International Research Journal of Multidisciplinary Scope (IRJMS), 2024; 5(4):1180-1197 IRJMS

Original Article | ISSN (O): 2582-631X DOI: 10.47857/irjms.2024.v05i04.01652

Exploratory Bibliometric Analysis on Geopolitical Risk

Aiswarya S, Muthumeenakshi M*

Department of Commerce, School of Social Sciences and Languages, Vellore Institute of Technology, Vellore, India. *Corresponding Author's Email: muthumeenakshi.m@vit.ac.in

Abstract

Geopolitical Risk is the risk associated with war threat, terrorist attacks and the escalated events which can influence international relations and other political factors. This paper resorted bibliometric analysis to investigate the research trend in the area of geopolitical risk, which helps in identifying the prominent authors, most globally cited documents, international collaboration, important research areas associated with geopolitical risk. China is the country which leads publication in geopolitical risk followed by Turkey, India, UK and USA in the selected study period. GPR studies are more associated with risk assessment, commerce, investments, cost analysis, climate change, economic effects and sustainable development. A systematic literature review on available documents is performed using 'Preferred Reporting Items for Systematic Reviews and Meta-analysis' (PRISMA) guidelines to find out its impact on financial market and macroeconomic variables. Out of the 810 articles found after applying filters, articles satisfying the objective were selected for review purpose. Oil market is the most explored market when it comes to assessing impact of GPR. TVP-VAR model is followed by majority of the researchers to find out the time varying relationship among the variables. From the analysis it is understood that the field of geopolitical risk is receiving much attention among the financial market researchers.

Keywords: Bibliometric Analysis, Biblioshiny, Financial Market, Geopolitical Risk, Macroeconomic Variables, PRISMA.

Introduction

The crises happening in a country or region not only have effects on that particular region or country but it ripples over other countries as well. Increased globalisation is urging the various economies to integrate their financial boundaries. So, countries or economies are forming trade blocs and economic unions to smoothen their trade and related activities. As much as the integration processes prosper, the consequences of it also increases, especially during crisis period. Nowadays, there are lot of studies being published in reputed journals about the exogenous factor called Geopolitical Risk (hereafter GPR) and its effects on various macroeconomic and financial indicators. Impact of GPR on stock market, oil market and commodities market are being studied by various researchers recently. Even though there are lot number of studies being published, a systematic review on this area is not being done. This is the main motive behind this study.

When it comes to geopolitical risk it should not be considered like political risk such as government stability, regulatory changes, corruption or likelihood of civil unrest. GPR extends beyond the domestic concerns and encompasses international issues and global events (1). For instances, the rise of non-state political actors in place of state actors can lead to change in the mode of governance thereby resulting in diplomatic concerns, global economic shift and military conflicts.

There has been a lack of measurement in the case of GPR to find out its impact on macroeconomic variables, level of investment and stock market dynamics. It was in 2018 that the Governors of Federal Reserve, Dario Caldara and Matteo Iacoviello (2018) constructed an index to measure the geopolitical issues which gave many researchers in the field of Economics and Finance the opportunity to conduct research on this field. Caldara and Iacoviello define geopolitical risk as the threat, realization, and escalation of adverse events associated with wars, terrorism, and any tensions among states and political actor that affect the peaceful course of international relations (2).

They have used an algorithm which measures the

(Received 16th July 2024; Accepted 25th October 2024; Published 30th October 2024)

frequency of news articles which cover the geopolitical issues in the prominent newspapers of the US, UK and Canada. The index is updated in the beginning of every month. In addition to the global GPR index, there are also sub-indices of GPR such as Geopolitical Act index and Geopolitical Threat Index. There are 44 country-specific indices for measuring the level of GPR for each particular country.

This paper investigates the future directions in the field of geopolitical risk, so that the performance analysis, collaboration analysis, co-occurrence analysis are being done as a part of bibliometric analysis. In addition to this, the impact of GPR on various financial and economic sectors; tools adopted by the relevant authors to understand its impact are also needs to be investigated. Systematic Review using the PRISMA guidelines and Bibliometric analysis using Bibliometrix R are used in this paper to provide a scientific analysis report.

Through bibliometric analysis, prominent authors, most influencing papers and the most cited works could be identified which would help in mapping how the works of intellectuals have shaped a particular field of knowledge. It also facilitates in analysing the collaborative relationship that cannot be recognised easily. This is particularly relevant in a multidisciplinary area like geopolitical risk, where stakeholders from different areas like political science, economics international relations and finance can also get comprehensive understanding of the subject. In addition to that, it systematically identifies the gaps in knowledge, which could help in conducting rigorous literature review.

While qualitative assessment of works can be more subjective and may rely on the individual interpretations, objective measurements cannot be conducted. Moreover, handling large dataset requires effective data analysis tools and techniques producing significant research impact. For a flourishing field like GPR it becomes necessary to conduct bibliometric analysis for an in-depth understanding.

Methodology

In this paper Bibliometric Analysis and Systematic Literature Review mechanism have been mainly adopted. Bibliometric Analysis has been done by using the statistical package R programming. R Studio which is a subset of R is a strong program in visualising the bibliometric details and efficient network analysis tool.

The main objective of this paper is to analyse the trend in research related to geopolitical risk in the area of finance and economics. In addition to that, also examines the impact of geopolitical risk in financial sector and on major macroeconomic variables. The main econometric models and tools used for analysing the impact of geopolitical risk will also be studied. For this purpose, a systematic literature review has been conducted following the PRISMA guidelines. Table 1 depicts the main objectives and research methods adopted to conduct the same.

To analyse the trend in research work publications, annual publication growth, citation analysis, co-occurrence analysis, collaboration network analysis have been carried out from the articles downloaded from Scopus database.

Table 1: Objectives of Research and Methods Adopted

Objectives	Analysis	Research methods
To analyse the trend in research work related to geopolitical risk	Bibliometric analysis	Annual production trend Major Countries in scientific production of articles Prominent Authors in publication Collaboration network analysis Co-occurrence network analysis
To examine the impact of geopolitical risk in financial sector and on major macroeconomic variables as well as the tools majorly adopted.	Systematic literature review	Systematic literature using PRISMA guidelines.

Identification of the Source of Study and Related Research

The study resorted Scopus database to access articles related to geopolitical risk. High quality contents are only curated in the scopus database (3). 2863 documents were available for the keyword "geopolitical risk". Using the filters available, only the full text articles were limited and they accounted for 2154 articles. Documents related to the field of 'Economics', 'Econometrics', 'Finance', 'Business', 'Management' and 'Accounting' were only included. The resultant number of documents were 967. Further the documents were only limited to the period starting from 1986 till the year of 2023, which were around 881 documents. And at last, the documents which are written only in English language were taken into account. Hence, for performing Bibliometric analysis 810 documents were considered. For systematic literature review process, 30 highly cited papers relevant to the study were included so that its content can be manually reviewed.

Results and Discussion

R programming is the software package used in the performance of bibliometric analysis as it is considered as a strong package in secondary data analysis (4). Biblioshiny, a web-based application which is one of the packages offered by R programming which best provides the graphical as well as the tabular representation of the publication works.

Annual Production Trend

The detailed examination of the trend in research articles related to geopolitical risk in the Scopus database is shown by the annual production trend. Information regarding the past studies, the present trend and the future direction is detailed by the annual scientific production. The Figure 1 shows that, there is an increasing trend in the number of articles produced. From the year 2014 onwards, there is a gradual increase in the number of articles produced. After three years, that is in 2017, the number of articles produced has been doubled. In 2019, the number has increased to 41. It was the time when, the global pandemic was going on. Whereas, after 2021, there is a dramatic rise in the number of articles produced as the major geopolitical issue such as Russian Ukraine was prevailing during that time period. In 2023, the number of articles produced is 355, which is approximately more than 100% increase in the number of articles produced in 2022. It is a sign that, the area of geopolitical risk is getting attention in the field of business, finance, economics and management. Table 2 shows the annual production trend and the details of growth rate in publication, author details etc.

