Review



# Market Connectedness and Volatility Spillovers: A Meta-Literature Review

Kamesh Anand K and Aswini Kumar Mishra *

Posted Date: 4 May 2023

doi: 10.20944/preprints202305.0260.v1

Keywords: Market Connectedness; Volatility Spillovers; Bibliometric analysis; Meta-analysis; Content analysis; Asymmetric information; Portfolio diversification

*Review*

# Market Connectedness and Volatility Spillovers: A Meta-Literature review

**Kamesh Anand K [1] and Aswini Kumar Mishra [2,*]**

[1] Department of Economics and Finance, BITS Pilani KK Birla Goa Campus; kameshanand1711@gmail.com
[2] Birla Institute of Technology and Science, Pilani, Pilani, India
* Correspondence: aswini@goa.bits-pilani.ac.in

**Abstract:** Evaluation of market connectedness and asymmetric volatility spillover has recently seen a surge in financial risk analytics and portfolio diversification. We carried out a meta-literature review on connectedness and spillovers, providing solid insight into the research field and robust guidelines for future investigation. The review consists of a quantitative bibliometric analysis of 594 papers and a qualitative content analysis of 77 papers covering 1991 to 2021. The results of the meta-citation analysis shows that ***Diebold's Spillover index*** (2007) is the predominant method in most works as far as market connectedness and spillover is concerned. With an extensive review, we answered the following objectives (1) Analyze the most influential authors, journals, and publications, (2) Understand the research streams and most studied streams, (3) Understand the theme structure and thematic evolution, and keyword trends, (4) Examine the pattern of collaboration, and most productive affiliations, (5) Explore future research directions and untapped areas. The content analysis revealed the following important research streams in the current literature (1) Asymmetries in the market connectedness, (2) Influence of Macro Factors in the market connectedness and spillover, (3) the Role of Oil in market spillovers and hedging portfolios, (4) Dynamic cross-market connectedness and spillovers. The ongoing financial turmoil and market advancements make market connectedness a vital research topic; thus, our work would significantly contribute to macroeconomic policymakers, researchers and hedging investors.

**JEL Classification:** G01; G11; G14; G15; G17; G18

**Keywords:** market connectedness; volatility spillovers; bibliometric analysis; meta-analysis; content analysis; asymmetric information; portfolio diversification

## 1. Introduction

The past decade has been a significant perturbation for the markets, with consequent international crises, and later the literature on the financial market integration, connectedness, co-movements and spillover extended in terms of the research in policy implications and portfolio diversification. While the financial turmoil threatens the market's vulnerability, it also threatens the stability of the country's economic activities. One of the main non-trivial problems the decision-makers and investors faces are managing the optimal portfolio and asset allocations and the adoptive policies to stabilize the economy and markets(BenSaïda, 2019).

Engle et al., (1990) termed the financial shocks and transmissions or the causality in the variance between markets as volatility spillovers. Forbes & Rigobon (2002) called it contagion, usually detected during events or crises as it increases the cross-market linkage or co-movements. Later, studies Baruník et al., (2016a); Baruník & Křehlík (2018a); BenSaïda (2019)explored the information dissemination and asymmetries surrounding the market connectedness and spillovers, which pose another non-trivial problem, as there is lack of knowledge on the market reaction towards these asymmetries.

Brown (2012) propounds that the increase in volatility converges from innovation and development, investor protection, financial openness and Country risk. Studies have addressed determinants of why and how the volatility transmissions occur. Most triggering factors are macro and economic policy based, and some are potentially due to the firm origin or country origin(E. C. Chang et al., 1999; Hu et al., 2020; C. Liu & Yang, 2016; L. Liu, 2013a; Narayan et al., 2014). Thus,

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market connectedness and volatility spillovers grabbed the researcher's interest in market information dissemination and how to rip fruit out of this behaviour from markets through hedging and diversification.

Although there have been several studies concerning the market integration and linkage literature, our study tries to delve into a specific field: connectedness and volatility spillover across the market rather than a broad review. We try to address these research areas from the evolutionary point of view. For this, we conducted a review to address the following questions (1) Analyze the most influential authors, journals, and publications (2) Understand the research streams and most studied streams (3) Understand the theme structure and thematic evolution, and keyword trends (4) Examine the pattern of collaboration, and most productive affiliations (5) Explore future research directions and untapped areas. To examine the above questions to the fullest, we have adopted the Meta-literature review comprising the bibliometric analysis and content analysis from 1991 to 2021 with the keywords given in Figure 1.

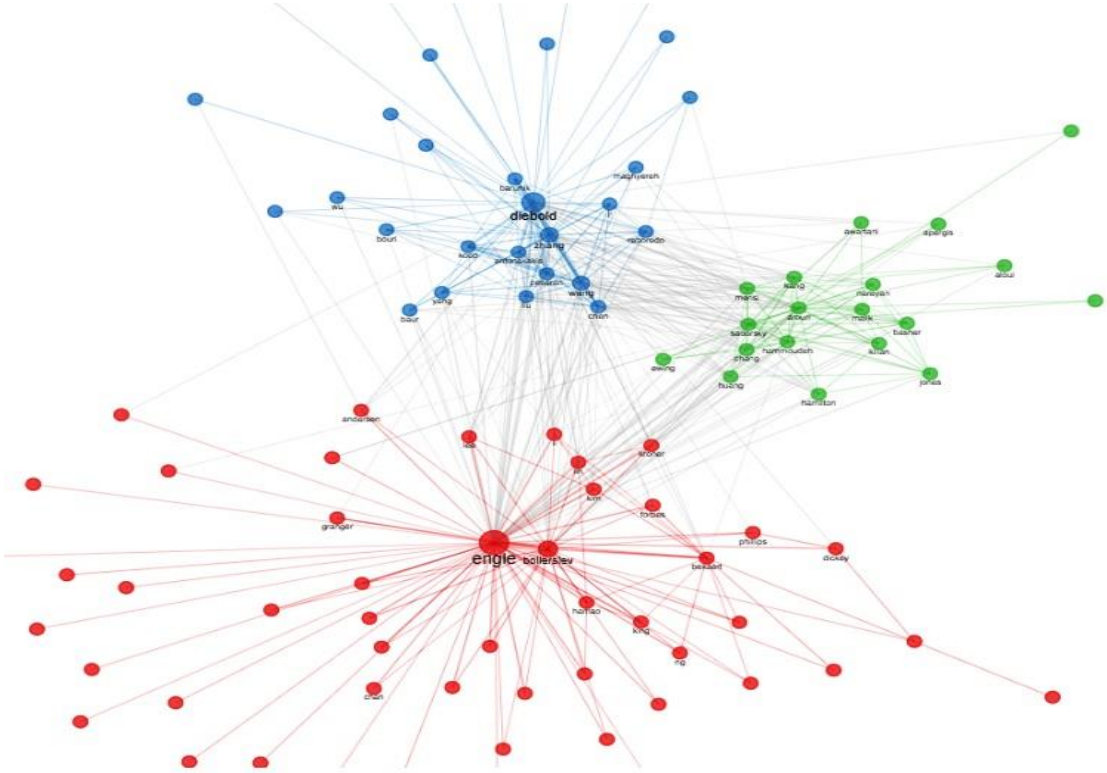


**Figure 1.** Results of Co-citation analysis.

We identified four streams in the current literature on connectedness and spillover, which are (1) Asymmetries in the market connectedness, (2) the influence of macro factors in the market connectedness and spillover, (3) the role of oil in the market spillovers and hedging portfolios (4) Dynamic cross market connectedness and spillovers. We also identified key research questions and future research directions, which will be great inquisitive to the researchers, policymakers, and Potential investors.

The paper is presented as follows, in section 2 methodology and the analysis conducted are discussed. Section 3 and 4 presents significant aspects of Connectedness and Spillover and Visualization and results of the co-citation analysis and word analysis respectivley. In section 5, we provided the extensive content analysis on the core papers of the literature and in section 6 we discussed about the research streams and future directions and with section 7 we concluded the paper.

