

A BIBLIOMETRIC STUDY USING VOSVIEWER ON STOCK MARKET VOLATILITY (2000-2022)

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Abstract

Purpose: The purpose of this study is to comprehensively review and evaluate the literature on stock market volatility in India. The paper focuses on the research gaps in the existing literature by encapsulating the important findings and methodologies.

Design/Methodology/Approach: This study examines 275 articles and research papers that were published between 2000 and 2022 in various financial, business, management, economics, and social science journals that were indexed by the Scopus database. The selected research papers are arranged to provide an extensive analysis and a summary of the current research in the area of stock market volatility. VOSviewer and R software are used to investigate the gathered data and put in the bibliometric tests such as citation analysis of documents, source, authors, institutions, Co-occurrence analysis of author keywords, co-authorship and Bibliographic coupling of authors.

Findings: After diagnosing the growth in this topic, during the first 10 years, the publication in this area was abruptly low. Following that, and up until 2022, the rise is impressive. It aids academics and researchers in exploring and developing a quantitative foundation for the India stock market's volatility.

Originality/Value: This is one of the first articles, as far as the author is aware, to discuss the literature on India's stock market volatility from a bibliometric perspective. It offers a thorough compilation and categorization of the literature on India's stock market volatility. Future academics, practitioners, and researchers in the field of stock markets would benefit from this.

Keywords: Stock Market, Volatility, Bibliometric, VoSviewer, R Language

Introduction

Researchers and analysts across the world have devoted a lot of attention to understanding how volatility behaves in the stock market. As investors enter the stock market with the expectation of

receiving reasonable returns by lowering the associated risks, this is known as the risk-return trade-off while assessing the price of a financial asset. The volatility in the returns produced by an asset is a risk measure indicator for the financial assets. Risk and return are intimately linked, with expected return and uncertain return volatility correlated positively and unexpected return volatility correlated negatively. The latter relationship arises when unanticipated increases in volatility increase the needed rates of return, resulting in a decline in stock prices (Whitelaw, 1994, PP.515-6). According to Kakkar and Rajput and (2012), the term volatility is interpreted as the current price of the asset minus average past prices of that asset. The volatility is represented in terms of standard deviation of returns from the average return. High volatility exists when prices vary widely over short time frames, whereas low volatility exists when prices move gradually.

All stock market investors who are interested in making investments should be concerned about the term "volatility" in the stock market. Global as well as domestic factors have an impact on the stock market in India. These factors make the market volatile, and ultimately impacting the stock price returns. The expansion of portfolios globally and the worldwide speculative activity are major concerns in the current era of progress, privatization, and globalization, particularly at a time when the volatility of the stock market is particularly high. Individuals frequently invest in the securities market in order to profit. In order to achieve his goal of the best return with the least amount of risk, a speculator designs his portfolio by keeping track of various stocks or collections of stocks. The rationale of choosing international diversification is that while conditions abroad may differ from those at home, stock returns within a country can be highly correlated due to similar environmental factors.

Volatility on the stock market is inevitable. The stock markets' propensity to fluctuate and quickly go from green to red is part of their nature. Volatility being inseparable part of the stock market to hold the market's nerves in check. The positive and negative aspects of the market are like the two sides of a coin: they are both present. It is clear that market volatility has a long-term effect, so an investor must take every precaution while creating his portfolio. Since stock prices fluctuate when financial volatility rises, stock returns and volatility have a positive relationship. In comparison to the typical market returns, the average investor receives significantly lower returns.

In light of the issue just indicated, we conduct research through bibliometric analysis to present a critical overview of knowledge maps as they relate to published scientific articles. The use of bibliometrics to assess the quantitative and qualitative shifts in research activity over time is a reliable strategy (Xie et al., 2020). It takes use of literature methodology tools as well as literary databases. It is now widely used to provide insight into particular research issues. A publication with a lot of citations is frequently reviewed by many peers and subject-area experts. In a similar manner, several academic investigations have evaluated the impact of articles in the related fields of research. Consequently, bibliometric research has improved in a number of research areas of academics. It is beneficial to locate the popularly cited papers that have contributed largely in the research investigations. In stock market volatility areas, this present study intends to investigate factors driving the research roadmap cluster. Recent studies have employed bibliometric analysis

to summarize a variety of academic related subjects. The objective of this present study is to improve the roadmap for research that will be helpful for upcoming investigations in research. The roadmap for clustered research will make it simpler for upcoming researchers to create and develop fresh research ideas.

The motive of this paper is to furnish an outline of the academic research on Stock Market Volatility. Volatility is the standard of deviation of a price Sequence over the interval, generally restrained by the standard deviation of logarithmic returns. Despite the fact that the researcher takes into account the breadth of stock market volatility and the multidisciplinary character of the topic, our key emphasis is on the economic literature based on GARCH & its variant methods. Open research questions are then identified and explored in relation to the findings of the preliminary investigation.

