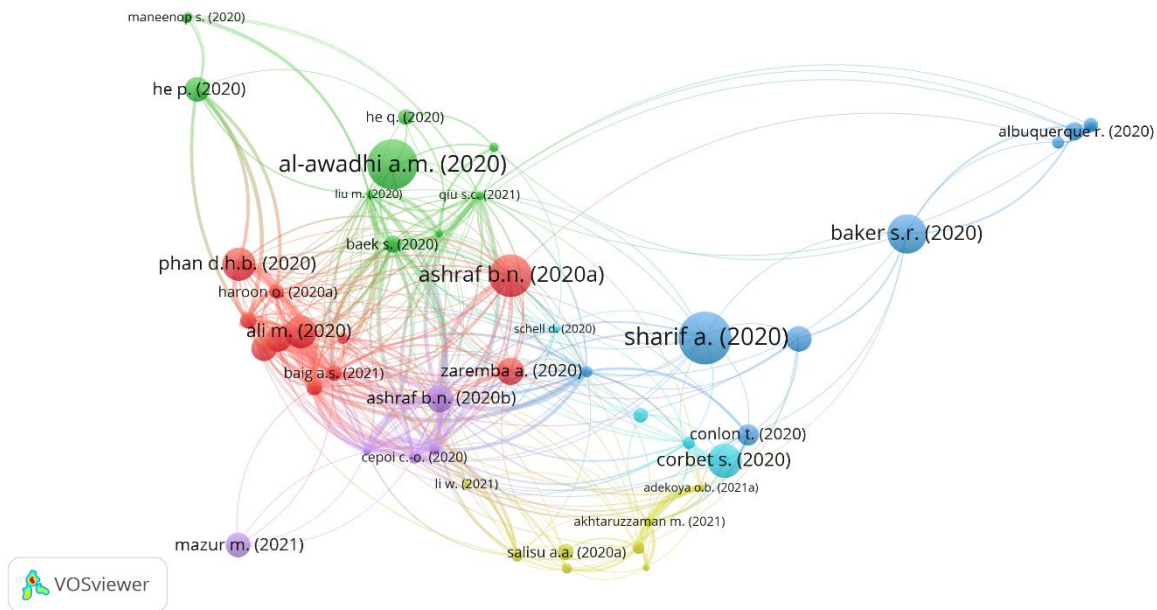


Figure 4 Bibliographic coupling analysis visualization results  
Source: Data Analysis