## 2. Methodology

A meta-analysis is an excellent tool for extracting multiple subject matter from numerous pieces of work(Fetscherin & Heinrich, 2015). The systematic literature review has grown evidently; and become an ideal method to deliver evidence on the meta-level and disclose which area needs more research contributions (Snyder, 2019). Our study uses bibliometric analysis to assess the statistical properties and content analysis to assess the validity and reliability of the research.

Bibliometric analysis evolved considerably and keened to many software updates for the mapping and visualization of the research. Bibliometrix, an R package, lets us evaluate various statistical parameters and mapping. Content analysis is a text-mining method that systematically reviews and assesses the validity of the research knowledge—an outline of the methodology is provided in a Figure A1 in the appendix.

### *2.1. Data Collection & Sample selection process*

Our sample selection follows the following steps; first, we extracted the data using keywords and refined the final ones using the most used author's keywords in the data from the Scopus database. Vieira & Gomes (2009) mentioned that Scopus is quite comprehensive as it includes expansive publications, houses and fields of study.

We use Bibliometrix to examine the metadata (bibliographic information) for the most used keywords to refine our data to the core papers. The final keywords used to refine the extraction of articles from the database are stated in Figure A1 in the appendix, which appears in the title, abstracts, and keywords. Secondly, we filter the journals based on their score on the SJR. For quality papers, we selected only the journals that scored one and above in the SJR.

### *2.2. Data Analysis & Visualization*

#### 2.2.1. Meta-literature review

Our study focuses on two methods: bibliometric analysis for quantitative and empirical analysis and content analysis for qualitative analysis. We follow Alon et al., (2018); Apriliyanti & Alon (2017); Bajaj et al., (2022); Fetscherin & Heinrich (2015); Patel et al., (2022); Zamore et al., (2018) by conducting the following analyses: (1) co-citation analysis, (2) co-authorships and (3) Co-word and thematic evolution analyses.

We primarily use the RStudio package Bibliometrix provided by (Aria & Cuccurullo, 2017). Bibliometrix is an R-tool for comprehensive science mapping analysis that uses the metadata (bibliographic information) as input and provides us with the networks, clusters and themes among the given input. We use the software to perform the (1) Co-citation analysis and (2) Co-authorship analysis, and (3) Co-word analysis and Thematic Evolution. The tool captures the specified research field's intellectual, conceptual and social network. Our study design is given in the following subsections:

#### 2.2.2. Co-citation analysis:

Co-citation analysis studies the cited documents, examines the connections, and infers the shift in the epitome and schools of thought. Depending on the scope of analysis, the co-citation network tries to visualize the connection among sources, articles and authors. Thus, it helps us to capture the impact of these different actors in the field and their influence on the research area (Aria et al., 2020; Aria & Cuccurullo, 2017; Fetscherin & Heinrich, 2015). Even though many citation analyses exist to do better research on the literature, we perform co-citation analysis in our study because of its prospective and dynamic nature and performance over multiple time slices.

#### 2.2.3. Co-authorship analysis:

Co-authorship and collaboration analysis are performed to get a social network framework among different affiliations and countries. We can infer the global and local collaboration and

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research direction in the future periods. Thus, assessing the social structure and the leading scholars in the domain and capturing the whole knowledge creation in the field gives us a complete structure of the research pyramids.

2.2.4. Co-word analysis:

It gives us the conceptual structure framework by mapping and clustering the keyword co-occurrences. The package gives us the conceptual structure using the multiple correspondence analysis, which identifies the cluster of common concepts(Cobo et al., 2011; Sanchez-Nunez et al., 2020).

2.2.5. Word trend and thematic analysis:

We made a keyword analysis to identify the key streams in the literature. We used the word trend and thematic analysis in the package. We showed the critical changes in the usage of the keywords over time and evaluated the pertinent change in the streams through thematic analysis.

2.2.6. Content analysis:

We conducted content analysis to add a qualitative component to the empirics from the works of Potter & Levine-Donnerstein (1999); Zamore et al., (2018). We verify and categorize the research stream and explore the origins and evolution of the concepts, research topics, and significant findings and gaps in more detail.

## 3. Identification of significant aspects of Connectedness and Spillover literature

The general information about our sample is provided in the Table 1.

**Table 1.** Main information about the data.

| Description | Results |
|---|---|
| Timespan | 1991:2021 |
| Sources (Journals, Books, etc) | 66 |
| Documents | 594 |
| Annual Growth Rate % | 16.14 |
| Document Average Age | 7.41 |
| Average citations per doc | 42.79 |
| References | 23501 |
| DOCUMENT CONTENTS | |
| Keywords Plus (ID) | 1073 |
| Author's Keywords (DE) | 1428 |
| AUTHORS | |
| Authors | 1104 |
| Authors of single-authored docs | 85 |
| AUTHORS COLLABORATION | |
| Single-authored docs | 87 |
| Co-Authors per Doc | 2.63 |
| International co-authorships % | 37.21 |
| DOCUMENT TYPES | |
| article | 585 |
| conference paper | 2 |
| erratum | 2 |
| review | 5 |

We have also provided a detailed summary of key papers in each stream in Appendix Table A1.

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*3.1. Most studied countries*

We provided the list of most studied countries in the Table 2 based on total number of articles, and MCP ratio.

**Table 2.** Most studied countries.

| Country | TC | Average Article Citations |
|---|---|---|
| USA | 4483 | 75.98 |
| CHINA | 2579 | 31.07 |
| UNITED KINGDOM | 1604 | 34.13 |
| AUSTRALIA | 1427 | 43.24 |
| FRANCE | 1151 | 46.04 |
| CZECH REPUBLIC | 828 | 118.29 |
| GREECE | 824 | 45.78 |
| KOREA | 769 | 36.62 |
| SPAIN | 725 | 31.52 |
| JAPAN | 591 | 59.1 |

It is clear that the top three countries studied in our literature are the USs, China and the UK, where the other top 10 countries are mostly European countries. We found that still extensive research has to be conducted on the frontier countries and specific Asian countries based on the content analysis. The examination of the most and least studied countries helps in directing the future research. The cross-market portfolio diversification can be explored effectively with the inclusive of the frontier countries. However, few studies produced effective on the frontier markets movements and it seems the ground of the research will shift to these emerging and frontier markets from the developed markets.

*3.2. Most influential journal*

We identified top journal based on three parameters such as number of articles, impact scores and Bradford's law. The results can be seen in Table 3.

**Table 3.** Influential journals.

**Panel 1:** As per the Bradford's law

| Sources | Rank | Freq | cumFreq | Zone |
|---|---|---|---|---|
| ENERGY ECONOMICS | 1 | 88 | 88 | Zone 1 |
| INTERNATIONAL REVIEW OF FINANCIAL ANALYSIS | 2 | 63 | 151 | Zone 1 |
| RESEARCH IN INTERNATIONAL BUSINESS AND FINANCE | 3 | 58 | 209 | Zone 1 |
| RESOURCES POLICY | 4 | 56 | 265 | Zone 2 |
| ECONOMIC MODELLING | 5 | 54 | 319 | Zone 2 |
| JOURNAL OF INTERNATIONAL FINANCIAL MARKETS, INSTITUTIONS AND MONEY | 6 | 51 | 370 | Zone 2 |
| FINANCE RESEARCH LETTERS | 7 | 31 | 401 | Zone 2 |
| JOURNAL OF BANKING AND FINANCE | 8 | 30 | 431 | Zone 3 |

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| | | | | |
|---|---|---|---|---|
| JOURNAL OF INTERNATIONAL MONEY AND FINANCE | 9 | 30 | 461 | Zone 3 |
| JOURNAL OF EMPIRICAL FINANCE | 10 | 13 | 474 | Zone 3 |