As previously stated, this present study concentrates on the trends and key research fields of share market volatility which identifies research needs for subsequent research initiatives. With the best efforts in the present study, attempts have been made towards integration of bibliographic analysis with the related systematic literature on share market volatility, that enables us to analyze the following research questions: RQ1. What are the trends in literature's latest production and citation rates? RQ2. What has been the pattern of documents published in most prestigious journals? RQ3. Which renowned researchers and academic affiliations have made the latest contributions? RQ4. What has been published about collaborative research recently? RQ5. Which scholarly papers have the highest degree of scientific validity? RQ6. Which words appear more consistently? RQ7. Which variables are influencing co-occurrence networking in the literary works currently? RQ8. What is the prevailing research theme in this area, as per authors?

Scheme of Study

The volatility of the stock market and its effects on other markets are frequently questioned by institutional and retail investors. Contextually, we evaluate literature of current and propose comprehensive strategies for upcoming investigations of research. Using descriptive statistics, the researcher tries to identify key affiliations, publications, nations, writers, and sources of economic literature in order to provide answers to our research questions. Publications published annually, overall citations made, and impacts made by source are taken into account for core sources and core authors. Bradford's law segregating the selected researches into three perceptible zones as Zone 1 is termed a nuclear zone since it contains majorly productive sources, Zone 2 contains comparatively lower productive sources, and Zone 3 comprises low productivity sources—is also used to locate core sources (Wardikar & Gudadhe 2013). Based on publication frequency and overall citations made, our methodology triggers for making recommendations to the major affiliations and nations.

In order to connect different research streams and determine future research objectives, analysis and investigation of major themes areas is important. We rely on the co-occurrence map and theme

map in this regard. To find and connect various study areas and to look into the knowledge structure of recent research, we add keywords plus to the analysis outlined above (Li et al. 2016). More descriptive trends than the author's keywords are provided by keywords plus since they aid in clearly expressing research findings (Tripathi et al. 2018). To find research themes in recent literature, we use the "biblioshiny" utility from the R-program for bibliometric analysis.

Research Objectives with Analytical Techniques

Goal of the current study is to give a thorough evaluation of the literature on stock market volatility and to offer suggestions for ways to enhance economic literature. Using "biblioshiny" from the Bibliometrics R package, our goal is to identify key organizations, nations, authors, and research articles. By utilizing co-occurrence and co-citation analytic approaches in scientific mapping, we also hope to pinpoint important research themes. The use of these research methodologies enables us to conduct a thorough analytical assessment and discover gaps in the existing literature.

Selection of Dataset

In this research paper, a bibliometric analysis has been conducted on the research papers published globally in the area related to the volatility of stock market. SCOPUS database has been used for conducting the research analysis.

For analyzing the volatility of the stock market, high quality publications from the SCOPUS database's core collections have been included for the purpose of analysis. The following searches have been used for analysis as:

Data base: Scopus	
Selection of search Term	14365 documents
Subject: "Stock Market Volatility" AND "Share Market Volatility"	
Refinements: Limit to:	4683 documents
Open access: All	
Year: 2000-2022	
Further Refinements: Limit to:	497 documents
Subject Area: Econometrics, Finance and Business, Management Accounting, Economics	
Document Type: Article, Review and Conference Paper	
Publication Stage: Final	

Key Words: Stock Market, Volatility	
Source Type: Journal	
Language: English	
Paper included after manual screening	275 documents

Data Analysis: Overview of Data Collection

RQ1. What are the trends in literature's latest production and citation rates?

Descriptive statistics are provided in this section, and it is important to comprehend them before continuing with the rest of the study. In this study, 275 publications (2 conference papers and 9 review articles) have been finalized and published by 669 researchers within the time span of 2000-2022, where 45 research articles are authored by single authors, signifying a greater level of publication collaboration. Per co-author documents are 2.6 with 29.45% of international co-authorship. Table 1 describes the data in detail.

Table 1: Useful Information from Data Set

Description	Results
MAIN INFORMATION ABOUT DATA	
Timespan	2001:2022
Sources (Journals, Books, etc)	129
Documents	275
Annual Growth Rate %	14.6
Document Average Age	6.55
Average citations per doc	27.07
References	12603
DOCUMENT CONTENTS	
Keywords Plus (ID)	569
Author's Keywords (DE)	771
AUTHORS	
Authors	669
Authors of single-authored docs	45
AUTHORS COLLABORATION	
Single-authored docs	47
Co-Authors per Doc	2.6
International co-authorships %	29.45
DOCUMENT TYPES	
Article	264
Conference Paper	2
Review	9

Annual scientific production and Average Citation related trends are shown in Figs. 1 and 2 respectively. The Annual production trends can be analyzed into two decades. The first one is from 2000 till 2010 where research publications are very less but during the latter decade from 2011 onwards a significant jump has been noticed in the research publications. After analyzing annual citation per year data, a great increase in citation has been observed in years 2016 and 2020 otherwise an average range of 3-4 paper citations per year has been noticed.

