

# A Bibliometrics Exploration of Commodity Market Volatility: Trends and Insights



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*The current exploration of volatility delves into the bibliometric analysis of commodity market volatility, aiming to identify prevailing trends and insights within the existing literature. By systematically examining published works from various academic databases, this study utilizes quantitative metrics such as citation analysis, co-authorship networks, and keyword frequency to map the intellectual landscape of commodity market research. The findings reveal significant patterns in authorship, publication venues, and thematic evolution over time, highlighting the growing importance of investment in the secondary market, geopolitical factors, and technological advancements in shaping market dynamics. Furthermore, analysis uncovers the emerging areas of interest, such as the impact of short-term events and sustainability on commodity prices. This exploration contributes to a comprehensive understanding of commodity market volatility and offers a foundational framework for future research directions in this critical area of finance.*

**Keywords:** Volatility, Commodity market, Finance, Bibliometric Exploration, Trends.

## 1. Introduction

The global market growth rate can vary depending on the sector-whether you're looking at GDP growth, commodity markets, or specific industries. However, as of 2024, the overall global economic growth is expected to slow compared to the rapid recovery in 2021-2022. According to the International Monetary Fund (IMF), global GDP growth in 2024 is projected to be around 3.0%, down from approximately 3.5% in 2023. Rising interest rates, inflationary pressures, and ongoing geopolitical uncertainties are influencing this slowdown.

The global commodity markets have seen tremendous volatility in this quickly evolving climate due to a complex interaction of environmental, political, and economic factors. It is essential for scholars, investors, and politicians to comprehend these swings. Bibliometrics, a quantitative analysis of academic literature, offers a unique lens through which to examine trends and insights related to commodity market volatility. By mapping the intellectual landscape surrounding this topic, we can identify key themes, influential authors, and emerging research areas that shape our understanding of market dynamics.

This paper examines the bibliometric characteristics of literature related to commodity market volatility, illuminating the progression of studies in this area. By analysing publication trends, citation networks, and keyword co-occurrences, we can uncover the critical factors that drive market fluctuations and highlight gaps in the existing literature. The results will enhance academic discussions and offer practical insights for stakeholders dealing with the challenges of commodity markets.

As the global economy becomes increasingly interconnected, the need for robust analytical frameworks to interpret commodity volatility is more pressing than ever. In order to promote a better knowledge of how commodities markets function and react to different external influences, this investigation aims to close the gap between theoretical insights and practical applications. The goal of this bibliometric analysis is to help us make informed decisions and contribute to the ongoing discussion about commodity market resilience and stability.

## 2. Literature Review

According to the author, geopolitical tensions' impact on markets and volatility spillovers using Volatility Connectedness Networks, Panel Censored Regressions, and asset pricing models, finding that portfolios with PCI perform better (Biswas et al., 2024). Additionally, the relationship between financial stability and agricultural commodity markets in China from 2012 to 2020, highlights its significant influence on commodity prices and carbon emissions, emphasizing the need for sound financial management for sustainable recovery (Wang et al., 2024). Exploring the impact of uncertainty measures on agricultural futures market volatility, using historical data and methodologies like LASSO and HAR, highlighting the need for effective hedging strategies (Dutta et al., 2024). India's spot and futures markets for agricultural, base metals, bullion, and energy commodities using Granger Causality and Chow Tests. They suggest implementing arbitrage and hedging strategies for risk management (D et al., 2024). The paper conducted a study of the dynamic Granger causality relationship among futures and spot prices in natural gas and petroleum exchanges using Time-Point Grey Correlations, Time-sensitive Causality Tests, and Dynamic Equi-correlations, revealing a high correlation (Mensi et al., 2024). The study examines the impact of commodity volatility on sukuk returns, using data from 15 indices and 16 products. Results show fluctuating system-wide connectedness, with negative spillovers suggesting sukuk's risk-mitigating properties during bear markets (Billah et al., 2024). In addition, foreign traders' increased competition in China's commodity futures markets significantly improves market quality, while adverse selection