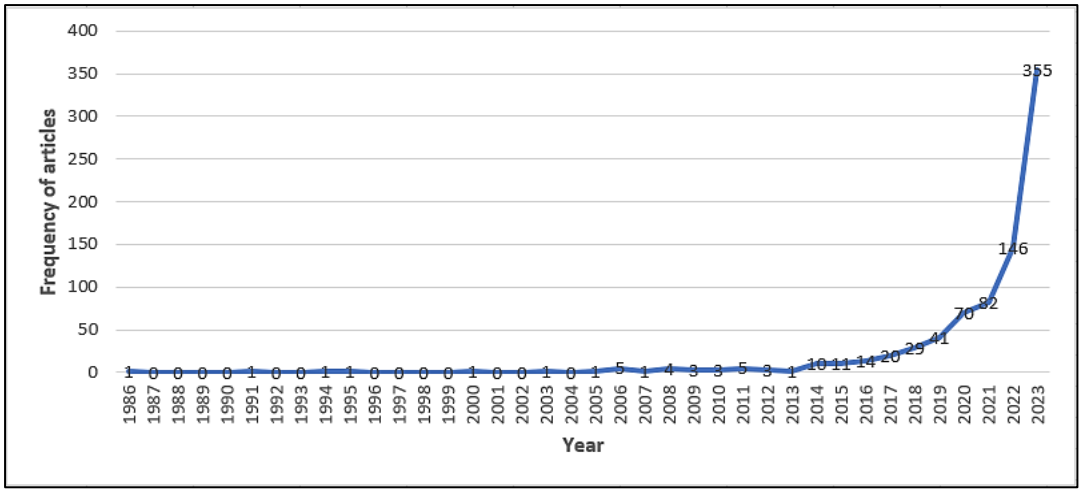

Figure 1: Annual Production Trend

Major Countries in Scientific Production of Articles

China is the country which has produced highest number of articles during the period 1986 to 2023, i.e.652 followed by USA, UK, and Turkey with 180, 131, and 116 documents respectively. China's growing influence on the global economy, geopolitical proximity with around 14 countries, China's emphasis on long-term planning necessitates studying geopolitical trends to anticipate future challenges and develop strategies to address them , growth in Chinese Academia and data availability for research could be the reason

for increase in the number of documents related to geopolitical risk (5, 6).

China evolve as the dominant contributor, with an an impressive number of nearly 700 articles (Figure 2). This could be taken as the indication of considerable investment in research and development, making it as a worldwide leader in scholarly contribution. When it comes to United States, 300 articles are being published in this area, suggesting a need for remarkable research activity in this field. The UK, Turkey, France, India and Australia contributes around 150 papers indicating the need for advancing knowledge in this field.

Table 2: Description of Significant Information

Description	Results
MAIN INFORMATION ABOUT DATA	
Timespan	1986:2023
Sources (Journals, Books, etc)	281
Documents	810
Annual Growth Rate %	17.2
Document Average Age	3.17
Average citations per doc	19.13
References	36839
DOCUMENT CONTENTS	
Keywords Plus (ID)	2000
Author's Keywords (DE)	2347
AUTHORS	
Authors	1849
Authors of single-authored docs	113
AUTHORS COLLABORATION	
Single-authored docs	123
Co-Authors per Doc	3.06
International co-authorships %	36.91
DOCUMENT TYPES	
Article	810

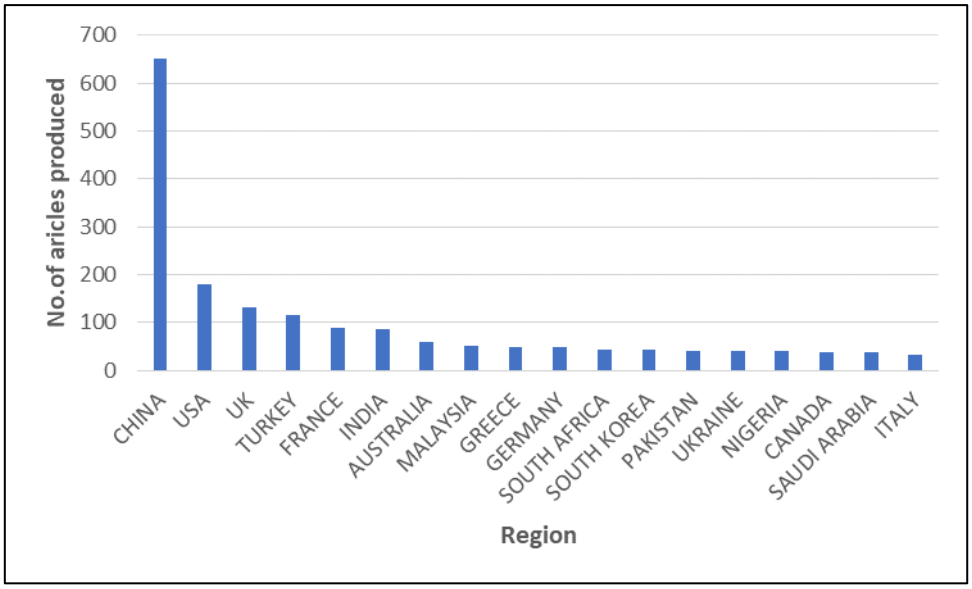

Figure 2: Frequency of Articles Produced

Major Countries in Citation of Articles

China receives significant number of citations for the papers related to geopolitical risk followed by USA, UK, Turkey and India (Table 3). The citations received for the articles from these countries indicate the volume of research output and influence in the academic community. The citation deatils of countirs like Austria, the UK and Saudi Arabia demonstrate the articles are frequently cited despite lower total citation count. Average citations of Ghana, Turkey, and Korea reflect their growing contributions to research and their visibility in the academic community.

Leading Authors in Publication

The Table 4, below shows the details of major authors in the field of geopolitical risk. It is evident from the table that Gupta R, followed by Lee C-C, Gozgor G, Li Y are the leading authors. It is to be noted that Gupta R has published 21 articles during the select period of study and these authors are majorly from emerging countries. The closeness of Lee's and Gupta's work reveals a competitive dynamic between top academics, indicating that both researchers are actively influencing the trajectory of this field's study. All the other authors' contribution reflects a meaningful contribution to the body of literature.

Table 3: Major Countries in Citation of Articles

Country	Total Citation	Average Article Citations
CHINA	3999	20.60
USA	1549	23.10
UNITED KINGDOM	1496	38.40
TURKEY	786	24.60
INDIA	546	18.80
GREECE	520	24.80
KOREA	434	27.10
AUSTRALIA	432	28.80
FRANCE	366	19.30
AUSTRIA	297	99.00
MALAYSIA	219	15.60
SPAIN	215	21.50
LEBANON	188	18.80
GHANA	180	180.00
JAPAN	157	22.40
CANADA	153	15.30
PAKISTAN	143	15.90
SOUTH AFRICA	136	27.20
SAUDI ARABIA	122	9.40
GERMANY	121	10.10

Table 4: Leading Authors in Publication

Authors	Articles
GUPTA R	21
LEE C-C	16
GOZGOR G	13
LI Y	12
SU C-W	11
BOURI E	10
DEMIR E	10
UMAR M	10
WANG Y	10
ZHANG Y	9

Significant Authors in Citations

Sharif A is the most cited author in the field of geopolitical risk with a citation of 890. Sharif *et al.,*(7) in their study titled 'COVID-19 pandemic, oil prices, stock market, geopolitical risk and policy uncertainty nexus in the US economy: Fresh evidence from the wavelet-based approach', has found out that the impact of COVID-19 on the geopolitical risk is far greater than on the US economic uncertainty. Their work is frequently referenced by peers, signifying its relevance in advancing knowldege in the field. Eventhough, Liu J and Hao Z is in the list with 163 and 152 citations, it still reflects a significant influence on the literature, showcasing that their work is contributing to the ongoing dialogue in the field. The significant authors in the citations are given in the Table 5.