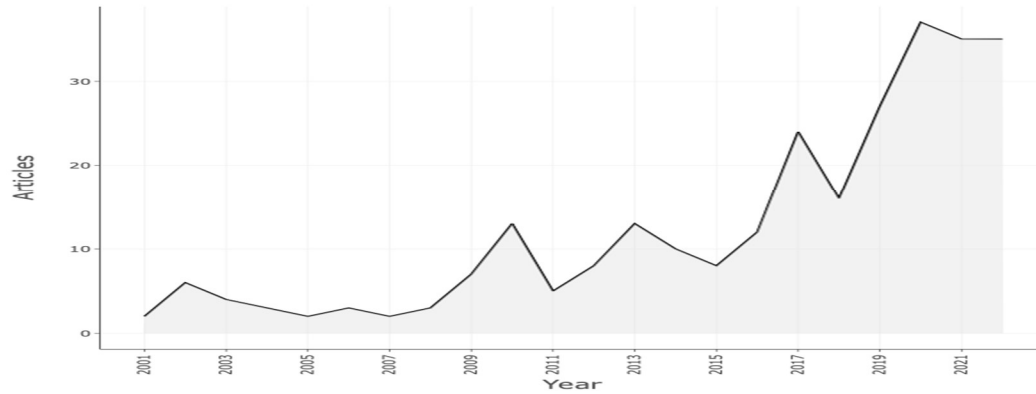


Fig 1: Annual Scientific Production

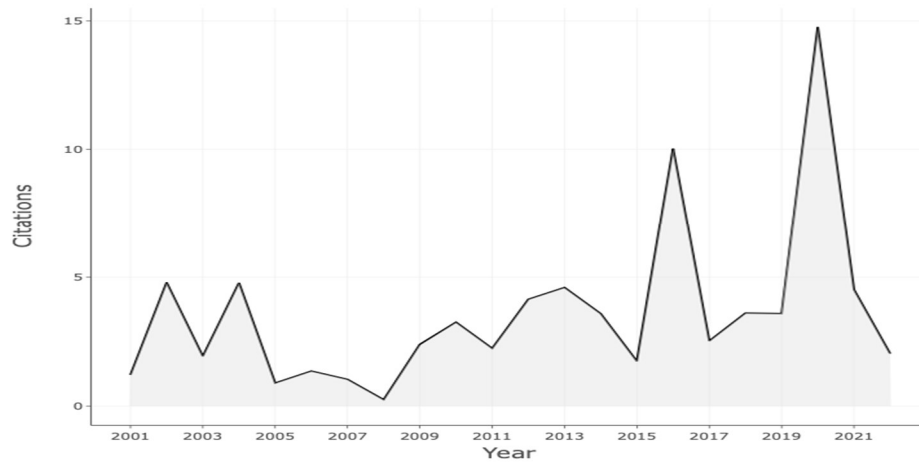


Fig 2: Average citation per year

The Sankey diagram is employed in this study to examine the thematic progression of stock market volatility in Figure 3. Sankey plots are used to show a three-field plot where the size of the part is negatively proportional to the amount of the node (Riehmman *et al.*,2005). The keywords are indexed below the Sankey Plot on the left side, the authors are depicted in the middle row, and the countries that are chosen for analysis are shown on the right-hand side. The analysis shows that stock market, Garch, volatility, financial market, DCC Garch are the main keywords with the most contribution coming from UK, Spain, Tunisia, France and Italy.

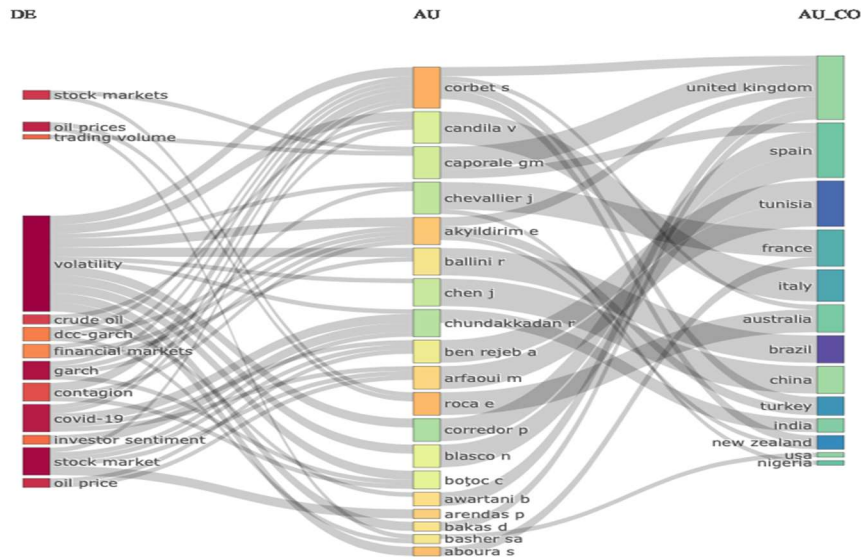


Fig 3: Three Field Plot of Keywords, Authors and Author's Country

Data Analysis: Influential aspects of Economic Literature

Most relevant source

RQ2. What has been the pattern of documents published in most prestigious journals?