risk does not significantly impact market quality (Xiong & Li., 2024). On the top of that, the effects of changes in commodity prices and conversion rate on stock market in Latin America, employing structural break tests, the Copula-GARCH model, and conditional value-at-risk. (Manner et al., 2024). A novel trading system using Deep Double Q-Learning and multi-agent architecture, effectively addresses volatility and dimensionality challenges in commodity futures markets, outperforming traditional benchmarks (Massahi & Mahootchi 2024). Furthermore, the Australian National Electricity Market's evolving energy mix has led to concerns over effective hedging due to declining liquidity and the exit of dispatchable plants (Flottmann et al., 2024). Stronger co-movements during significant upheavals such as the worldwide financial meltdown and the COVID-19 outbreak are revealed in conjunction with the relationship between Economic Policy Uncertainty (EPU) and commodity markets (Arouxe et al., 2024). The research examines how international agricultural commodity prices are transmitted to local markets in 23 developing and fragile economies, revealing that market efficiency facilitates quicker adjustments and stabilizes local markets (Emediegwu et al., 2024). Additionally, the study examines the spillover effects of financial variables in BRICS countries, focusing on market indices, currency conversions, and 10-year government bond yields. The author uses correlation analysis, Granger causality tests, and Vector Autoregression models to identify significant relationships. The results emphasize the significance of grasping these financial relationships for investors, policymakers, and stakeholders. (Meher & Mishra 2024). The correlation between EPU and indices in Group of 7 & EM7 nations from 1997-2022 showed that it had a more significant effect on stock markets. (Hong et al., (2024). The author discusses how fluctuations in commodity prices affect overall economic variations in countries that rely on commodity exports, focusing on Russia from 2001-2018. Commodity prices explain 33.6% of GDP fluctuations with endogenous default (Andreev et al., 2024). Investigating the impact of global economic policy uncertainty, variations in stock market volatility, geopolitical risks, gold values, and crude oil prices on sustainable stock returns across seven emerging markets. (Nittayakamolphon et al., (2024). A use of natural language processing to construct a political news index, measuring its daily connectedness to market volatility. It reveals that political news significantly impacts market volatility, offering valuable insights for investors (Abdollahi et al., 2024). The study examines the returns and fluctuations of assets in decentralized finance, commodities, and Islamic stock markets from 2019-2023. It highlights spillover effects during crises and emphasizes the interconnectedness of Islamic markets. (Younis et al., 2024) Where the geopolitical risk impact on stock market returns in Middle East and Africa. Findings suggest responses vary depending on context, emphasizing need to consider risks' scale and orientation for investment and policy decisions. (Eissa and Refai 2024). The correlation between African forex, geopolitical risk, and oil prices across 16 major African currencies from 2000 to 2023, found asymmetrical influence, tail-based causality, and negative correlations during crises (Huang et al., 2024). China's stock market's resilience against geopolitical risk using data from 2007-2024, revealing short-term impacts and long-term stability in investors' investment decisions (Maimaitijiang et al., 2024). Also, the impact of geopolitical risks (GPRs) on stock market returns in Turkey, focusing on the energy-stock market relationship. It uses Vector Autoregression models to analyze the net transmission effects of GPRs and electricity supply (Boyukaslan et al., 2024). Where the impacts of geopolitical risks on Saudi Arabia's oil and copper production, using monthly data from 1994 to 2022. Findings suggest risks boost oil production in bearish markets, hinder it in bullish markets, and negatively affect copper production (Islam et al., 2024). In addition to studies on the influence of geopolitical risk and EPU on the increase of crude oil prices between 1997 and 2022 discovered notable variations in growth rates, underscoring the importance of implementing robust risk management strategies within the energy industry. (Jia et al., (2024). She examines the disparity between the benefits of the derivative market and investor awareness and utilization. It finds that risk tolerance significantly influences engagement with derivatives, with those with higher risk capacity investing more frequently or differently (Vilas, 2023). The author uncovers changing patterns and complex connections, as agricultural products transitioned from negative to positive impacts both pre and post the pandemic. (Yin et al., 2023). In addition, the study examines the connections between the movements of prices and the transfer of volatility from spot prices to futures prices of Agricultural products that are bought and sold in the market NCDEX. The results indicate that NCDEX markets have the highest influence on E-NAM spot prices. (Garg et al., 2023). Besides market linkage and the tail risk between USA and Turkish agricultural commodities, considering COVID-19, global warming, and Ukraine war impacts. Findings show USA market significantly influences the Turkish market, suggesting the development of an agricultural commodity futures market (Atik et al., 2023). The impact of global uncertainties on agricultural commodities, finding that while they are not effective hedges against USEPU-driven risks, they can effectively manage downside risks associated with geopolitical uncertainties (Bossman et al., (2023). Additionally, the effects of financialization on markets for commodity futures, reveals that increased institutional investor involvement since 2004 has significantly altered market risk-sharing and price discovery, raising concerns about market stability (Xiao et al., 2023). The relationship between the Indian stock market and six key commodity markets underwent significant shifts in market behavior during the COVID-19 pandemic, influenced by increased volatility and spillover effects (Lu et al., 2023). Moreover, the market efficiency in commodity futures markets from 1999 to 2019, reveals that increased commodity index traders' financialization has positively impacted market efficiency (Bohl et al., 2023). Where the effects of financialization on markets for commodity futures over the past two decades, reveals that it significantly affects market behavior and suppresses returns in managed futures (Carter & Giha., 2023). Similarly, commodity price risk exposure among firms in 23 OECD countries is significant, with energy sector firms showing higher exposure levels of 38% (Han et al., 2023). Correspondingly using the Time-Varying Parameters Vector Autoregression and Extreme Risk spillover analysis to reveal that WTI and Brent crude oil markets significantly transmit tail uncertainty shocks, impacting other energy commodities (Hu et al., 2023). Likewise, China's commodity futures market's efficiency using 22,455 observations and the Wenhua Commodity Index. It found it not weak-form efficient, suggesting advanced machine learning techniques could improve trading performance (He et al., 2023). In a similar manner the COVID-19 pandemic's impact on spot and futures commodity markets in India, using