Three Field Plot Analysis

The three-field plot analysis helps to comprehend the details of major country, journals and keywords relating to the field of research. The below Figure 3 depicts the major countries involved in the production of the articles in geopolitical risk, as well as the sources which publishes the papers. From the left plot, that is, 'SO' which means sources, it is understood that 'International Review of Economics and Finance', 'Finance Research Letters', 'International Review of Financial Analysis' and 'North American Journal of Economics and Finance' are the major journals producing publications regarding Geopolitical risk. Middle plot denoted by 'DE'stands for author' Keywords shows the terms most commonly used along with GPR, and they are economic policy uncertainty, emerging markets, oil prices and corporate investments.The right side plot shows the Author's Countries which is denoted 'AU_CO'. As discussed earlier, China is the country which leads the publications in GPR followed by Turkey, India, UK and USA.

Table 5: Significant Authors in Citations

Paper	Total Citations
SHARIF A	890
CALDARA D	509
ANTONAKAKIS N	200
AYSAN AF	183
HABIB K	182
ADAMS S	180
BALCILAR M	174
LEE C-C	166
LIU J	163
HAO Z	152

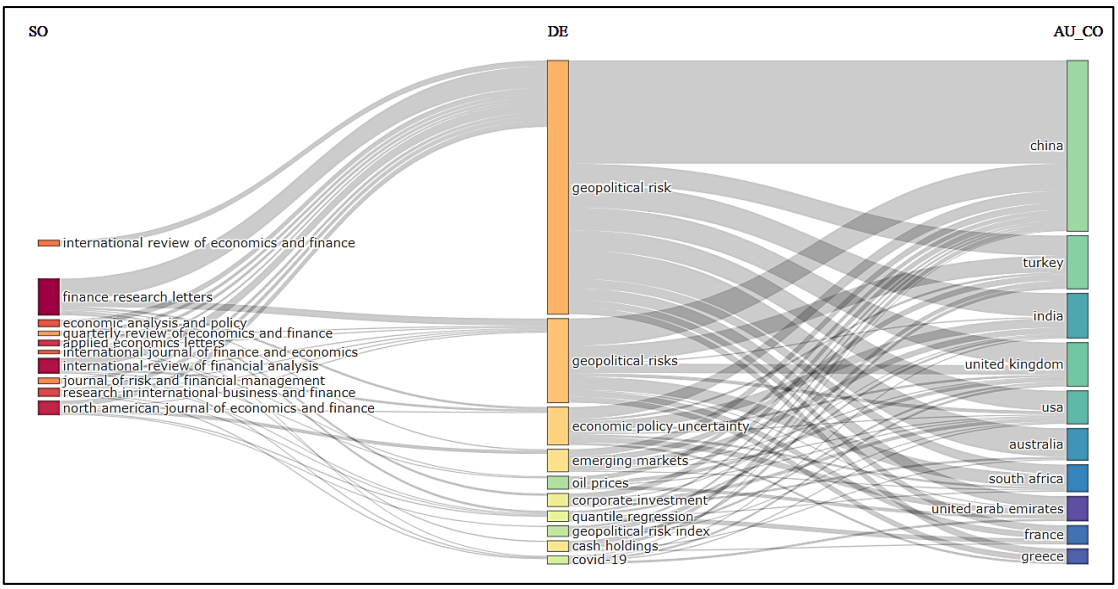

Figure 3: Three Filed Plot Analysis

Leading Publication

The knowledge acquired should be shared and communicated among the academicians and scholars for initiating fruitful discussions in the field of research. Publishers play a major role in this aspect by circulating the articles through their journals. When we analyse the leading sources of publication from the below Figure 4, it is understood that, the journal Resource Policy has published significant number of papers followed by 'Energy Economics', 'Finance Research Letters', 'International Review of Financial Analysis' etc.

Collaboration Network Analysis

Figure 5 below shows the collaboration network analysis where the different clusters show the collaboration network of authors co-authoring documents together, highlighting key relationships and collaborative patterns among scholars. In the red colour cluster where the big node represents the author with whom large number of papers have been co-authored. Gupta R affiliated to 'University of Pretoria, South Africa'., Gozgor G affiliated to 'University of Bradford School of Management, Bradford, United Kingdom'., Bouri E affiliated to 'School of Business, Lebanese American University, Lebanon'., Tiwari AK affiliated to 'DRDO Dehradun, India', are the ones who have majorly collaborated.

Cluster surrounding Gupta and other prominent authors indicates a focused area of research were these scholars share similar interests and contribute to likely themes. The cluster featuring Umar and Su.C-W indicates another collaborative group exploring different aspect of geopolitical risk and related fields. Zhang Y and Liu J are part of separate cluster, indicating that they may collaborate with the central figures in the future research synergies.

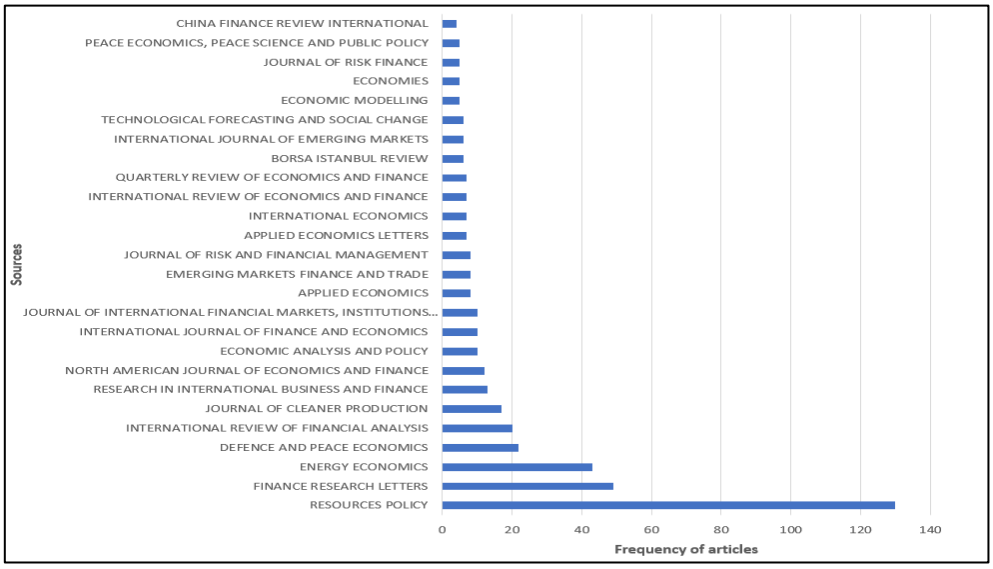

Figure 4: Leading Sources of Publication

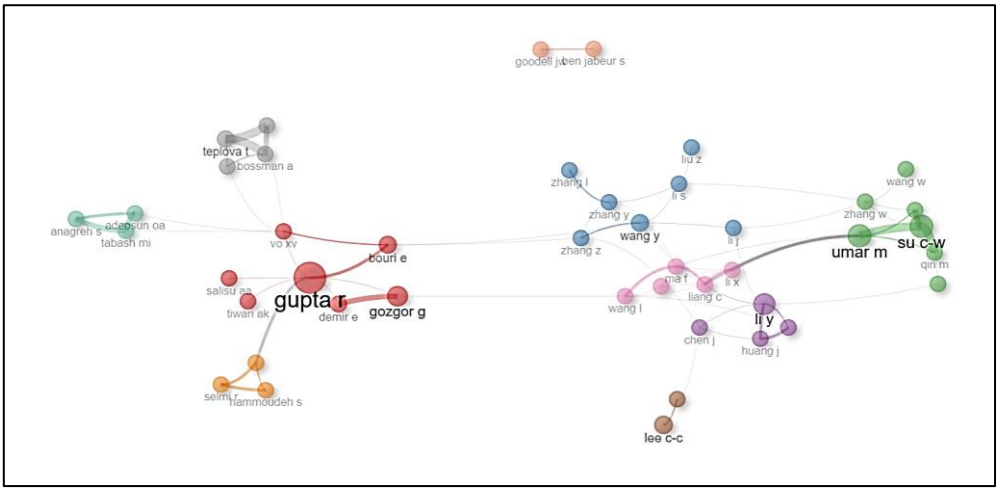

Figure 5: Collaboration Network Analysis

Co-occurrence Network Analysis

Co-occurrence network analysis helps to envisage the existing or future relationship among topics in a research field from the published works. Figure 6 shows the network of topics associated with the topic GPR. From the figure it can be understood that studies on GPR is related to risk assessment, commerce, investments, cost analysis, climate change, economic effects, sustainable development and the country China. And also, geopolitical risk and geopolitics are the most occurring keywords.