Bradford's law and source impact are used to analyze the impact of the most relevant source. Figure 4 depicts the top 10 sources based on H index which means number of articles published in a journal (H) each of which has been cited in other journal at least h times. Energy Economics has the highest H index of 15 among top 10 sources. In comparison, Table 2 The top 10 research journals are ranked using the Bradford law categorization system, which divides academic journals into three zones, Zone 1 containing core journals that publish works on stock market volatility and also termed as a nuclear zone since it is making the most contribution to research. It was concluded that out of 129 research journals, 8 journals fall under Zone 1, 31 journals fall under Zone 2, and 90 journals fall under Zone 3. Both represent that Energy Economics is the most relevant source followed by Applied Economics and International Journal of Finance and Economics.

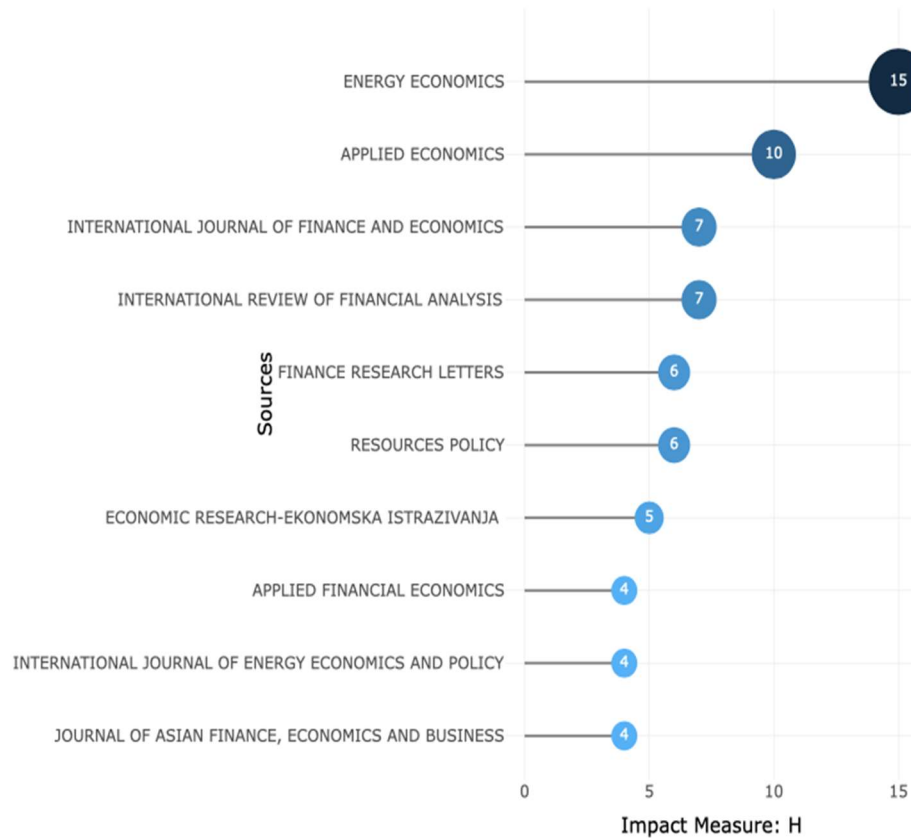


Fig 4: Source Local Impact

Table 2: Source Clustering through Bradford’s Law

SOURCES	Rank	Freq	CumFreq	Zone
ENERGY ECONOMICS	1	23	23	Zone 1
APPLIED ECONOMICS	2	15	38	Zone 1
INTERNATIONAL JOURNAL OF FINANCE AND ECONOMICS	3	12	50	Zone 1
RESOURCES POLICY	4	11	61	Zone 1
ECONOMIC RESEARCH-EKONOMSKA ISTRAZIVANJA	5	9	70	Zone 1
INTERNATIONAL JOURNAL OF ENERGY ECONOMICS AND POLICY	6	9	79	Zone 1
INTERNATIONAL REVIEW OF FINANCIAL ANALYSIS	7	8	87	Zone 1
COGENT ECONOMICS AND FINANCE	8	7	94	Zone 1
FINANCE RESEARCH LETTERS	9	6	100	Zone 2
PLOS ONE	10	6	106	Zone 2

The source dynamics of the top 5 journals and the articles published in totality during the time frame are represented in Figure 5 using LOESS (locally estimated scatterplot smoothing). According to the statistics, since 2014, publications in the fields of energy economics and applied economics have grown dramatically, but the International Journal of Finance and Economics shows a fall, particularly from 2019 on. A greater quantity of journals covering the field of research indicates that the field is multifaceted and covers an ample range of research themes (Low & Siegel, 2019).