MCX data and trend analysis to understand futures market response and risk management effectiveness (Kalaiarasi et al., (2023). Just as the author argues the impact of GEPU regarding precious metal, specifically gold, palladium, platinum, and silver, from 1997-2022. Results show that increased uncertainty leads to higher price volatility, with variations during pre- and post-COVID periods (Raza et al., 2023). Similarly, the effect of oil price fluctuations on financial markets, analyzing the 2008 financial crisis, the COVID-19 pandemic, and the 2015 oil price decline. Its findings suggest that supply-side oil price disturbances significantly affect market volatility, particularly in emerging markets. Demand-side shocks have less pronounced effects. The COVID-19 pandemic had unprecedented volatility spillover effects (Ortega et al., 2023). Correspondingly examining how geopolitical risk indexes affect G8 nations and commodity market prices, emphasizing their role in shaping economic dynamics and ensuring market stability. It highlights the need for financial policymakers to understand and respond to these risks (Foglia et al., 2023). Aligned with the impact of geopolitical, economic, and climate policy uncertainty on commodity markets, revealing that Chinese markets exhibit higher initial volatility and complexity compared to U.S. markets (Li et al., 2023). Utilizing the SDESE method to assess the risks associated with stock indices and commodities in the USA and emerging markets, aiding investors in decision-making during volatile periods (Jorcano and Marco 2022). Moreover, the connection between commodity futures and asset markets, revealed significant volatility transmission and varying investment patterns during pre- and post-COVID-19 periods, using Wavelet Coherence Plots and DCC-GARCH Model (Soni and Nandan, (2022). Equally, the transfer of volatility between currency exchange rates and commodity prices in Mexico, Indonesia, and Turkey, with an emphasis on the Covid-19 pandemic. It reveals precious metals protect against exchange rate volatility, while crude oil transfer risk (Yıldırım et al., 2022). The research employs Granger causality tests to investigate the connection between spot and futures prices of key agricultural commodities, discovering a bidirectional causality, with past spot prices proving to be more impactful. (Cermak and Ligocka 2022). As noted by the author, the correlation between futures contract and spot rate in Italian agricultural market, using data from 2008-2019 futures contract prices have a noteworthy impact on spot prices. (Penone & Trestini, 2022). Additionally, the influence of financial speculation on agricultural commodity prices has been investigated, revealing that speculation primarily affects corn and has minimal impact on other commodities. (Staugaitis & Vazonis 2022). Similarly, futures and spot markets' price discovery functions in Indian commodity exchanges using Bloomberg data from 2006-2018. Findings suggest policymakers should enhance futures market efficiency and encourage market participation through data-accessible trading strategies (Pani & et al, (2022). In addition to the correlation dynamics among global agricultural futures markets, categorizing them into Asia Pacific, North America, Latin America, and Europe. It uses random matrix theory to analyze market correlations and clusters of similar behaviors (Dai et al., 2022). In conjunction with stock market volatility in BRIC economies using ARIMA and GARCH models. It uses data from 1997-2020, aiming to improve investment strategies and risk management in developing economies by accurately representing volatility patterns (Pattnaik et al., 2022). The influence of fluctuations in commodity prices on the US economy indicates that disruptions in agricultural, energy, and metals sectors have a more pronounced adverse effect. (Triantafyllou et al., 2022).