The occurence of the words commerce and geopolitical risk indicates that the political stability and international relations are crucial to make investment related decisions. The presence of the words COVID-19, stock market, financial market, commodity market, geopolitics, risk assessment, does mean that the external shock can reshape the economic landscape advocating for taking strategies to adapt to the environment.

Sustainability related terms like climate change, sustainable development, energy security and natural resources emphasizes the stemming need of enviornmental considerations into economic policy making as well as the potential areas of research where geopolitical risk can be attributed and the linkages can be explored.

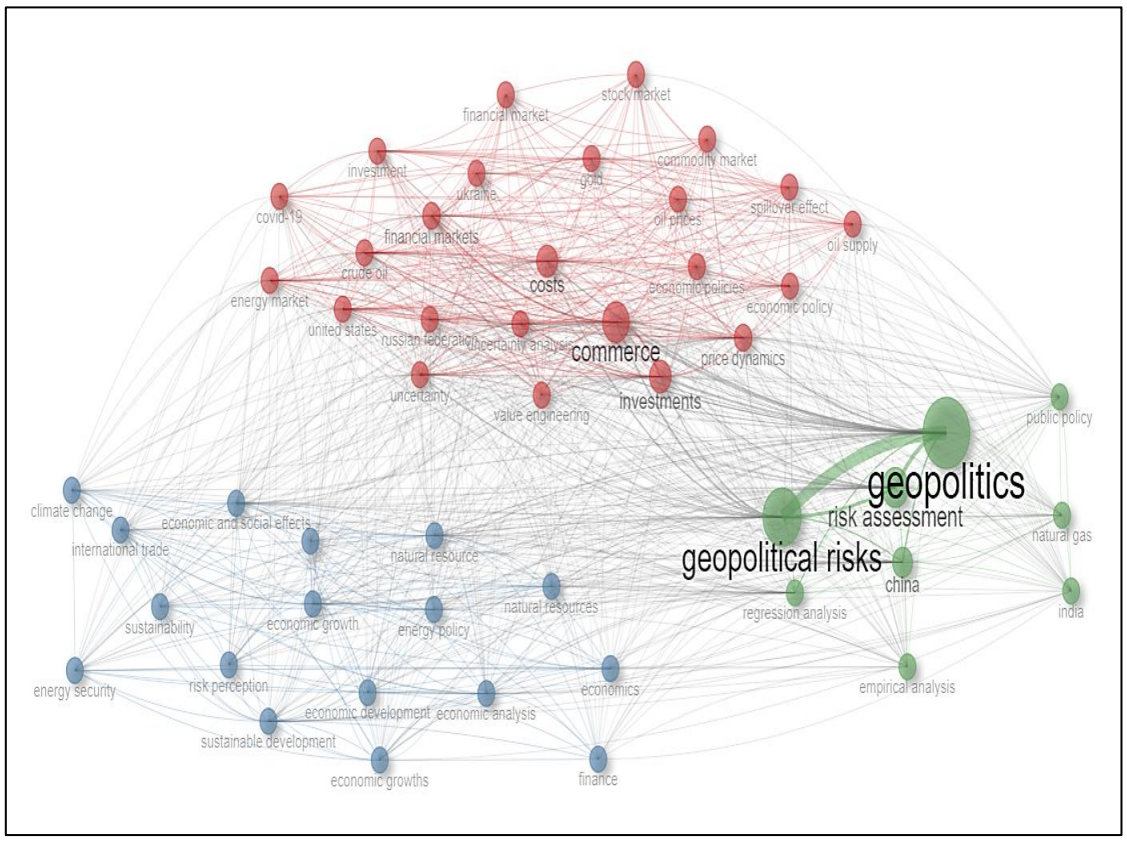

Figure 6: Co-occurrence Network Analysis

Systematic Review

Here, most highly cited works are discussed. The Figure 7 below shows the works in the field of geopolitical risk and the details of citations they have received. Systematic literature review (Table 6) of the most highly cited papers has been conducted to know about the main markets which got affected by geopolitical risk. Thirty highly cited papers (Figure 8) have been taken into consideration after eliminating the studies which are not relevant. Systematic literature review is done by using the PRISMA guidelines. PRISMA stands for the 'Preferred Review Items for Systematic Reviews and Meta Analyses'. It is usually used in reporting intervention studies but nowadays it is also used in business research as well. A systematic literature which has a specific objective in its execution can use the PRISMA guidelines. The criteria in which the studies have been selected is given in the PRISMA diagram (Figure 7) below:

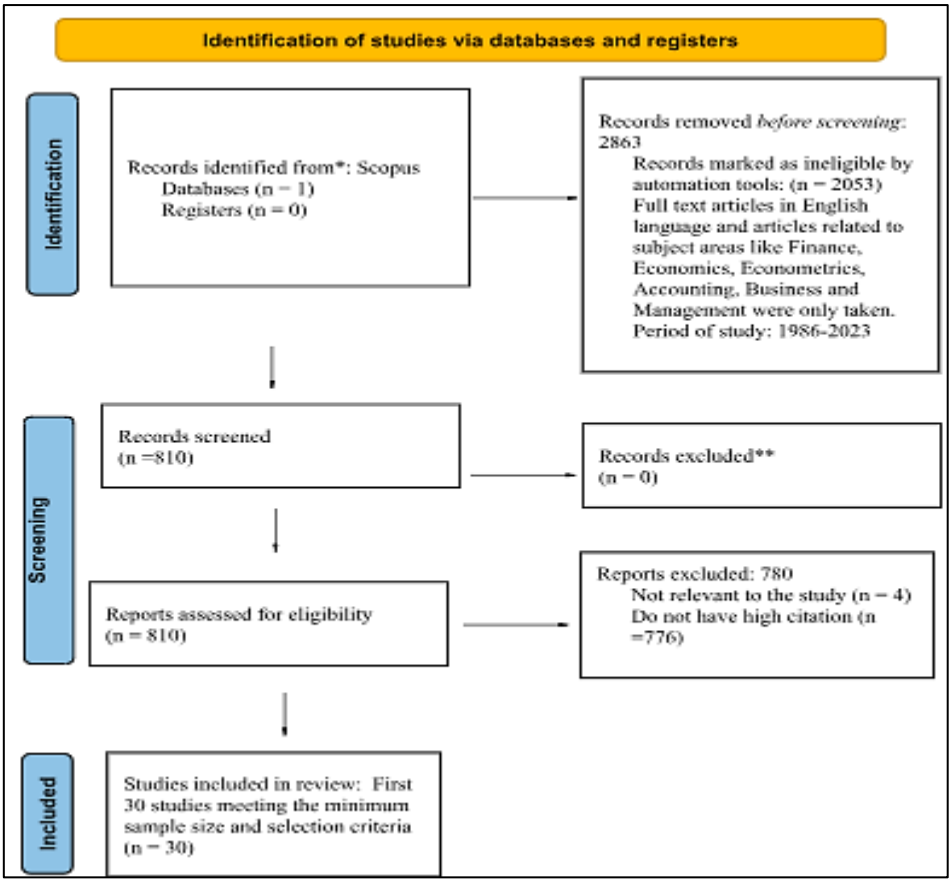

Figure 7: PRISMA Chart Depicting Selection of Studies

Paper	DOI	Total Citations	TC per Year	Normalized TC
SHARIF A, 2020, INT REV FINANC ANAL	10.1016/j.irfa.2020.101496	890	178.00	17.50
CALDARA D, 2022, AM ECON REV	10.1257/aer.20191823	509	169.67	23.44
ANTONAKAKIS N, 2017, FINAN RES LETT	10.1016/j.frl.2017.07.017	200	25.00	6.31
AYSAN AF, 2019, RES INT BUS FINANC	10.1016/j.ribaf.2018.09.011	183	30.50	4.37
ADAMS S, 2020, ECON ANAL POLICY	10.1016/j.eap.2020.09.012	180	36.00	3.54
BALCILAR M, 2018, ECON SYST	10.1016/j.ecosys.2017.05.008	174	24.86	6.44
LEE C-C, 2021, NORTH AM J ECON FINANC	10.1016/j.najef.2020.101309	166	41.50	5.90
LIU J, 2019, ENERGY ECON	10.1016/j.eneco.2019.104548	163	27.17	3.89
UMAR Z, 2022, FINAN RES LETT	10.1016/j.frl.2022.102976	148	49.33	6.82
BOUOIYOUR J, 2019, ENERGY ECON	10.1016/j.eneco.2019.104523	147	24.50	3.51
MEI D, 2020, ENERGY ECON	10.1016/j.eneco.2019.104624	123	24.60	2.42
DAS D, 2019, NORTH AM J ECON FINANC	10.1016/j.najef.2019.01.008	122	20.33	2.91
CHENG CHJ, 2018, INT ECON	10.1016/j.inteco.2018.05.002	122	17.43	4.51
AKADIRI SS, 2020, J HOSP TOUR MANAGE	10.1016/j.jhtm.2019.09.002	119	23.80	2.34
QIN Y, 2020, ENERGY ECON	10.1016/j.eneco.2020.104851	118	23.60	2.32
BAUR DG, 2020, J BANK FINANC	10.1016/j.jbankfin.2020.105823	116	23.20	2.28
CUNADO J, 2020, DEF PEACE ECON	10.1080/10242694.2018.1563854	110	22.00	2.16
BOLDANOV R, 2016, INT REV FINANC ANAL	10.1016/j.irfa.2016.10.002	110	12.22	4.13
LIANG C, 2022, TECHNOL FORECAST SOC CHANGE	10.1016/j.techfore.2022.121810	106	35.33	4.88
SU C-W, 2020, TECHNOL FORECAST SOC CHANGE	10.1016/j.techfore.2020.120182	104	20.80	2.04
KANNADHASAN M, 2020, FINAN RES LETT	10.1016/j.frl.2019.08.024	104	20.80	2.04
DOGAN E, 2021, RESOUR POLICY	10.1016/j.resourpol.2021.102056	103	25.75	3.66
TIWARI AK, 2019, TOUR MANAGE	10.1016/j.tourman.2019.06.002	102	17.00	2.44
WANG Y, 2022, FINAN RES LETT	10.1016/j.frl.2022.103066	101	33.67	4.65
HABIB K, 2020, RESOUR CONSERV RECYCL	10.1016/j.resconrec.2019.104603	100	20.00	1.97
LEE C-C, 2021, PAC BASIN FINANC J	10.1016/j.pacfin.2020.101480	96	24.00	3.41
ASAI M, 2020, INT J FORECAST	10.1016/j.ijforecast.2019.10.003	94	18.80	1.85
PLAKANDARAS V, 2019, RESOUR POLICY	10.1016/j.resourpol.2018.11.006	89	14.83	2.13
GONG X, 2022, ENERGY ECON	10.1016/j.eneco.2022.106028	88	29.33	4.05
SWEIDAN OD, 2021, J CLEAN PROD	10.1016/j.jclepro.2021.126189	88	22.00	3.13

Figure 8: Top Research Papers

Table 6: Systematic Literature Review

Authors	Total Citation	Title	Journal	Key Research Outline	Models Used	Major Findings
Sharif A, Aloui C,	890	"COVID-19 pandemic, oil prices, stock market,	'International Review of Financial Analysis'	Examines, using a time-frequency approach, the relationships	Coherence wavelet method and the	Discovered the unexpected effects of COVID-19 and oil price shocks on

Yarovaya L (7)		geopolitical risk and policy uncertainty nexus in the US economy: Fresh evidence from the wavelet-based approach"		between the current COVID-19 outbreak, the stock market, the shock to oil prices, geopolitical risk, and the uncertainties surrounding US economic policy.	wavelet-based Granger causality tests	the low frequency bands' stock market volatility, uncertainty around economic policy, and degrees of geopolitical risk.
Caldara D, Iacoviello M(2)	509	"Measuring Geopolitical Risk"	'American Economic Review'	Provides a news-based assessment of geopolitical events based on news.	News based Algorithm	Increased geopolitical risk leads to decreased investment and employment opportunities, moreover greater downside risk
Antonakakis N, Gupta R, Kollias C, Papadamou S (8)	200	"Geopolitical risks and the oil-stock nexus over 1899–2016"	'Finance Research Letters'	Sets out to examine the impact of geopolitical risk on the oil-stock covariance, their returns and their variances.	Bivariate unrestricted BEKK-GARCH model	Negative effects triggered by geopolitical risk affect oil returns and its volatility. There is an existence of covariance between the two markets.
Aysan AF, Demir E, Gozgor G, Lau CK (9)	183	"Effects of the Geopolitical Risks on Bitcoin Returns and Volatility"	'Research in International Business and Finance'	Examines the impact of the global geopolitical risks (GPR) index on daily returns and Bitcoin price volatility.	Quantile-on-Quantile estimations	States that the impacts are positive at the greater quantiles of both the GPR as well as the price volatility and the returns of Bitcoin. Further they have concluded that Bitcoin can act as a hedging tool against GPR.
Adams S, Adedoyin F, Olanipekun E, Bekun FV (10)	180	"Energy consumption, economic policy uncertainty and carbon emissions; causality evidence from resource rich economies."	'Economic Analysis and Policy'	Examines long term relationship between economic policy uncertainty, energy consumption, and a carbon function for high-risk geopolitical countries between 1996 and 2017.	Panel Pooled Mean Group-Auto regressive distributed lag model	Greater levels of economic policy uncertainties negatively affect environmental sustainability for countries with higher levels of geopolitical risks.
Balcilar M, Bonato M, Demir	174	"Geopolitical risks and stock market dynamics of the BRICS"	'Economic Systems'	Analyse the impact of geopolitical uncertainty on return and volatility aspects	Causality-in-quantiles tests	GPR is found to be a driver of bad volatility