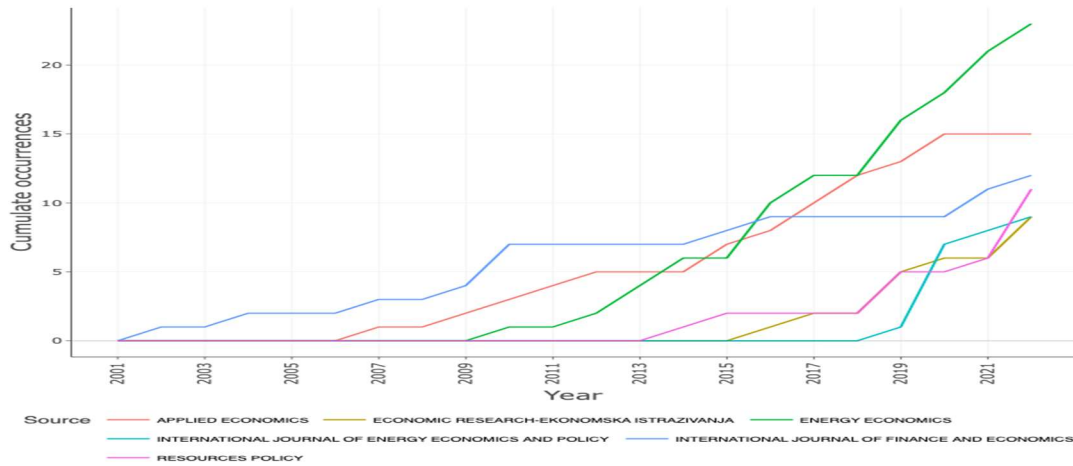


Fig 5: Source Dynamics

Data Analysis: Main Authors, their Affiliations and Countries

RQ3. Which renowned researchers and academic affiliations have made the latest contributions?

In this section the study provides data regarding authors, academic affiliations, and countries contributing towards research inputs significantly. Table 3 shows the top 10 authors ranked on the basis of their total publications and h-index. Corbet S is on the top of the list with 3 publications, 430 citations and 3 h-index followed by Roca E. Corbet S discusses how the volatility association between bitcoin and Chinese share market has increased dramatically during the financial stress period (covid 19). Table 4 represents author productivity through Lotka's Law indicating that 2 core authors i.e., Corbet S and Roca E have published at least 3 articles while 625 occasional authors have published single documents only.

Table 3: Author’s Local Impact

Element	h_index	g_index	m_index	TC	NP	PY_start

CORBET S	3	3	0.75	430	3	2020
ROCA E	3	3	0.25	76	3	2012
ABOURA S	2	2	0.2	6	2	2014
AKYILDIRIM E	2	2	0.5	66	2	2020
ARFAOUI M	2	2	0.286	69	2	2017
AWARTANI B	2	2	0.25	322	2	2016
BAKAS D	2	2	0.333	103	2	2018
BALLINI R	2	2	0.167	5	2	2012
BASHER SA	2	2	0.25	290	2	2016
BEN REJEB A	2	2	0.286	69	2	2017

Table 4: Author Productivity through Lotka's Law

Documents written	No. of Authors	Proportion of Authors
1	625	0.934
2	42	0.063
3	2	0.003

Table 5 shows the top 10 countries according to publications' total citation and average article citations. UK, China, France, USA and France are the top five cited countries. The list is topped by the UK with 1422 total citations and having 59.25 average citations. On the other hand, Malaysia and Canada are ranked 9th and 10th place with 373 and 315 total citations respectively.

Table 5: Most cited Countries

Country	TC	Average Article Citations
UNITED KINGDOM	1422	59.25
CHINA	695	28.96

FRANCE	502	55.78
USA	482	25.37
AUSTRALIA	461	25.61
SPAIN	446	49.56
GERMANY	408	58.29
IRELAND	386	193.00
MALAYSIA	373	62.17
CANADA	315	157.50

In figure 6 the study further analyzes the impact of most relevant affiliation with top 10 institutions. Griffith University is at the top place with 12 academic publications, followed by University of Innsbruck with 7 research contributions and Lancaster University with 6 research contributions. Dublin City University and Nanjing University of Aeronautics and Astronautics are placed at 9 and 10 place with 5 publications for both universities.