**Panel 2:** As per the impact scores

| Sources | h_index | g_index | m_index | TC | NP | PY_start |
|---|---|---|---|---|---|---|
| ENERGY ECONOMICS | 41 | 72 | 2.278 | 5400 | 88 | 2005 |
| ECONOMIC MODELLING | 25 | 44 | 1.087 | 2041 | 53 | 2000 |
| INTERNATIONAL REVIEW OF FINANCIAL ANALYSIS | 23 | 47 | 0.92 | 2324 | 63 | 1998 |
| JOURNAL OF BANKING AND FINANCE | 22 | 30 | 0.846 | 1965 | 30 | 1997 |
| RESEARCH IN INTERNATIONAL BUSINESS AND FINANCE | 22 | 36 | 1.158 | 1434 | 57 | 2004 |
| JOURNAL OF INTERNATIONAL FINANCIAL MARKETS, INSTITUTIONS AND MONEY | 21 | 34 | 0.808 | 1246 | 51 | 1997 |
| JOURNAL OF INTERNATIONAL MONEY AND FINANCE | 21 | 30 | 0.7 | 2312 | 30 | 1993 |
| RESOURCES POLICY | 21 | 32 | 2.333 | 1176 | 55 | 2014 |
| FINANCE RESEARCH LETTERS | 16 | 25 | 1.067 | 689 | 31 | 2008 |
| EMERGING MARKETS REVIEW | 10 | 10 | 0.588 | 358 | 10 | 2006 |

**Panel 3:** As per the articles

| Sources | Articles |
|---|---|
| ENERGY ECONOMICS | 88 |
| INTERNATIONAL REVIEW OF FINANCIAL ANALYSIS | 63 |
| RESEARCH IN INTERNATIONAL BUSINESS AND FINANCE | 58 |
| RESOURCES POLICY | 56 |
| ECONOMIC MODELLING | 54 |
| JOURNAL OF INTERNATIONAL FINANCIAL MARKETS, INSTITUTIONS AND MONEY | 51 |
| FINANCE RESEARCH LETTERS | 31 |
| JOURNAL OF BANKING AND FINANCE | 30 |
| JOURNAL OF INTERNATIONAL MONEY AND FINANCE | 30 |
| JOURNAL OF EMPIRICAL FINANCE | 13 |

It is essential to note that the *Energy Economics* is the top journal as per all the analysis followed by different set of journals. We carried the analysis using total citations, citations per year, impact scores (h index, g index and m index to avoid discrepancies from these metrics). The wide contribution of the energy economics journal makes it a noteworthy journal in the area of connectedness and spillovers literature.

*3.3. Influential authors and articles*

We carried an extensive analysis on identifying the core authors based on their local citations (among our sample), impact scores (h index, g index and m index) and their production over time

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(where the circle denotes number of articles and shade intensity says the number of citations over the time), provided in Table 4.

**Table 4.** Influential authors.

**Panel 1:** As per Local Citations.

| Authors | Articles | Articles Fractionalized |
|---|---|---|
| KANG SH | 15 | 4.32 |
| MENSI W | 14 | 3.73 |
| TIWARI AK | 12 | 3.25 |
| BOURI E | 10 | 3.37 |
| UMAR Z | 9 | 2.92 |
| VO XV | 9 | 2.62 |
| YOON S-M | 9 | 3.03 |
| ANTONAKAKIS N | 7 | 3.2 |
| GABAUER D | 7 | 2.2 |
| GUESMI K | 7 | 2.2 |

**Panel 2:** As per Impact scores.

| Authors | h_index | g_index | m_index | TC | NP | PY_start |
|---|---|---|---|---|---|---|
| KANG SH | 12 | 15 | 1.714 | 599 | 15 | 2016 |
| TIWARI AK | 11 | 12 | 2.75 | 477 | 12 | 2019 |
| MENSI W | 10 | 14 | 1 | 719 | 14 | 2013 |
| BOURI E | 9 | 10 | 1.125 | 633 | 10 | 2015 |
| YOON S-M | 9 | 9 | 1 | 558 | 9 | 2014 |
| UMAR Z | 8 | 9 | 1.333 | 287 | 9 | 2017 |
| ANTONAKAKIS N | 7 | 7 | 0.636 | 521 | 7 | 2012 |
| NGUYEN DK | 7 | 7 | 0.583 | 1238 | 7 | 2011 |
| VO XV | 7 | 9 | 2.333 | 148 | 9 | 2020 |
| CAPORALE GM | 6 | 6 | 0.462 | 184 | 6 | 2010 |

**Panel 3:** As per authors production over time

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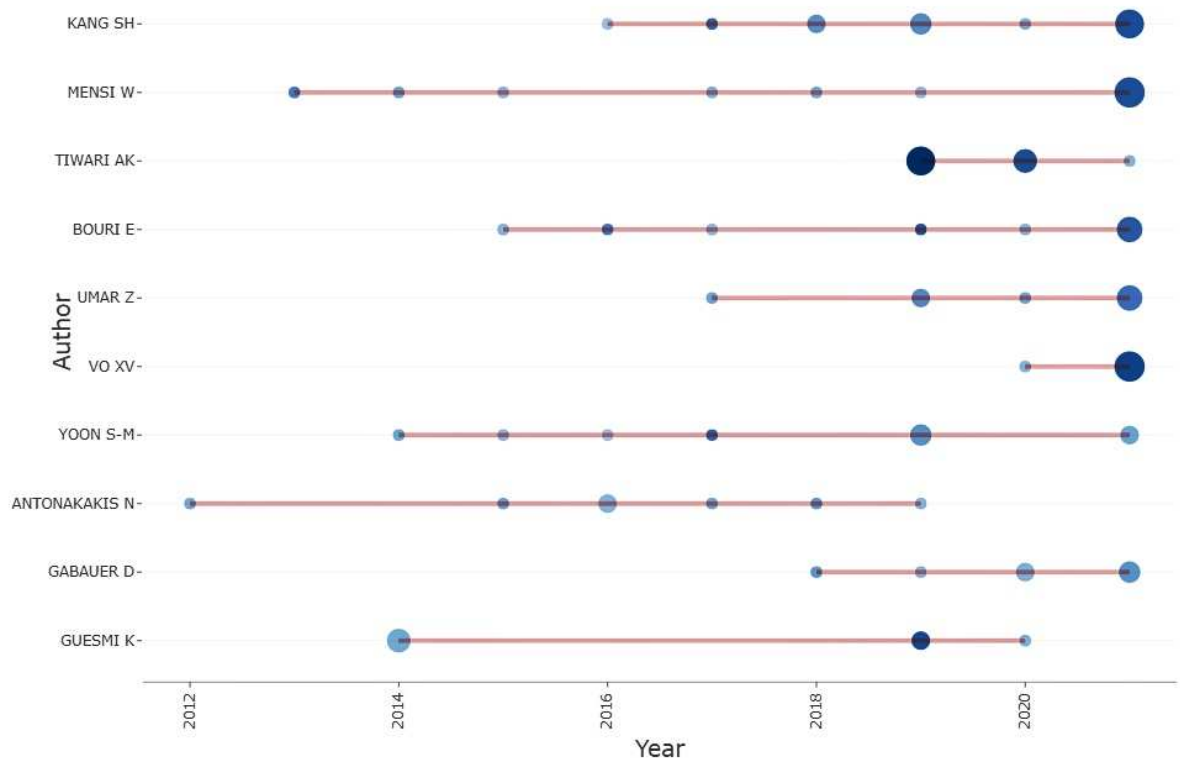


The identification of core authors let us explore how these authors directs a research stream in the field and how their collaboration extends in the future. We discovered the influential articles based on their local citations, which can be seen in Table 5, it is apparent to have the Diebold's work as the top article, as the content analysis also revealed that the Spillover index is the most used methodology in the literature.