er R, Gupta R (11)				of the BRICS stock markets		
Lee CC, Lee CC, Li YY (12)	166	"Oil price shocks, geopolitical risks, and green bond market dynamics"	'North American Journal of Economics and Finance'	Elucidates the relationship among oil price, geopolitical risks, and green bond index in the United States from December 2013 to January 2019	Granger-causality in quantile analysis	Unidirectional Granger-causality from geopolitical risk to oil price at the extreme quantiles and bidirectional Granger-causality from geopolitical risk to green bond index at the lower quantiles could be evidenced.
Liu J, Ma F, Tang Y, Zhang Y (13)	163	"Geopolitical risk and oil volatility: A new insight"	'Energy Economics'	Role of GPR in forecasting oil price volatility	GARCH-MIDAS model	GPR leads to oil market fluctuations
Umar Z, Polat O, Choi S, Teplova T (14)	148	"The impact of the Russia-Ukraine conflict on the connectedness of financial markets"	'Finance Research Letters'	Shed light on the effect of GPR on the European financial market and global commodity market	Time-varying parameter vector autoregression	GPR events has changed the relationship of financial markets. European equities and Russian bonds transmit shocks; and the adverse events impact returns as well as volatility connectedness among them
Bouoiyour J, Selmi R, Hammoudeh S, Wohar ME (15)	147	"What are the categories of geopolitical risks that could drive oil prices higher? Acts or threats?"	'Energy Economics'	Examine the effects of geopolitical risks on the informational efficiency of the oil market, assuming that the informational efficiency may vary with potential geopolitical events	Dynamic Copula with Markov-switching model	Geopolitical acts have positive and strong effects on oil price changes whereas the geopolitical threats have only moderate or no effects at all.
Mei D, Ma F, Liao Y, Wang L (16)	123	"Geopolitical risk uncertainty and oil future volatility: Evidence from MIDAS models"	'Energy Economics'	Studies the role of geopolitical risk uncertainty on oil futures price volatility	MIDAS model specifications	Geopolitical Act index, affect long-term oil volatility compared to geopolitical threat
Das D, Kannadhasa	122	"Do the emerging stock markets react	'North American Journal of	Examine whether the international (US based)	Non parametric causality-	These shocks impact the markets differently

n M, Bhattacharyya M (17)		to international economic policy uncertainty, geopolitical risk and financial stress alike?"	Economics and Finance'	economic policy uncertainty, geopolitical risk and financial stress impacts emerging stock markets in a same manner	in-quantiles test	in terms of causality and intensity
Cheng CH, Chiu CW (18)	122	"How important are global geopolitical risks to emerging countries?"	'International Economics'	Studies how geopolitical risk affects emerging countries	Structural VAR models	Geopolitical shocks are significant sources of business fluctuations in emerging countries.
Saint Akadiri S, Eluwole KK, Akadiri AC, Avci T (19)	119	"Does causality between geopolitical risk, tourism and economic growth matter?" Evidence from Turkey"	'Journal of Hospitality and Tourism Management	Investigate the relationship among the geopolitical risk index, tourism and economic growth in Turkey.	Granger causality approach	There is a unidirectional causality flowing from geopolitical risk index to economic growth as well as from geopolitical risk index to tourism.
Qin Y, Hong K, Chen J, Zhang Z (20)	118	"Asymmetric effects of geopolitical risks on energy returns and volatility under different market conditions"	'Energy Economics'	Using a quantile regression model, examine the asymmetrical impact of geopolitical risks on energy (crude oil, gas, and heating oil) returns and volatility under various market conditions.	Ordinary Least Square method and Quantile regression model	Under certain market circumstances, the effects of geopolitical risks on the volatility of crude oil are notably positive, while the effects on the volatility of petrol and heating oil are mostly negative but not statistically significant.
Baur DG, Smales LA (21)	116	"Hedging geopolitical risk with precious metals"	'Journal of Banking and Finance'	Analyse the relationship between geopolitical risk and asset prices	Regression analysis	The impact of geopolitical risk could be minimised by having precious metals in the portfolio
Cunado J, Gupta R, Lau CK, Sheng X (22)	110	"Time-Varying Impact of Geopolitical Risks on Oil Prices"	'Defence and Peace Economics'	Examines the changing effect of geopolitical risk on oil returns from February 1974 to August 2017	TVP-SVAR model	Higher GPRs drive up oil prices.
Boldanov R, Degiannaki	110	"Time-varying correlation between oil and stock	'International Review of Financial Analysis'	Examine the relationship between the volatility of the	Diag-BEKK model, Ljung-Box test and	The correlation between the volatility of the oil and stock markets

s S, Filis G (23)		market volatilities: Evidence from oil-importing and oil-exporting countries"		stock market and oil prices over time in countries that import and export oil.	Autoregressive Distributed Lag (ARDL) model	varies over time, showing both positive and negative values.It is influenced by major economic and geopolitical events
Liang C, Umar M, Ma F, Huynh TL (24)	106	"Climate policy uncertainty and world renewable energy index volatility forecasting"	'Technological Forecasting and Social Change'	Discusses the impact of geopolitics along with other exogenous factors on the price volatility of renewable energy	GARCH-MIDAS model	Climate policy uncertainty, geopolitical risk, GPRT and GRPA have an adverse effect on the volatility of the renewable energy market.
Su CW, Qin M, Tao R, Shao XF, Albu LL, Umar M (25)	104	"Can Bitcoin hedge the risks of geopolitical events?"	'Technological Forecasting and Social Change'	Examine how Bitcoin can help to mitigate and overcome the risks linked to worldwide geopolitical events.	Granger Causality Tests and Intertemporal Capital Asset Pricing Model	Bitcoin can act as an asset to mitigate the risks associated with global geopolitical events
Kannadhasan M, Das D (26)	104	"Do Asian emerging stock markets react to international economic policy uncertainty and geopolitical risk alike? A quantile regression approach"	'Finance Research Letters'	Compare and differentiate the effect of Economic Policy Uncertainty (EPU) and Geopolitical Risk (GPR) related adverse events on emerging stock markets of Asia	Quantile Regression analysis	Effect of Geopolitical Risk (GPR) on emerging stock markets were found to be negative in lower quantiles as well as positive in intermediate and upper quantiles.
Dogan E, Majeed MT, Luni T (27)	103	"Analysing the impacts of geopolitical risk and economic uncertainty on natural resources rents"	'Resources Policy'	Investigates how natural resources rents in developing economies gets affected by geopolitical risk and economic policy uncertainty	Quantile regression analysis	Geopolitical risk has an adverse impact on natural resources rents in developing economies, whereas economic growth has a positive influence on these rents.
Tiwari AK, Das D, Dutta A (28)	102	"Geopolitical risk, economic policy uncertainty and tourist arrivals:	'Tourism Management'	Examine the economic policy uncertainties and geopolitical risks influence the tourist arrivals in a	Wavelet coherence technique and Partial Wavelet Coherence	The study revealed that geopolitical risks have a more significant and enduring impact on tourist arrivals

		Evidence from a developing country"		developing country, specifically India.		than economic policy uncertainties
Wang Y, Bouri E, Fareed Z, Dai Y (29)	101	"Geopolitical risk and the systemic risk in the commodity markets under the war in Ukraine"	'Finance Research Letters'	Analyse the spillovers of returns and volatility among 16 commodities across different groups under heightened geopolitical risk induced by the war in Ukraine.	Time-varying spillover approach	There is a significant increase in both return and volatility spillovers among commodities during heightened geopolitical risk.
Lee CC, Wang CW (30)	96	"Firms' cash reserve, financial constraint, and geopolitical risk"	'Pacific Basin Finance Journal'	Investigate the impact of geopolitical risk on Chinese firms' holdings of cash, particularly focusing on the manufacturing sector and financial constraints.	Two-Stage Least Squares Regression	Manufacturing-related industries, tend to increase their cash holdings in response to geopolitical risk, with financially constrained firms holding more cash as a precautionary measure.
Asai M, Gupta R, McAleer M (31)	94	"Forecasting volatility and co-volatility of crude oil and gold futures: Effects of leverage, jumps, spillovers, and geopolitical risks"	'International Journal of Forecasting'	By utilising the realised covariance matrices, they analysed the impact of leverage jumps, spillovers and geopolitical risk	Full BEKK structure	GPR tend to affect volatility of futures crude oil
Plakandaras V, Gupta R, Wong WK (32)	89	"Point and Density Forecasts of Oil Returns: The Role of Geopolitical Risks"	'Resources Policy'	Analyse the ability of global and emerging market GPRs in forecasting oil returns	TVP-VAR model	Increase in GPR at the initial-level reduce oil returns. Oil exporting countries witness slowdown in economic growth whereas importing countries take up expansionary policies.
Gong X, Xu J (33)	88	"Geopolitical risk and dynamic connectedness between commodity markets"	'Energy Economics'	Analyses the connectedness among energy, precious metal, industrial metal, agriculture and livestock commodity markets during	TVP-VAR-SV model and GARCH-MIDAS model	The net spillover of the energy, livestock, and agriculture commodity markets is positively impacted by geopolitical risk, whereas the

				geopolitical risk events.		precious metal and industrial metal commodity markets are negatively impacted.
Sweidan OD (34)	88	"The geopolitical risk effect on the US renewable energy deployment"	'Journal of Cleaner Production'	Focuses on the influence of GPR on creating a cleaner and sustainable environment, especially on US renewable energy deployment	Cointegration analysis and estimate an autoregressive distributed lag model	GPR act as driver of renewable energy diffusion.