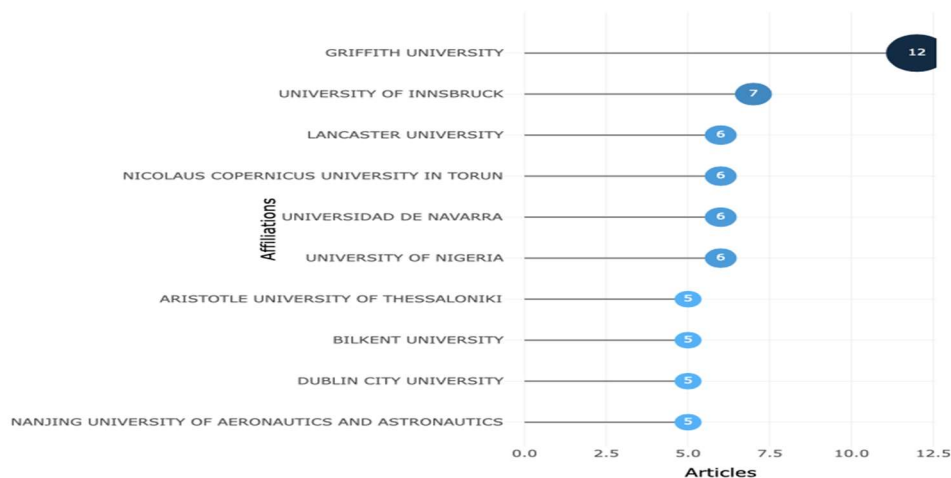


Fig 6: Most relevant Affiliation

Data Analysis: Collaborative Research

RQ4. What has been published about collaborative research recently?

Table 5 breaks down statistical data into single-authored publications (SCP) and multi-authored publications (MCP) to present specific information about the top 10 countries. With 24 articles, 16 of which are single-authored and 8 of which are multi-authored, China is rated top. With 24, 19, 18, and 10, respectively, the UK, the USA, Australia, and India are placed second, third, fourth, and fifth. Since SCP is greater than MCP in all nations which indicates that level of collaboration in research is not significant among them.

Table 5: Countries' List (Highly Corresponding Author)

Country	Articles	SCP	MCP	Freq	MCP_Ratio
	58	47	11	0.211	0.19
CHINA	24	16	8	0.087	0.333
UNITED KINGDOM	24	14	10	0.087	0.417
USA	19	13	6	0.069	0.316
AUSTRALIA	18	9	9	0.065	0.5
INDIA	10	10	0	0.036	0
FRANCE	9	8	1	0.033	0.111
SPAIN	9	8	1	0.033	0.111
GERMANY	7	6	1	0.025	0.143
CZECH REPUBLIC	6	5	1	0.022	0.167

Data Analysis: Core research publications

RQ5. Which scholarly papers have the highest degree of scientific validity?

The top 10 research articles on stock market volatility are included in the current section. Global citations give an overall study of citations, whereas local citations provide citation data for the sampled literature. Table 6 covers both global and local citations. The most cited article has 613 citations and is "COVID-19 pandemic, oil prices, stock market, geopolitical risk and policy uncertainty link in the US economy: Fresh evidence from the wavelet-based method" by Sharif A, (2020). This study examines the temporal and spatial links between the COVID-19 pandemic, oil prices, financial market volatility, and geopolitical risk. The second-placed article, "The contagion consequences of the COVID-19 pandemic: Evidence from gold and cryptocurrencies," by Corbet S. (2020), has 364 citations. This study shows that during the period under examination, a number

of traits typical of a "flight to safety" were present. During this time of extreme financial stress, there was a major evolution in the volatility link between the main Chinese stock markets and Bitcoin. These publications with exclusive recognition have a lot of potential in the field.

Table 6: Documents cited most globally

Document	DOI	Year	Local Citations	Global Citations
SHARIF A, 2020, INT REV FINANC ANAL	10.1016/j.irfa.2020.101496	2020	5	613
CORBET S, 2020, FINAN RES LETT	10.1016/j.frl.2020.101554	2020	3	364
ALI M, 2020, J BEHAV EXP FINANC	10.1016/j.jbef.2020.100341	2020	1	331
CRETI A, 2013, ENERGY ECON	10.1016/j.eneco.2013.01.005	2013	11	314
BASHER SA, 2016, ENERGY ECON	10.1016/j.eneco.2015.11.022	2016	3	285
MAGHYEREH AI, 2016, ENERGY ECON	10.1016/j.eneco.2016.04.010	2016	5	235
BROADSTOCK DC, 2012, ENERGY ECON	10.1016/j.eneco.2012.08.008	2012	1	190
FRATZSCHER M, 2002, INT J FINANC ECON	10.1002/ijfe.187	2002	2	189
OBERNDORFER U, 2009, ECOL ECON	10.1016/j.ecolecon.2008.07.026	2009	1	158
CHAN YL, 2002, J POLIT ECON	10.1086/342806	2002	0	157

RQ6. Which words appear more consistently?

Keywords:

The term "stock market" occurred 95 times, followed by "price dynamics," "commerce," "crude oil," "financial markets," "covid 19," "investment," "risk assessment," and "spillover effect," according to an evaluation of the occurrence of the keywords used in the articles. In Figure 7-word tree demonstrates the word frequency in the document, which is denoted by the volume of the word. It can serve as a stand-in for a word's literary significance. In relation to these, price dynamics, commerce, crude oil, and financial markets are seen to be dominant.