**Table 5.** Most influential articles.

| Document | DOI | Year | Local Citations |
|---|---|---|---|
| DIEBOLD FX, 2009, ECON J | 10.1111/j.1468-0297.2008.02208.x | 2009 | 125 |
| EL HEDI AROURI M, 2011, J INT MONEY FINANC | 10.1016/j.jimonfin.2011.07.008 | 2011 | 44 |
| BARUNÍK J, 2018, J FINANC ECONOM | 10.1093/jjfinec/nby001 | 2018 | 41 |
| SADORSKY P, 2012, ENERGY ECON | 10.1016/j.eneco.2011.03.006 | 2012 | 38 |
| MENSI W, 2013, ECON MODEL | 10.1016/j.econmod.2013.01.023 | 2013 | 35 |
| AROURI MEH, 2012, ENERGY ECON | 10.1016/j.eneco.2011.08.009 | 2012 | 31 |
| NG A, 2000, J INT MONEY FINANC | 10.1016/S0261-5606(00)00006-1 | 2000 | 30 |
| DU X, 2011, ENERGY ECON | 10.1016/j.eneco.2010.12.015 | 2011 | 30 |
| HONG Y, 2001, J ECONOM | 10.1016/S0304-4076(01)00043-4 | 2001 | 30 |

| | | | |
|---|---|---|---|
| BAELE L, 2005, J FINANC QUANT ANAL | 10.1017/s0022109000002350 | 2005 | 29 |

## 4. Citation analysis and visualization

### *4.1. Co-citation mapping*

We conducted the co-citation analysis using the Bibliometrix. We fixed the minimum citation threshold as 12 and carried out the walk trap algorithm for the citation networking. We got Three main clusters, red, blue and green, pertaining (presented in Figure 1) respectively to asymmetries in market connectedness, major determinants and macroeconomic variables or factors that influence the market connectedness and spillovers, and dynamic market spillover among different markets and sectors.

To add the thematic evolution element and identify the key focus of research on each cluster, we conducted a content analysis; we extracted the core papers using the PageRank metric and evaluated them to confirm their linkages and integrity(Xu et al., 2018). The content analysis revealed extensive studies conducted on oil, which should be given attention; thus, we took it as a separate stream in this literature. The identified streams are 1) Asymmetries in market connectedness, 2) Macro factors that impact market connectedness and spillovers, 3) the Role of Oil in Spillover and hedging portfolio and 4) Dynamic Cross-market connectedness and spillovers.

### *4.2. Co-authorship visualization:*

We conducted the co-authorship analysis, with the threshold being at least three co-authored papers. It gives us a unique perception of the flow of the research streams over time with these authors(Acedo & Casillas, 2005). The authors do not form a massive network; however, the network is pertinent, and the affiliations are improving over time. The analysis result is given below in the Figure 2.

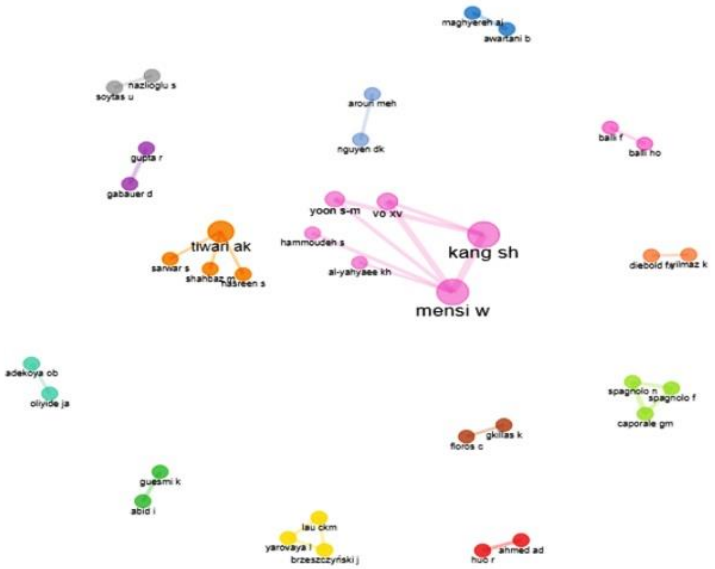


**Figure 2.** Results of Co-authorship analysis.

### *4.3. Co-word and Thematic analysis*

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We performed the co-word analysis and then proceeded with thematic analysis to picture the evolution of keywords and themes under each stream. Keyword analysis gives us the evolution of keyword usage by the authors and how the present literature has grown over time (presented in Figure 3).

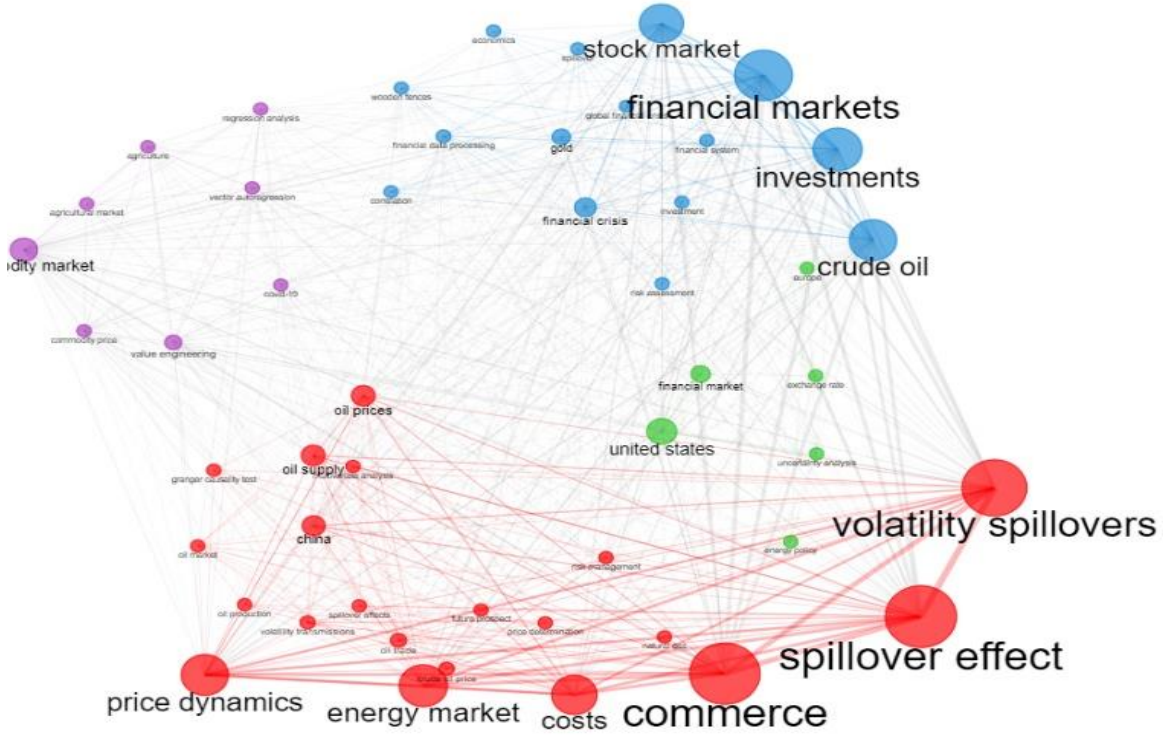


**Figure 3.** Results of Co-word analysis.

We used concepts of centrality and density to capture core keywords. We examined their evolution across time slices and the overall sample period where the themes are classified into the base, motor, isolated and declining or emerging themes, given in Figure 4.