After reviewing the selected documents, it is understood that geopolitical events and the nuances emerging as part of it has the potential to affect the various markets and macroeconomic variables. The findings from the systematic literature review can be envisaged in the following aspects:

- To begin with the widespread impact of GPR on various markets, it could be witnessed that it affects a broad spectrum of markets including oil (7, 22), stock (11, 18), renewable energy (24, 34), Bitcoin (9, 25) and commodities (29, 33). Oil market has got much attention among researchers when it comes to the analysis of impact of geopolitical risk. The reason is that the high sensitivity of this commodity to such adverse events as pointed out by Sharif *et al.,* (7), global reliance on this particular commodity (14), concentration of oil production in a few countries magnifies the impact of geopolitical events, historical precedents (22), and transparency of oil market to directly analyse the impact of geopolitical events (32). The uncertainty and policy shifts, supply chain disruptions as well as sector specific impacts caused by geopolitical issues direct the researchers to concentrate on stock market and renewable energy sectors (11, 14, 18).
- Conditional effects of GPR on various factors, Kannadhasan *et al.,* (26) and Qin *et al.,* (20) highlight how this effect can be positive or negative depending on market conditions (e.g., quantile of returns).
- Another thing to be considered after the reviewing is that, GPR is a significant driver of volatility and uncertainty in financial market (13, 31). This could pose challenges for investors and business in making informed decisions.
- In addition to the above things, it is to be noted that GPR can affect the macroeconomic variables like investment, economic growth and inflation level Saint Akadiri *et al.,* (19) and Dogan *et al.,* (30). Tiwari *et al.,* (28) stated that GPR has a long-lasting negative impact on the tourism industry in emerging countries like India. Moreover, it is to be noted that, tourism industry gets affected more due to GPR than economic policy uncertainty. Considering these macroeconomic effects are significant for the policymakers to frame effective economic strategies.
- In light of all the consequences of GPR on the financial market and macroeconomic variables, Baur *et al.,* (21) and Su *et al.,* (25) have conducted study on the hedging power of precious metals and bitcoins in order to help the investors. Su *et al.,* (25) is of the opinion that Bitcoin market can optimize the negative effects of geopolitical events. In the study of Baur *et al.,* (21), they have also found that silver and gold hedges against global geopolitical risk and realized geopolitical acts.

The systematic literature review also focuses on the diversity of statistical tools used by the researchers to analyse the impact of GPR. There are numerous methods available and it could be identified from the previous literature available. It ranges from econometric models, time series analysis and panel data analysis which comes under quantitative methods to the qualitative methods such as case studies, expert interviews and surveys. The study particularly focuses on the

tools of econometric models adopted by researchers to gauge the impact of GPR on major macroeconomic variables and financial assets.

The prominently used tool is the Time Varying Parameter Vector Autoregressive method, which assist in establishing causal relationship between GPR and other variables like stock market returns or renewable energy deployment (14, 18). TVP-VAR can identify the time varying, that is, short run and long run impact of one variable on the other variable (14). It works on the assumption that the relationship between the variables will not be the same as the time changes. Hence, it takes into consideration, the time varying relationship between the variables. Sharif *et al.,* (7) and Tiwari *et al.,* (28) have used wavelet-based techniques in their study to analyse the time-frequency relationship between the variables. Wavelet based techniques are used to identify the co-movements among variables over a period of time.

Other tools used for analysis are the GARCH models followed by quantile regression techniques. GARCH models (16, 31) are well-suited for capturing the volatility dynamics in financial markets, particularly when GPR is a factor, making them valuable tools for understanding market fluctuations. Quantile regression techniques (26, 20) allows researchers to examine the impact of GPR on different parts of a variable's distribution, such as the upper or lower quantiles. This provides a more nuanced understanding of how GPR might affect extreme market events.

The selection of the most appropriate tool relies on the particular research question and the type of the data being taken into account for analysis. However, the prevalence of VAR models, wavelet analysis, GARCH models, and quantile regression highlights their effectiveness in untangling the complex relationship between GPR and various markets.

Conclusion

This paper tries to highlight the increasing importance of studying GPR due to globalization and its effects on financial markets. The main objectives are to analyse the past trend, current progress and future direction in which the GPR field of study is moving, as well as the impact of GPR on various financial markets and economic indicators. In addition to that, the tools used for analysing its impact on various sectors of financial markets are also studied. For this purpose, Bibliometric Analysis using R and systematic literature review has been conducted. Scopus database has been resorted for tracing the articles related to the keyword geopolitical risk and only studies related to the subjects like Economics, Finance, Business, Management and Accounting were considered.

Biblioshiny a web based bibliometric analysis package offered by R programming is a strong tool for analysing the trends in a specific research area. It also offers visualisation techniques that assists in building network analysis diagrams for understanding the co-citation analysis, co-occurrence analysis and also to understand the collaboration made by the authors. From the 810 papers analysed, it is understood that China is the leading country in the scientific production of articles related to GPR, Gupta R is the leading author in publication and Sharif A is the author who receives more citation and Resource Policy followed by Finance Research letters and Energy Economics are the major journals which produce large number of documents related to GPR.

Systematic literature review assists in summarizing the findings of the already existing literature (35). From the most globally cited papers' report generated from Bibliometric analysis, the thirty most highly cited papers have been identified and reviewed. The findings from those papers revealed that, GPR is an exogenous factor which can affect the functioning of various sectors of the financial market and macroeconomic variables of a country. Majority of the studies take into consideration the spillover effect of GPR, the ability of it to make the markets volatile, especially oil market followed by stock market. Nowadays, the studies which focuses on impact of GPR on commodities market is gaining much attention among the researchers. Improved DY method using TVP-VAR is the most frequently used tool to analyze the causality among the variables, which can identify the time varying relationship among the variables followed by Wavelet methods and GARCH models.

A detailed analysis of the research trends related to GPR disclosed, there is an increase in attention given by researchers to this particular area in the field of Finance, Economics and Business Management. Significant studies focus on oil market due its global economic dependency. However, there is a need to give much attention to

its impact on commodities market as well due to the increasing financialization of commodities. Event studies related to particular geopolitical issues which can have a global impact could also be explored further. Though, Energy commodities, and the role of GPR in energy transition, sustainable access to clean energy have been discussed earlier, its impact on agricultural commodities, food commodities in particular need also to be discussed. The countries which mostly get affected by GPR and its role in attracting capital investments which in turn leads to economic growth and development could also be explored in future by the researchers who wish to work in this area. In additon to this, more number of databases like Web of Science can also be considered for bibiliometric analysis and also other strong packages like VOSviewer and Gephi can be used along with biblioshiny. Considering articles of different time period can also provide insights on this field.