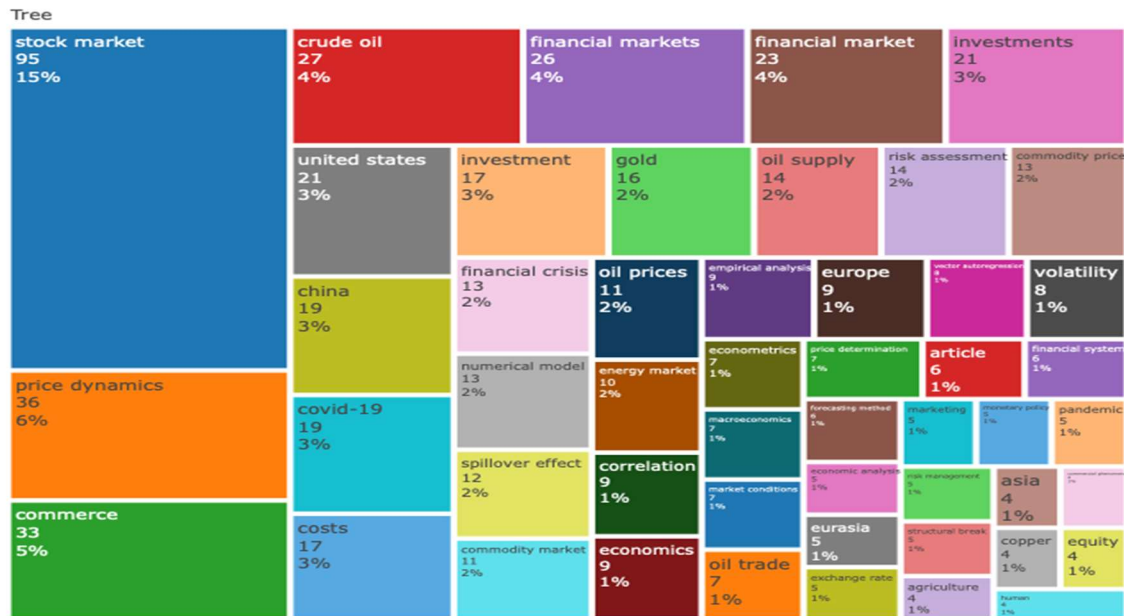


Fig 7: Keywords Tree

Data Analysis: Conceptual Framework

Co-occurrence Network

RQ7. Which variables are influencing co-occurrence networking in the literary works currently?

Using a co-occurrence network, conceptual framework depicts the relations among topics, trends, and themes. It's the primary strategy which uses research paper content. As an outcome, the research unit is a notion, a term that's also constantly used, or a theme that is prevalent throughout the network (Li *et al.*, 2018). This proposed framework of the study field is developed by the Bibliometrix package through multiple correspondence analysis (MCA). MCA enables both graphical & numerical analysis of multivariate nominal data (Greenacre & Blasius, 2006). After being constructed for the keyword and unit of analysis using the different options- automated layout & normalization by association using Louvain's clustering method with 50 nodes—the co-occurrence network of keywords is presented in (Fig. 8). A computer algorithm created the terms

known as motor themes. We utilized a minimum frequency of 5 and set the representation label in each theme to 3 in the "biblioshiny" software. We want to be very clear that it has nothing to do with earlier research and merely presents the authors' subjective opinion of the chosen data's best representation and basic dynamics.

Basic topics are depicted in the lower right corner of Figure 9, which also shows three significant research groupings. Due to their great centrality and low density, these study fields are regarded as transversal or fundamental themes. Due to substantial coverage in the literature, these study fields have made considerable research contributions, making it challenging to determine the path of future research. The financial market and market circumstances, with a focus on Europe, are a key research issue in this cluster. Further, crude oil price, performance assessment time series analysis specifically in the European Union are the emerging themes of the study depicted by the lower left quadrant. Moving forward, motor themes are viewed as significantly contributing themes due to their high centrality and high density. Price dynamics and stock markets serve as driving themes in modern literature and contribute to economics and investing studies. Last but not least, due to their low centrality and high density, the study themes connected to Markov chain analysis, international trade, and interest rates are dispersed yet highly developed. These study topics are considered to have a greater potential for research and have the ability to have a big influence on the body of knowledge in their respective fields.