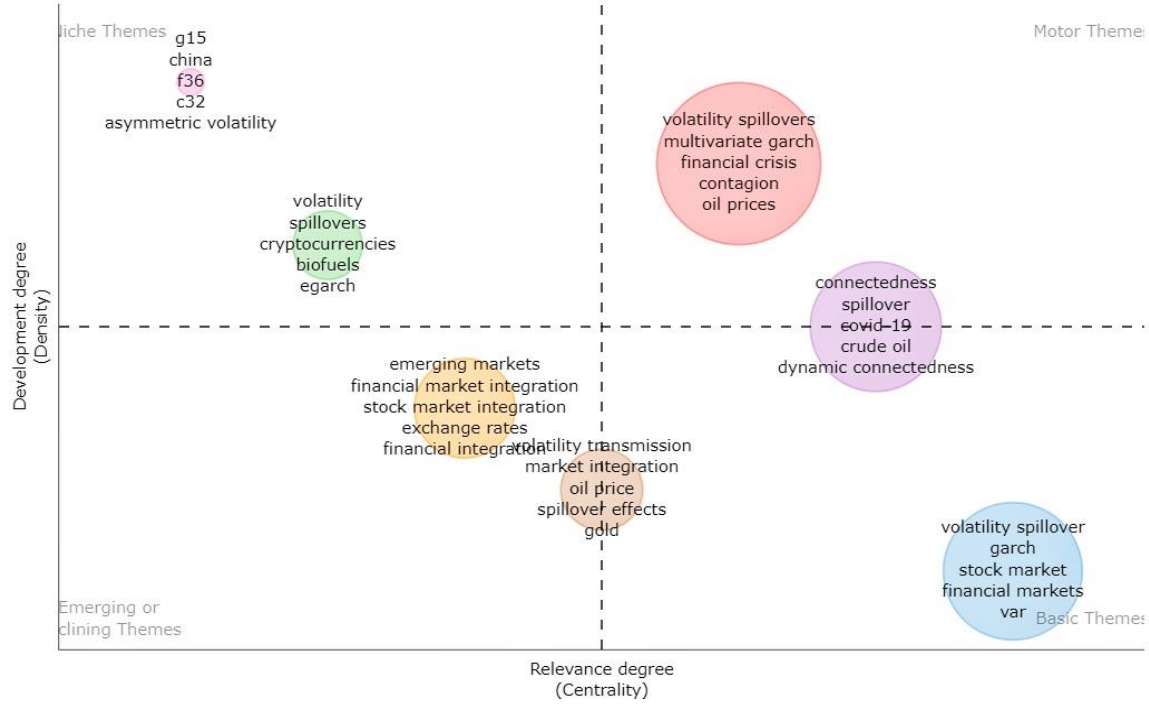

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**Figure 4.** Results of Thematic analysis using Author's Keywords.

## 5. Content Analysis of the four clusters:

### *5.1. Asymmetries in market connectedness:*

Baruník et al., (2017) analyzed the asymmetries in the forex market of AUD, GBP, CAD, EUR, JPY, and CHF during 2007-2015. The GFC mainly triggered good volatility, and Japan mostly became the receiver. Bouri et al., (2017) conducted the ARMAX -GARCH to investigate the volatility spillover of the commodity market (energy, industrial metals, precious metals, oil seeds) to the Sovereign CDS of 23 emerging and frontier markets and registered significant transmission but inconsistent over time. However, the results differ over time and commodities.

Bouri et al., (2020) verified the statistical properties of asymmetries in return connectedness between the Asian currencies from 1994 through 2019. They propounded that considering the size of the return shock is proportional to connectedness and crucial for developing rigorous portfolio diversification and policies. The study debates that planning policies and schemes should follow the market's potential positive and negative asymmetries. Mensi, Hammoudeh, & Yoon (2014) states that policymakers should take caution in investing simultaneously in currency and energy markets. Assessment of structural breaks provides a better understanding of the persistent behaviour of the market (Balcilar et al., 2020; Mensi, Hammoudeh, & Yoon 2014).

Asymmetric transmission is large from oil to equities, whereas bilateral transmission is not much. Maghyereh et al., (2016) argue that implied volatility gives extra information on the connectedness and risk transmission among different markets and countries instead of using historical volatility. L. Liu et al., (2013) evidence that China's and international oil prices possess asymmetries. Narayan et al., (2014) found that the Asian stock market co-moves without any asymmetries among them.

Mensi, Hammoudeh, Nguyen, et al., (2014) termed asymmetries from OPEC's announcement as the cut, maintain, and hike decisions and studied their influence on cereal products. They confirm a significant asymmetric effect of oil and gasoline on cereals over a continuous period, deferring from the economic fundamentals and the prices of the commodities; they stated cut decision as bad news and maintain decision as the good news.

C. L. Chang et al., (2010); Maghyereh et al., (2016) argue that market volatility spillover and asymmetries are essential in constructing hedge ratios and optimal portfolios. However, Wu (2019) registered that market connectedness is not highly prone to information spillover among the ASEAN markets.

### *5.2. Macro factors impact on market connectedness and spillovers:*

Wu (2019) evidence that the market size does not play a significant role in market integration. They found that the level of connectedness falls drastically after filtering out the effects of the global market. L. Liu (2013b); Wu (2019) termed that capital account restrictions, exchange restrictions, and capital control play a unique role in the integration and information dissemination among the markets. Different regimes (tax, size, stability, technological advancements) influence connectedness differently.

Balcilar et al., (2020) backed the notion of flight-to-quality, i.e., shifting to safe-haven assets at times of crisis. In his study, VIX is considered the ideal hedging tool and unconditional against developed markets where currency treasuries (likely Yen and USD) are conditional on the state of the market. For developed markets, the safe-haven assets exhibit relatively low-risk exposure, less than unity; however, it increased during the GFC. S. Kim et al., (2006) claims that the macroeconomic developments with the EMU also trigger the bond-stock market integration.

L. Liu et al., (2013) advocates that arbitrage plays a vital role when the oil market's prices are below the threshold level using the threshold VECM, and these threshold effects originate from the transaction cost. L. Liu (2013a) advocated four linkages, which are economic, financial, information capacity and industrial similarity and found that information capacity and industrial similarity are

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highly prone to developed markets where economic and financial integration is important among developing and developed markets.

E. C. Chang et al., (1999) provided evidence that future trading impacts the spot stock prices but not spilt over the futures, and the impact is not due to the exogenous factors but mostly broad market factors. C. Liu & Yang, (2016) added that during extreme events, the currency carry-trade and stock markets affect each other, i.e., a bilateral spillover exists in times of events.

EPU have an enormous impact when the stock market faces downside risk. When stimulative schemes are passed, the upside risk is sensitive to the EPU but shifts the other way around regarding disputes or contagion (Wang et al., 2020). However, Mokni et al., (2020) found that EPU's effect on dynamic connectedness is regime-dependent concerning the oil-gold nexus.

*5.3. Role of Oil in the Market spillovers and hedging:*

Kumar et al., (2019) states that the influence of natural gas has not been given much attention compared to crude oil, and the former has environmental benefits. They found an optimal hedging ratio between stocks and oil and natural gas, i.e., a dollar invested in stock should be hedged with a cent in natural gas futures or short selling of the oil futures. They found that Indian investors tend to incline towards natural gas over oil for hedging when stocks possess significant asymmetries. Similarly, in Mensi et al., (2021) work, a dollar in brent crude oil should be hedged with 10 cents in DJASIA and 30 cents in Italy stocks. The hedging depends on the time horizon, and the uncertainty depends on the contingents. They noted that during ESDC, hedging is more expensive than GFC and oil bursts. Higher oil prices can affect vulnerable economies, break the exchange rates, and deteriorate the performance of the stock returns. It is also noted that higher oil prices boost the oil-exporting country's fiscal stability.

Bouri (2015) enriches the gap by studying the oil volatility impact on the stocks of heavy oil importing countries; he found that oil played a significant role during the post-crisis (GFC). Lebanon, a country which is dominated by banking and services, did not have much effect from the oil volatility, whereas Jordan has shown a high response to the oil shocks. The presence of foreign investors influenced small countries such as Morocco and Tunisia.

Malik & Umar (2019) analyzed the oil and exchange rate connectedness and spillover of the major oil exporting and importing countries. He segregated the oil shocks into demand, supply and risk following Mokni et al., (2020). The study found that the demand and risk shock significantly affect the exchange rates and increase after the crisis; the author claims these phenomena possess potential forecasting benefits that can be used to form an international hedging portfolio. He states that this is also important for the policymakers to seek oil shocks for trade balance as part of macro policing.

L. Li et al., (2016) tried to capture the role of exogenous shocks on the information transmission of the oil-equity uncertainty index. They figured that the exogenous shocks impacted the volatility spillovers between the oil and equity uncertainty index during the post-crisis but insignificant pre-crisis. J. M. Kim & Jung (2018) found that the exchange rates and interest rates and the oil prices co-move over time, and the significant oil importing and exporting countries' exchange rates got affected by the crude oil and relatively higher to exporting countries in their study. They noted that the rise(fall) in oil prices leads exchange rate appreciation (depreciation).