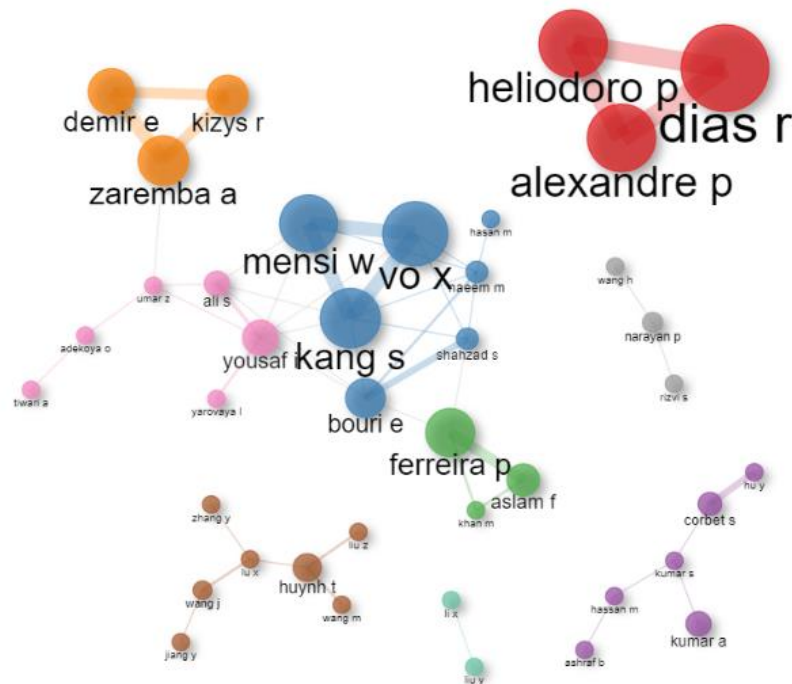


Figure 5 Co-authorship analysis visualization result  
Source: Data Analysis

Table 10 Bibliographic Coupling Clusters' Members

	<b>Label (based on Figure 4)</b>	<b>Publication Title</b>	<b>Cluster</b>
1	Ashraf B.N. (2020a)	Stock Markets' Reaction To Covid-19: Cases Or Fatalities?	1
2	Zaremba A. (2020)	Infected Markets: Novel Coronavirus, Government Interventions, And Stock Return Volatility Around The Globe	1
3	Baig A.S. (2021)	Deaths, Panic, Lockdowns And Us Equity Markets: The Case Of Covid-19 Pandemic	1
4	Narayan P.K. (2021)	Covid-19 Lockdowns, Stimulus Packages, Travel Bans, And Stock Returns	1
5	Topcu M. (2020)	The Impact Of Covid-19 On Emerging Stock Markets	1
6	Narayan P.K. (2020)	Japanese Currency And Stock Market—What Happened During The Covid-19 Pandemic?	1
7	Haroon O. (2020a)	Flatten The Curve And Stock Market Liquidity—An Inquiry Into Emerging Economies	1
8	Phan D.H.B. (2020)	Country Responses And The Reaction Of The Stock Market To Covid-19—A Preliminary Exposition	1
9	Erdem O. (2020)	Freedom And Stock Market Performance During Covid-19 Outbreak	1
10	Ali M. (2020)	Coronavirus (Covid-19) — An Epidemic Or Pandemic For Financial Markets	1
11	Haroon O. (2020b)	Covid-19: Media Coverage And Financial Markets Behavior—A Sectoral Inquiry	1
12	Al-Awadhi A.M. (2020)	Death And Contagious Infectious Diseases: Impact Of The Covid-19 Virus On Stock Market Returns	2
13	He P. (2020)	Covid-19's Impact On Stock Prices Across Different Sectors—An Event Study Based On The Chinese Stock Market	2
14	Baek S. (2020)	Covid-19 And Stock Market Volatility: An Industry Level Analysis	2
15	He Q. (2020)	The Impact Of Covid-19 On Stock Markets	2
16	Maneenop S. (2020)	The Impacts Of Covid-19 On The Global Airline Industry: An Event Study Approach	2
17	Khan K. (2020)	The Impact Of Covid-19 Pandemic On Stock Markets: An Empirical Analysis Of World Major Stock Indices	2
18	Qiu S.C. (2021)	Can Corporate Social Responsibility Protect Firm Value During The Covid-19 Pandemic?	2
19	Alam M.N. (2020)	Stock Market Response During Covid-19 Lockdown Period In India: An Event Study	2
20	Anh D.L.T. (2020)	The Impact Of The Covid-19 Lockdown On Stock Market Performance: Evidence From Vietnam	2
21	Liu M. (2020)	The Response Of The Stock Market To The Announcement Of Global Pandemic	2
22	Sharif A. (2020)	Covid-19 Pandemic, Oil Prices, Stock Market, Geopolitical Risk And Policy Uncertainty Nexus In The Us Economy: Fresh Evidence From The Wavelet-Based Approach	3
23	Baker S.R. (2020)	The Unprecedented Stock Market Reaction To Covid-19	3

	<b>Label (based on Figure 4)</b>	<b>Publication Title</b>	<b>Cluster</b>
24	Altig D. (2020)	Economic Uncertainty Before And During The Covid-19 Pandemic	3
25	Conlon T. (2020)	Are Cryptocurrencies A Safe Haven For Equity Markets? An International Perspective From The Covid-19 Pandemic	3
26	Albuquerque R. (2020)	Resiliency Of Environmental And Social Stocks: An Analysis Of The Exogenous Covid-19 Market Crash	3
27	Ding W. (2021)	Corporate Immunity To The Covid-19 Pandemic	3
28	Gormsen N.J. (2020)	Coronavirus: Impact On Stock Prices And Growth Expectations	3
29	Bai L. (2020)	Infectious Disease Pandemic And Permanent Volatility Of International Stock Markets: A Long-Term Perspective	3
30	Bae K.-H. (2021)	Does Csr Matter In Times Of Crisis? Evidence From The Covid-19 Pandemic	3
31	Salisu A.A. (2020a)	Revisiting Oil-Stock Nexus During Covid-19 Pandemic: Some Preliminary Results	4
32	Adekoya O.B. (2021b)	How Covid-19 Drives Connectedness Among Commodity And Financial Markets: Evidence From Tvp-Var And Causality-In-Quantiles Techniques	4
33	Salisu A.A. (2020b)	The Covid-19 Global Fear Index And The Predictability Of Commodity Price Returns	4
34	Zhang W. (2021)	Crude Oil Market And Stock Markets During The Covid-19 Pandemic: Evidence From The Us, Japan, And Germany	4
35	Akhtaruzzaman M. (2021)	Is Gold A Hedge Or A Safe-Haven Asset In The Covid-19 Crisis?	4
36	Li W. (2021)	The Nexus Between Covid-19 Fear And Stock Market Volatility	4
37	Adekoya O.B. (2021a)	How Covid-19 Upturns The Hedging Potentials Of Gold Against Oil And Stock Markets Risks: Nonlinear Evidences Through Threshold Regression And Markov-Regime Switching Models	4
38	Hung N.T. (2021)	Directional Spillover Effects And Time-Frequency Nexus Between Oil, Gold And Stock Markets: Evidence From Pre And During Covid-19 Outbreak	4
39	Ashraf B.N. (2020b)	Economic Impact Of Government Interventions During The Covid-19 Pandemic: International Evidence From Financial Markets	5
40	Mazur M. (2021)	Covid-19 And The March 2020 Stock Market Crash. Evidence From S&P1500	5
41	Cepoi C.-O. (2020)	Asymmetric Dependence Between Stock Market Returns And News During Covid-19 Financial Turmoil	5
42	Lyócsa Š. (2020)	Fear Of The Coronavirus And The Stock Markets	5
43	Liu Z. (2021)	The Impact Of Covid-19 On The Stock Market Crash Risk In China	5
44	Corbet S. (2020)	The Contagion Effects Of The Covid-19 Pandemic: Evidence From Gold And Cryptocurrencies	6
45	Okorie D.I. (2021)	Stock Markets And The Covid-19 Fractal Contagion Effects	6

	<b>Label (based on Figure 4)</b>	<b>Publication Title</b>	<b>Cluster</b>
46	Corbet S. (2021)	Aye Corona! The Contagion Effects Of Being Named Corona During The Covid-19 Pandemic	6
47	Schell D. (2020)	This Time Is Indeed Different: A Study On Global Market Reactions To Public Health Crisis	6