It is evident that all the studies considered has used the GPR index and the sub categories of it like geopolitical threat index, geopolitical act index as well as the county specific indices developed by Caldara and Iacoviello. It is an indication that, in future researchers can develop gepolitical risk indices particular to a country incorporating pecularities of the country being studied. For that purpose, automated textual analysis model adopted by Caldara and Iacoviello could be referred. GPRNK index developed by Lee S *et al*., is one such index built which captures the geopolitical issues in Soth Korea using automated keyword searches in South Korean media (36).

Abbreviation

Nil.

Acknowledgement

I would like to extend my gratitude to Vellore Institute of Technology and my research supervisor, Dr.Muthumeenakshi M for their guidance and support throughtout the completion of this research.

Author Contributions

All authors accept the responsibility for the contents of this document.

Conflict Of Interest

The authors declare that there is no conflict of interest.

Ethics Approval

Not Applicable.

Funding

Nil.

References

1. Kullik J. George Friedman: The Next 100 Years. A Forecast for the 21st Century. Anchor Books/Random House: New York 2010, 253 Seiten. SIRIUS – Zeitschrift für Strategische Analysen. 2024;8(2): 244-246. https://doi.org/10.1515/sirius-2024-2015
2. Caldara D, Iacoviello M. Measuring geopolitical risk. American Economic Review. 2022 Apr 1;112(4):1194-225.
3. Baas J, Schotten M, Plume A, Côté G, Karimi R. Scopus as a curated, high-quality bibliometric data source for academic research in quantitative science studies. Quantitative science studies. 2020 Feb 1;1(1):377-86.
4. Harikumar Y, Muthumeenakshi M. Future directions of volatility spillover and systematic review of measurement models: Evidences from bibliometric analysis. Multidisciplinary Reviews. 2023 Dec 4;7(2):2024030.
5. China; Council on Foreign Relations. 2019. https://www.cfr.org/asia/china
6. Goldberg I. China's Heavy Economic Legacy of State Ownership and Central Planning. The Diplomat. 2023 Nov 18. https://thediplomat.com/2023/11/chinas-heavy-economic-legacy-of-state-ownership-and-central-planning/
7. Sharif A, Aloui C, Yarovaya L. COVID-19 pandemic, oil prices, stock market, geopolitical risk and policy uncertainty nexus in the US economy: Fresh evidence from the wavelet-based approach. International Review of Financial Analysis. 2020 Jul;70(1):101496.
8. Antonakakis N, Gupta R, Kollias C, Papadamou S. Geopolitical risks and the oil-stock nexus over 1899–2016. Finance Research Letters. 2017 Nov 1;23:165-73.
9. Aysan AF, Demir E, Gozgor G, Lau CKM. Effects of the geopolitical risks on Bitcoin returns and volatility. Research in International Business and Finance. 2018 Sep 27;47:511–8.
10. Adams S, Adedoyin F, Olaniran E, Bekun FV. Energy consumption, economic policy uncertainty and carbon emissions; causality evidence from resource rich economies. Economic Analysis and Policy. 2020 Dec 1;68:179-90.
11. Balcilar M, Bonato M, Demirer R, Gupta R. Geopolitical risks and stock market dynamics of the BRICS. Economic Systems. 2018 Jun 1;42(2):295-306.
12. Lee CC, Lee CC, Li YY. Oil price shocks, geopolitical risks, and green bond market dynamics. The North American Journal of Economics and Finance. 2021 Jan 1;55:101309.
13. Liu J, Ma F, Tang Y, Zhang Y. Geopolitical risk and oil volatility: A new insight. Energy Economics. 2019 Oct 1;84:104548.

14. Umar Z, Polat O, Choi SY, Teplova T. The impact of the Russia-Ukraine conflict on the connectedness of financial markets. Finance Research Letters. 2022 May 16;48:102976.
15. Bouoiyour J, Selmi R, Hammoudeh S, Wohar ME. What are the categories of geopolitical risks that could drive oil prices higher? Acts or threats?. Energy Economics. 2019 Oct 1;84:104523.
16. Mei D, Ma F, Liao Y, Wang L. Geopolitical risk uncertainty and oil future volatility: Evidence from MIDAS models. Energy Economics. 2020 Feb 1;86:104624.
17. Das D, Kannadhasan M, Bhattacharyya M. Do the emerging stock markets react to international economic policy uncertainty, geopolitical risk and financial stress alike?. The North American Journal of Economics and Finance. 2019 Apr 1;48:1-9.
18. Cheng CH, Chiu CW. How important are global geopolitical risks to emerging countries?. International economics. 2018 Dec 1;156:305-25.
19. Saint Akadiri S, Eluwole KK, Akadiri AC, Avci T. Does causality between geopolitical risk, tourism and economic growth matter? Evidence from Turkey. Journal of Hospitality and Tourism Management. 2020 Jun 1;43:273-7.
20. Qin Y, Hong K, Chen J, Zhang Z. Asymmetric effects of geopolitical risks on energy returns and volatility under different market conditions. Energy Economics. 2020 Aug 1;90:104851.
21. Baur DG, Smales LA. Hedging geopolitical risk with precious metals. Journal of Banking and Finance. 2020 Aug 1;117:105823.
22. Cunado J, Gupta R, Lau CK, Sheng X. Time-varying impact of geopolitical risks on oil prices. Defence and Peace Economics. 2020 Aug 17;31(6):692-706.
23. Boldanov R, Degiannakis S, Filis G. Time-varying correlation between oil and stock market volatilities: Evidence from oil-importing and oil-exporting countries. International Review of Financial Analysis. 2016 Dec 1;48:209-20.
24. Liang C, Umar M, Ma F, Huynh TL. Climate policy uncertainty and world renewable energy index volatility forecasting. Technological Forecasting and Social Change. 2022 Sep 1;182:121810.
25. Su CW, Qin M, Tao R, Shao XF, Albu LL, Umar M. Can Bitcoin hedge the risks of geopolitical events?. Technological Forecasting and Social Change. 2020 Oct 1;159:120182.
26. Kannadhasan M, Das D. Do Asian emerging stock markets react to international economic policy uncertainty and geopolitical risk alike? A quantile regression approach. Finance Research Letters. 2020 May 1;34:101276.
27. Dogan E, Majeed MT, Luni T. Analyzing the impacts of geopolitical risk and economic uncertainty on natural resources rents. Resources Policy. 2021 Aug 1;72:102056.
28. Tiwari AK, Das D, Dutta A. Geopolitical risk, economic policy uncertainty and tourist arrivals: Evidence from a developing country. Tourism Management. 2019 Dec 1;75:323-7.
29. Wang Y, Bouri E, Fareed Z, Dai Y. Geopolitical risk and the systemic risk in the commodity markets under the war in Ukraine. Finance Research Letters. 2022 Oct 1;49:103066.
30. Lee CC, Wang CW. Firms' cash reserve, financial constraint, and geopolitical risk. Pacific-Basin Finance Journal. 2021 Feb 1;65:101480.
31. Asai M, Gupta R, McAleer M. Forecasting volatility and co-volatility of crude oil and gold futures: Effects of leverage, jumps, spillovers, and geopolitical risks. International Journal of Forecasting. 2020 Jul 1;36(3):933-48.
32. Plakandaras V, Gupta R, Wong WK. Point and density forecasts of oil returns: The role of geopolitical risks. Resources Policy. 2019 Aug 1;62:580-7.
33. Gong X, Xu J. Geopolitical risk and dynamic connectedness between commodity markets. Energy Economics. 2022 Jun 1;110:106028.
34. Sweidan OD. The geopolitical risk effect on the US renewable energy deployment. Journal of Cleaner Production. 2021 Apr 15;293:126189.
35. Donthu N, Kumar S, Mukherjee D, Pandey N, Lim WM. How to conduct a bibliometric analysis: An overview and guidelines. Journal of business research. 2021 Sep 1;133:285-96.
36. Lee S, Lee J, Jung S. The Impact of Geopolitical Risk on Stock Returns: Evidence from Inter-Korea Geopolitics. 2023 Jan 19. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4329355