*5.4. Dynamic Cross-markets connectedness and spillover:*

Wu (2019) finds that the level of cross-market integration between the ASEAN market is not what it is perceived to be when they consider the world market influence; the interconnectedness is relatively low. They noticed that the cross-market connectedness decreases by filtering the world market factors. Kumar et al., (2019) evidenced that the dynamic model (DCC) works better in capturing the asymmetries in the market compared to the constant model (CCC). In their sample, oil plays a vital role in cross-market spillovers. Studies have considered the dynamic models for the cross-market analysis to incorporate the geopolitical risk it transits into the world market systems(Y. Li et al., 2021). He also analyzed the geopolitical risks of BRICS, oil and gold and found that they vary

around time and frequency frame and intensifies in the short term. For the short time investors, the impact of the geopolitical risk has to be the main focal element, as the study stated that the GFC and Ukrainian crisis caused numerous peaks in the spillover. They have stated that gold and oil have a hedging function during geopolitical events, and the oil-gold nexus has to be the main concern for the hedgers.

In the crypto market, investors are not only accustomed to positive returns. Ji et al., (2018) noticed that the general notion of bitcoin does not apply to crypto market connectedness, and bitcoin shifted from net contributor to the net receiver. At the same time, other significant currencies took the market, and Litecoin became the connectedness epicentre. They have seen that if return and trading volumes are connected, there is a significant linkage between the return connectedness and the trading volume; however, Ji et al., (2019) have stated that the volatility of bitcoin exchange markets depends on the asset's withdrawal rather than the trading volume. Kang et al., (2017) evidenced that the LME nonferrous metal futures impact SFE nonferrous metal and that the GFC intensified the impact pattern. S. Kim et al., (2006) noted bond and stock integration and why it is happening. He pointed out that international bond and stock integration typically have dynamic changes. The monetary policies might play a role in these linkages, and if that happens, bonds usually have the upper hand.

H. Li & Majerowska (2008) found shreds of evidence in the spillover from the developed stock market to the emerging market; however, the linkage is weak. Studies found that Asian countries' stock markets co-moves and strengthened after the impact of the GFC. However, Asian-US had a minor interaction, and hardly any co-movements ensued. Yarovaya et al., (2016) found that the asymmetry transmission can be discerned as stabilizing unit between the stock markets and shall be treated as a hedging tool. He found some level of transmission from the developed markets to the emerging Asian markets.

## 6. Discussions & Future Directions:

### *6.1. Asymmetries in the market connectedness and spillover:*

With a growing depth in asymmetry studies, studies concentrate on information dissemination in terms of good and bad in the market. Only occasional studies explore the geopolitical risks of various institutional unions, macro variables, and investing tools. One should also take the geographical setting and the time variation between regions while addressing the cross-country asymmetries. Ederington & Guan (2010) argues that social and cultural factors can also influence market information dissemination. Although comprehensive studies on cross-country and cross-listed and cross-market analysis are there, they focus on large markets, leaving the frontier and small countries out of the inclusivity. Thus, a broad study must be done on these frontier markets and small countries (potentially growing ones).

The methodologies for the connectedness and spillover have been updated from basic GARCH models to Frequency analysis and other significant techniques. However, in our study, the primary techniques used are the DY or Spillover index, DCC-GARCH and variants of GARCH models. At the same time, Barunik's SAM and Frequency asymmetric index have contributed much to the asymmetry hypothesis analysis(Baruník et al., 2016b; Baruník & Křehlík, 2018b). The usage of high-frequency data is stagnant in a particular framework. Other financial methods and tools had to be studied under the connectedness literature.

### *6.2. Macro factor influence on the market connectedness and spillover:*

We have mentioned already that the studies focus on developed markets, leaving out small markets even though few studies have shown that the size effect does not play a significant role in connectedness. The small market had to be considered to determine the bilateral spillover or whether they were primarily net receivers. Policy creation, global speculation, and anticipation have to be indexed in terms of connectedness, and the same should be analyzed with the frontier and emerging markets. Globalization, market openness, innovation in trading and monetary unions must be

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examined to the fullest for their contributions to the volatility transmission between markets. Country-specific determinants have yet to be explored. The time-varying nature of these determinants, their role and dynamics in times of contagion have to be addressed.

*6.3. Role of Oil in market spillovers and hedging portfolios:*

Previous studies did not take the role of oil in the market linkages for the geopolitical risk it holds; we have explored the oil impacts in market spillover and its influence over hedging. Oil is studied in one way or another in most studies. The notion of large oil importing small countries has to be explored on their contributions to the oil volatility fluctuation. Oil futures from a country-specific point of view have to be investigated to show how hedging can be made possible, given that the markets are connected. The connectedness between large oil-importing and exporting Asian countries has to be evaluated as to how the oil volatility influences their net spillovers. The impact of green alternatives and green energy on oil volatility and oil spillovers should be initiated in the context of our literature.

*6.4. Dynamic Cross market connectedness and spillovers:*

Lately, the time-varying spillover between and across different markets and sectors is being analyzed. An ample number of studies captured the stock and bond market connectedness; however, the influence and network with the commodity market are still understudied. Time-varying integration on the feedback trading of cross-listed shares and the intensity of the foreign investors is very much underexplored in the connectedness literature. As mentioned previously, currency, monetary union, and liquidity effects on the stock-bond connectedness have yet to be made for several countries.

Thus, we outlined the gaps from the identified streams in the literature and presented them in the form of future research questions in Table 6.

**Table 6.** Future research questions.

| Research Stream Clusters | Question | Research Questions |
|---|---|---|
| Asymmetries in market connectedness | 1 | What are the variables that pose a geopolitical risk to the markets? |
| | 2 | How does information dissemination happen between Frontier and Emerging markets and developed markets? |
| | 3 | Do the asymmetries in the currency market propounds into the large oil-importing small countries? |
| | 4 | How do the asymmetries differ when high-frequency data are used from different markets? |
| | 5 | How do the asymmetries differ in economic integration and financial integration? |
| | 6 | Can asymmetry in connectedness be quantified? |
| | 7 | How does the country-specific asymmetry differ among the sectors? |
| | 8 | Do structural breaks in volatility play a significant role in asymmetry prediction? |
| | 9 | Does volatility asymmetry follow a mean reverting process? |
| | 10 | Does the US contribute most of the asymmetry to the world market? |
| | 11 | Does the EMU have an impact on the Asian markets? |
| | 12 | Do Social and cultural factors play any role in volatility asymmetry fluctuations? |
| | 13 | Do political and policy tie-ups between countries direct market connectedness? |

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| | | |
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| | 14 | Are there any potential benefits from good volatility spillovers? |
| | 15 | Is there a Bilateral Spillover between Asia and US and EMU? Moreover, how much net good and bad contribution happens between them during the tranquil and contagion period? |
| | 16 | What are the major determinants of the volatility asymmetries in developed and emerging markets? |
| Macro Factors influence on market connectedness and spillovers | 17 | Does the market size indicate the level of integration? |
| | 18 | How to derive the EPU index between the Frontier and Emerging markets? How do their economic conditions behave about this index? |
| | 19 | Does the technologically advanced stock market dominate international markets? |
| | 20 | Country-specific determinants of the connectedness and spillovers? |
| | 21 | How do Dollar currency and exchange rates trigger the connectedness among specific Asian countries? |
| | 22 | What is the role of information capacity in the volatility spillovers in country-level sectors? |
| | 23 | Does international economic integration trigger financial integration among the countries? |
| | 24 | What is the degree of impact of oil volatility fluctuation in the macroeconomic variables in oil-importing countries? |
| | 25 | What is the long-run behaviour between emerging and developed nations' economic and financial integration? |
| | 26 | Does EDC affect specific Asian markets? Why is there not much political or terrorism spillover from the US and EU to the East Asian markets? |
| | 27 | Does good economic performance from a country or firm shield them from bad volatility spillovers? |
| Role of oil in the spillovers and hedging | 28 | Do the Asian markets have the upper hand in the Oil futures as a hedging tool? |
| | 29 | What is the degree of connectedness between the large oil-importing and exporting EU and Asian countries? |
| | 30 | What is the impact of green alternatives and green energy products on oil price fluctuations? |
| | 31 | What is the role of oil in connecting the commodity and financial markets in specific EU and Asian Countries? |
| | 32 | What is the degree of change in geopolitical risk from oil among different countries? |
| | 33 | Does the Oil-Gold nexus pose an effective hedging tool for emerging countries? |
| | 34 | What is the spillover effect of oil on the Safe haven assets? |
| | 35 | Are high natural gas-using countries well-off from oil spillovers? |
| | 36 | What are the substantial hedging values for oil futures and exchange rates for the Asian sub-countries? |
| | 37 | What is the optimal international diversification for Oil futures in the tranquil and event period? |
| | 38 | What is the directional spillover of oil to the Asian Sub-countries during the Crises? |