### 2.1 Objective of the Study

1. To evaluate the quantity of publications over time in order to recognize patterns in interest and research efforts within the domain of commodity market volatility.
2. To identify leading scholars and researchers contributing significantly to the field. This includes examining citation counts and their impact on the academic community.
3. To identify the main research topics and keywords that frequently appear in the literature

## 3. Methodology

Bibliometric assessment, citation assessment, and co-citation assessment serve as effective methods for examining the patterns and traits of earlier published research in any academic domain. These tools can also assist in recognizing the prevailing theories or perspectives, if applicable, within a specific discipline. (Mandal, 2017; Christie, 2008). Bibliometric analysis utilizes a quantitative research method focused on published materials (such as books, journals, and websites), reflecting an objective perspective. The main goals of citation and co-citation assessment are to uncover emergent topics within specific research fields and to assess the impact of different publications and academic perspectives (Nyagadza, 2020).

By employing bibliometric research methods like citation and co-citation assessment, it becomes easier to examine the trends and features of the literature, facilitating the review, organization, and dissemination of effort exerted in a special field. (Diodato, 1994; Ferreira et al., 2014). Bibliometric analysis can also assist in shaping collections, delineating the academic strengths of institutions, as well as their citation and co-citation patterns, and recognizing potential schools of thought within a field. (Lewis and Alpi, 2017).

The bibliometric information from the Web of Science database is analysed using the specific keyword research criteria focusing on the Boolean phrases "volatility" and "commodity market". To give a more complete picture of the evolution of this literature, the years 2004–2024 were selected. By using these filters, 2,669 papers were located. After that, the dataset was exported and analysed. When identifying the "document type," all document kinds were taken into account, including editorials, brief surveys, conference papers, conference reviews, books, book chapters, articles, and note reviews. The VOS viewer and the bibliometrics package in the R programming language were used to analyse the data after they were retrieved from the Web of Science database.

### 4. Results and Analysis

The result of a beginning performance analysis is appeared within the figures underneath in Figure 1 it can be seen that there's an expanding trend of add up to number of publications of the subject instability in product after 2010s. Figure 2 appears the three-field plot of country, keyword and affiliation. Figure 3 the foremost visit keyword used in publications.

#### 4.1 Performance Analysis

The findings shown in Figure 1 offer insight into the development of scientific output in the examined area across multiple decades. In the initial years, scientific production seems to have been extremely limited or possibly absent, apart from a few minor variations. Beginning in the 1992s and 2024s, there was a noticeable rise in the quantity of articles released each year, exhibiting some yearly variations. This expansion strengthens starting in the 2010s and continuing into the 2024s, a notable and steady growth in scientific output. The 2010s and thereafter appear to be times of swift and steady development, indicating a rise in interest and research efforts in the domain. This rising trend indicates a development in the discipline and a growth in research participation, with increased attention from the scientific community and policymakers. Specifically, the period from 2020 to 2024 is notable for a striking rise in scientific output, with a steadily increasing quantity of articles each year. This could be ascribed to increased interest from scientists, technological progress, improved financing, or various other elements that have promoted research efforts in the area. In general, this information indicates a notable development of the discipline throughout the examined timeframe and a steady and heightened enthusiasm for studies within this field.

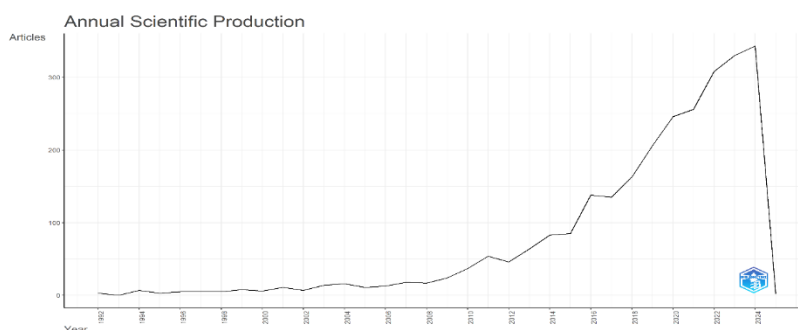


Figure 1 Annual Scientific Production

#### 4.2 The interconnection among Country, Keyword, and Affiliation

For example, Figure 2 illustrates that China plays a considerable role in research within the domain of volatility in the commodity market, involving various external partnerships. It links the majority firmly with the term's "volatility", "commodities", and "COVID-19" "volatility," suggesting a strong connection between China and this area of study, as similarly to other areas of study like "connectedness", "crude oil", "commodity future", and "forecasting." China has a wide range of diverse partnerships in the area of commodity market analysis, collaborating with organizations such as Pusan National University, Univ Econ Ho Chi Minh City, and Cent South Univ. Conversely, Tunisia demonstrates a lesser yet still important input to studies in commodity markets.