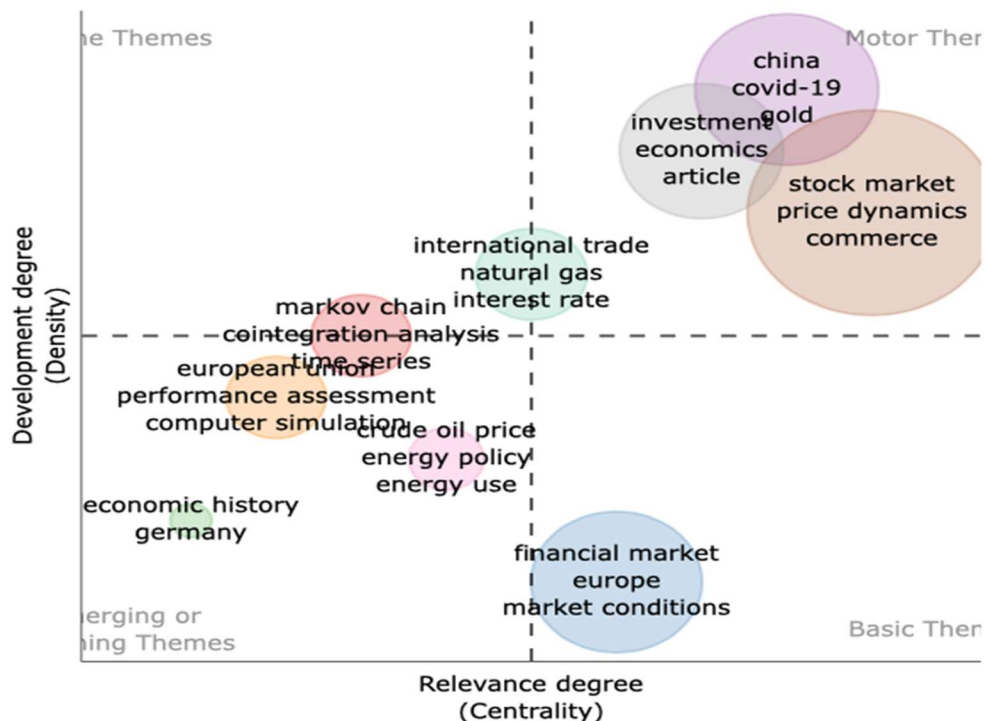


Fig 9: Thematic map

Conclusion

This research focuses on the progression in the field of stock market volatility over two decades from 2000-2022. It also provides a comprehensive analysis of the conceptual framework for the research problem. The primary contribution of the study is a compilation of the extensive literature in the topic with an emphasis on the important sources, authors, and documents. The Bibliometrix R-package was used as a bibliometrics tool because of its adaptability and user-friendliness. Due to its formal design, the strength of its research sources, and software compatibility, the database Scopus was chosen to create the data set for the study. The data set shows that despite a slow but steady initial increase in publications, there is an increase of articles after 2011 and from 2016 onwards there is significant increase in citations also. The main nations that contributed to the intellectual effort in this study area were the UK, China and France. Using aspects including price dynamics, investment, volatility spillover, financial market, Garch, and performance assessment the conceptual structure showed how the area has advanced. Journals like Energy Economics, International Journal of Finance and Economics, Applied Economics and International Review of Financial Analysis produced the majority of publications. This opens the door for the transition from a domain-specific strategy to a multidisciplinary one. As a result, this research intends to create a framework so that academics and professionals can understand the current position of the area. Additionally, they can look at trends in publications in terms of countries, sources, citations, and authorship, as well as high impact articles, well-known authors, and theme maps, by using bibliometric analysis to evaluate the research opportunities. This study's significant insights into current trends can aid investors and policy makers in deciding their investment portfolio, hedging strategies and diversifications of financial assets throughout the globe. Nevertheless, the recent bibliometric and systematic analysis gives a comprehensive view of existing research. Furthermore, we want to nudge scholars to widen their fields of inquiry and make recommendations for investors and policy makers that would benefit from their pioneering research. Firstly, different financial market assets and key sectors react to changes in the price of shares differently. In order to add to the economic literature, we therefore urge scholars to look into differentiated sector specific research. Secondly, meta-analysis would be an interesting method of conducting research which aids in synthesizing present findings and improves the caliber of study output by including moderators' analysis over numerous investigations. We anticipate that future studies will contribute in this area due to the growing study attention being paid to stock market volatility and volatility spillovers.

Further Research Scenario

We can infer that a number of reasons limit the current literature and that further studies can address these drawbacks after thorough bibliometric and systematic analysis. The present study's scope and reach remained restricted to its fundamental elements and techniques. Firstly, we excluded Web of Science and other important databases from our research collection and solely used the Scopus dataset. We believe that adding more datasets should strengthen the conclusions drawn from upcoming research. Secondly, publications in languages other than English were not

included. By adding research conducted in different languages, we will indeed motivate academics to broaden their horizons. This may also enable us to develop local development strategies. Thirdly, in order to address the shortcomings of the current literature, future studies should focus on establishing a strong conceptual framework. Meanwhile, as price volatility has a substantial influence on global financial markets, institutional research integration is required in order to better understand the relationship between stock return volatility and economic conditions. Finally, on the grounds of cross sectors, a group of academics have extended the effect of share price fluctuations connections across sectors. Research of cross-industry heterogeneity is essential in order to comprehend how well the effects of stock market volatility vary across industries because macroeconomic factors vary significantly from one sector to another.

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