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| | 39 | Does oil integrate the financial markets across countries during Crises? |
| Dynamic cross-market connectedness and spillover | 40 | How do the dynamic spillover changes differ in the high-frequency data? |
| | 41 | Do structural changes pose a constraint in the dynamic analysis? |
| | 42 | What is the level of integration among firms? |
| | 43 | What are the changes in dynamics in the Short and Long-run? |
| | 44 | What is the intensity of short- and long-run connectedness and directional spillovers between commodity, stock and bond markets? |
| | 45 | Does connectedness shift when the market's foreign investors percentage is high? |
| | 46 | What is the time-varying changes in feedback trading of cross-listed shares? |
| | 47 | Do market openness and information capacity transform the directional spillover in Developed and emerging markets? |

## 7. Conclusions

We wanted to explore the prominent literature on market connectedness and spillovers. We followed some of the previous study's footprints of Meta-literature review to derive a set of quantitative and qualitative structures to the literature, for which we conducted Bibliometric analysis for the former and Content analysis for the latter. We used the Bibliometrix package for various bibliometric analyses (co-citation, co-authorship, co-word and thematic analysis). We conducted a Co-word analysis which adds an element of thematic analysis that is missing in the previous works of literature. We extracted 40 years (1991-2021) of data from the Scopus database and purged them accordingly to the structure of the study.

The paper contributes in two aspects. First, it extracts the most influential facets of the Connectedness literature: most studied countries, top collaboration, sources, authors and articles. We then examined the themes in the field and categorized them according to compelling topics, the base and motor and emerging themes. With the extensive content analysis of 75 papers comprised of core and secondary papers, we found four major streams in the connectedness in the literature, which are 1) Asymmetries in the Market Connectedness, 2) Macro factors impact on the Connectedness and Spillovers across markets and countries, 3) Role of Oil in the market spillovers and Portfolio Hedging, 4) Dynamic Cross market connectedness and Spillovers. We analyzed and summarized the key findings with the abovementioned streams and mapped out the essential methodologies and authors. We contributed by identifying the literature gaps, then lined out and discussed the Future directions of the research field.

The growing globalization and interactions of markets and countries have made the market co-movements a calamity element, as well as investing arena, with the verge of crisis passing from country to country, the literature on connectedness and spillover would be of outstanding contribution and interest to the policymakers and the investors and hedgers for portfolio diversification.

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## Appendix

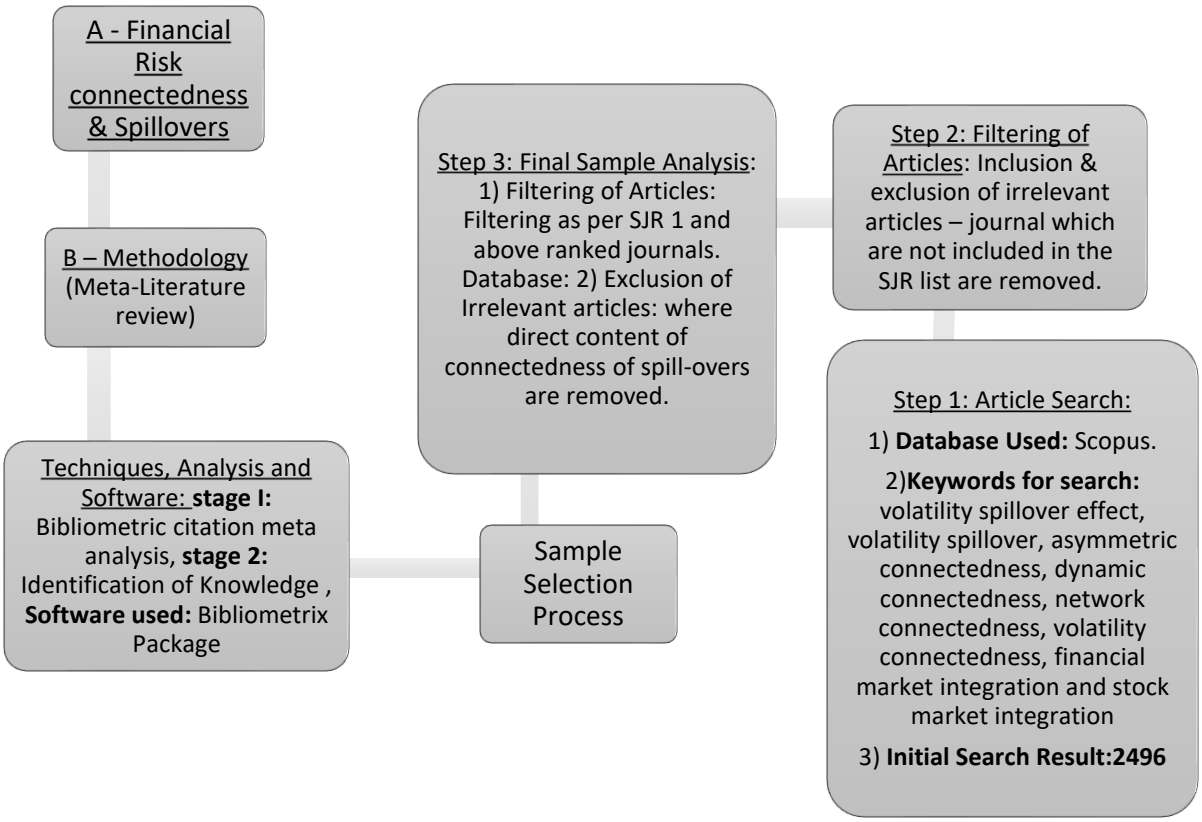


**Figure A1.** Outline of Methodology.

**Table A1.** Summary of the core literatures in each stream.

| Authors (Year) | Type of paper (empirical or qualitative) | Title of Study | Objective/research question | Methods (technique/sample of study/data questions | Main Findings |
|---|---|---|---|---|---|
| • Engle,2012 | Empirical | Volatility spillovers in east Asian financial markets: A mem-based approach | Volatility spillover during Asian Currency Crisis | MEM-GARCH | Hong Kong was a major transmitter and build-up of volatility transmission during the currency crises in 1997 but few in the 9/11 attack. |
| • Baillie R.T., Bollerslev T., Redfearn M.R. 1993 | Empirical | Bear squeezes, volatility spillovers and speculative attacks in the hyperinflation 1920s foreign exchange | Co-movements between exchange rates during 1920 and their behaviour to present exchange rate connectedness | QMLE and Robust Wald test for causality, 7 Country 162 Weekly exchange rates | Even though there is a significant relationship during events, there is no clear evidence of transmission between exchange rates. |