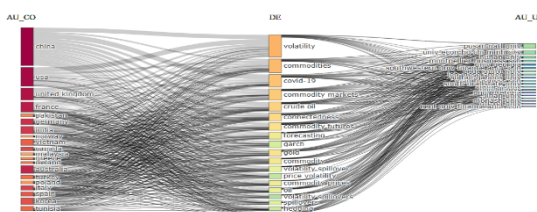


Figure 2 Three Field Plot between Country, Keyword, and Affiliation

#### 4.3 Co-occurrence and All Keywords Network Map

According to Figure 3: What are the key sub-topics connected to volatility in the commodity market? The secondary bibliometric analysis is performed to uncover significant themes that are common in the field of commodity market volatility research for the capital market. Employing a VOS viewer for analysis of keyword co-occurrence, this technique spotlights and illustrates the most frequently occurring keywords or terms in the literature (Figure 3). This method enables the identification of commonly mentioned keywords or themes, providing an understanding of the primary topics of interest and their connections within the discipline (Kholidah et al., 2022). This keyword co-occurrence analysis involves analyzing all keywords from each article with a VOS viewer, grouping them into clusters according to their frequency of occurrence, the relationships between

terms, and the classification of word clusters. The bibliometric map created from this analysis is shown in Figure 3. This visualization highlights the most frequent keywords and themes found within the commodity market, clarifying the relationships among various subjects and motifs. The clusters presented are closely connected and relevant to volatility and capital market tactics. Significantly, the biggest cluster revolves around ‘volatility’ as the primary term, incorporating a variety of related keywords such as volatility spill over, crude oil, commodity pricing, stock return, and gold.

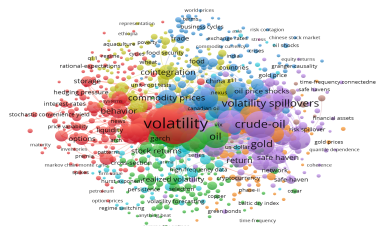


Figure 3 Co-occurrences and All Keywords Network Map

4.4 Citation Sources Network Map

From Table 1, the most popular source is energy economics with the highest document of 265 with citations of 13827 and the link strength is 3499. Followed by Resources Policy and other top 5 sources.

Table 1 Top 5 Citation Sources

Source	Document	Citations	Total link strength
Energy Economics	265	13,827	3,499
Resources Policy	233	7,270	2,641
International review of financial analysis	79	3,408	1,029
Journal of Commodity Markets	108	1,482	984
Journal of Future Market	126	1,995	832

From the Figure 4, In this citation network map, the minimum number of citations is 5 out of which 445 sources, 85 meets the threshold. Where Energy Economics is showing the highest citation 13827 with a link strength of 3499.

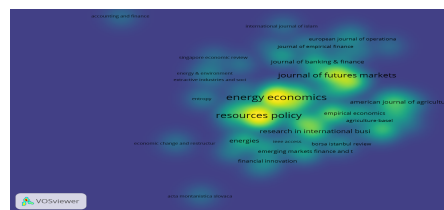


Figure 4 Citation-Sources Network Map

4.5 Visualization of Most Frequent Keyword

The Word Cloud derived from the authors' keywords in Figure 5 offers a comprehensive understanding of the subjects of focus in the area of volatility of commodity market analysis. Terms like "volatility" "crude oil," "commodity prices," "return," "risk," "impact," "market" Terms like "time series", "financialization," and "dependence" are some of the most commonly encountered. These terms indicate a focus on examining commodity markets, particularly price dynamics, fluctuations, spillover effects, and other factors important for comprehending and overseeing these markets. Moreover, ideas like “investment performance,” “cointegration,” "impulse response analysis" and "hedge" are emphasized, suggesting a thorough and interdisciplinary method in the study. The keywords from these authors suggest an emphasis on financial assets and the organization and dynamics of commodity markets overall. Moreover, the crucial phrase “metal commodities” highlights the focus on the metal sector of commodity markets, with issues surrounding production, trade, and costs. Additionally, researchers express interest in examining price variations and related dangers in commodity markets, along with factors concerning the financialization of markets for commodities and speculative actions. The emergence of the term "COVID-19" demonstrates an understanding of the pandemic’s influence on commodity markets and its possible consequences on scientific studies related to commodities.



Figure 5 Visualization of the most Frequent Keyword





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