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| • Bekaert,2019 | Empirical | On the global financial market integration "swoosh" and the trilemma | Analyzing the pattern in Financial Market Integration | Factor Model and CAPM 17 country's 1554 monthly equity portfolio of 1885-2014 | There is no significant regional cointegration, but the cointegration among countries follows a swoosh pattern as opposed to the previous findings. |
| • Lin B.2014 | Empirical | Oil price fluctuation, volatility spillover and the Ghanaian equity market: Implication for portfolio management and hedging effectiveness | Hedging and portfolio diversification during oil shocks in west Africa and Nigeria stocks | VAR-GARHC, VAR-AGARCH &DCC-GARCH,574 weekly Ghana stock, oil from 2000-2010 | There is significant volatility spillover between oil and the two stock markets, and the information shocks intensified the spillovers and predictability. |
| • Suk-Joong Kim, Fariborz Moshirian, Eliza Wu 2006 | Empirical | Evolution of international stock and bond market integration: Influence of the European Monetary Union | EMU influence on stock-bond integration | EGARCH, PCA&GLS, the eurozone and non-eurozone total of seven countries of 1994-2003. | The introduction of EMU impacted the eurozone stock-bond co-movement but not the non-euro countries; it led to a flight to quality phenomena. |
| • Jong-Min Kim and Hojin Jung 2018 | Empirical | Dependence Structure between Oil Prices, Exchange Rates, and Interest Rates | What is the co-movement nature of the oil, exchange rate and U.S. interest rate | TGARCH and Asymmetric ARCH, APRCH and Copula, weekly data 1998-2017 | There is a negative relationship between oil and the U.S. interest rate; Oil fluctuations are transported to the Exchange rate of oil exporting countries. |
| • Lei Li, Libo Yin, Yimin Zhou 2016 | Empirical | Exogenous shocks and the spillover effects between uncertainty and oil price | Examining the information spillover between oil and stock pre- and post-GFC | Bi-variable EGARCH, VIX, ted spread, S&P 500 index and gold future oil price as exogenous shocks, daily data of 2004-2014 | There was no information transmission between the oil and stock pre crises, but it became significant after the crises, and the exogenous shocks intensified the transmission. |
| • Yingli Li, Jianbai Huang, Wang Gao, Hongwei Zhang 2021 | Empirical | Analyzing the time-frequency connectedness among oil, gold prices and BRICS geopolitical risks | Examining the interaction between Oil, BRICS, Gold and Geopolitical risk index. | Asymmetric Frequency Index, 2000-2019, Gold, Geopolitical risk index, BRICS risk index and Oil price. | There is a clear presence of spillover among the variables. |
| • Jozef Baruník, Evžen Kočenda, Luká š Vácha(2017) | Empirical | Asymmetric volatility connectedness | Do Asymmetries exist in the volatility of the Currency | BK (2016) &DY (2012) &SAM | GFC triggers good volatility spillover, and JPY is the |

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| | | on the forex market | market, and if they do, what is their uniformity | | receiver mainly, and macro variables play their Role in monetary policies and bank interventions. |
| • Elie Bouri (2015) | Empirical | Oil volatility shocks and the stock markets of oil-importing MENA economies: A tale from the financial crisis | AVS between oil and MENA countries (Jordan and Lebanon Stock markets) | L.M. test & ARMAX-GARCH | Oil volatility impacts Jordan's stock post-GFC, whereas oil volatility does not predict Lebanon's volatility. There is a heterogeneity in the comparison between Tunisia and Morocco (small & heavy oil importing countries). |
| • Elie Bouri, Maria E. de Boyrie, Ivelina Pavlova (2016) | Empirical | Volatility transmission from commodity markets to sovereign CDS spreads in emerging and frontier countries | AVS from Commodity to Sovereign CDS, sector-wise, country-wise analysis | L.M. test & AR-GARCH | 10 out of 17 emergings, four frontier markets are affected by commodity price volatility, whereas the energy and precious metals sectors are large contributors. |
| • Elie Bouri, Brian Lucey, Tareq Saeed, Xuan Vinh Vo (2020) | Empirical | Extreme spillovers across Asian-Pacific currencies: A quantile-based analysis | AVS between Asian Currency markets | Quantile based VAR | Return spillovers vary between periods of appreciation and depreciation and extreme events. |
| • Elie Bouri, Xiaojie Lei, Naji Jalkh, Yahua Xu, Hongwei Zhang | Empirical | Spillovers in higher moments and jumps across U.S. stock and strategic commodity markets | AVS in the Higher moment and jumps between | TVP-VAR, GIRF & GFEVD | U.S. (RV&RK), Oil (R.S. & jumps) main transmitter, and Gold is the primary receiver. |
| • Jing Chen, Yizhe Dong, Wenxuan Hou, and David G McMillane(2017) | Empirical | Does feedback trading drive returns of cross-listed shares? | Analyze feedback and information volatility spillover among cross-listed shares, whether the same market segmentation information gives volatility of the same stock and how exogenous shocks affect the price discovery | Feedback Model-VAR, VECM, VAR-MV-GARCH | Cross-listed shares have long-run co-movements and bi-directional causations; a dynamic exists between volatility and liquidity. |
| • Qiang Jia, Elie Bouric, Ladislav | Empirical | Realized volatility connectedness | To determine the integration degree of the crypto market | Realized Volatility, FEVD, D.Y. Connectedness | Coinbase is the most influential exchange, although not in the |

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| Kristoufekd, Brian Luceye | | among Bitcoin exchange markets | | | top 3 in trading volume, and Binance is the no1 in terms of trading volume but not influential. |
| • Qiang Ji, Elie Bouri, Chi Keung Marco Lau, David Roubaud | Empirical | Dynamic connectedness and integration in cryptocurrency markets | Return Connectedness and Volatility spillover between six Cryptocurrencies | FEVD, D.Y. Connectedness | The largest net Transmitter is Bitcoin and Receivers are Ethereum and Dash. A negative Return is more potent than a positive, Dynamically, Bitcoin moved from net transmitter to net receiver, and Trading volume might be a significant determinant given that return and trading volume have linkages. |
| • Min Hu, Dayong Zhang, Qiang Ji, Lijian Wei | Empirical | Macro factors and the realized volatility of commodities: A dynamic network analysis | Analyzing Macro Factors' impact on Commodity volatilities | Realized Volatility, FEVD, D.Y. Connectedness | Gold is the net information transmitter, . Gold and Crude Oil show significant time-varying characteristics over macro information; Gold influenced mainly from the sentiment index and volatility index and Crude Oil for default spread and volatility index. |
| • Jian Yang, Meng Tong, Ziliang Yu | Empirical | Housing market spillovers through the lens of transaction volume: A new spillover index approach | Analyzing the determinants and the pattern of housing information transmission | Directed Cycle Graph (DAG) and Spillover index. Eight Chinese provinces' daily housing index, from Nov 2009 to Feb 2018 | Hierarchy in the cities is the primary determinant and propounds different dynamic information transmissions. The Usage of High and low-frequency results in different daily fluctuations housing sector. |
| • Chia-Lin Chang a, Michael McAleer, Roengchai Tansuchat, 2010 | Empirical | Analyzing and forecasting volatility spillovers, asymmetries and hedging in major oil markets | Crude oil price volatility | CCC, VARMA–GARCH, VARMA–AGARCH | Conditional correlation forecasts exhibited both upward trend and downward trends, and optimal portfolio weights suggest holding the |

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| | | | | | light sweet grade category in a more significant proportion than the heavier and less sweet-grade category |
| • Farooq Malik, Zaghum Umar | Empirical | Dynamic connectedness of oil price shocks and exchange rates | different sources of oil price shocks are connected to the exchange rates of major oil-dependent countries | ARMA, VAR, SVAR | Oil price shocks resulting from changes in demand and risk significantly contribute to variations in exchange rates, while supply shocks have virtually no impact. |
| • Sang Hoon Kang, Ron McIver, Seong-Min Yoon | Empirical | Dynamic spillover effects among crude oil, precious metal, and agricultural commodity futures markets | spillover effects among six commodity futures markets | multivariate DECO-GARCH, Spillover Index | Hedging strategies depend on market conditions, with a higher value for the hedge ratios during episodes of financial turmoil. |
| • Walid Mensi, Shawkat Hammoudeh, Duc Khuong Nguyen, Seong-Min Yoon | Empirical | Dynamic spillovers among major energy and cereal commodity prices | examining the impacts of three types of OPEC news announcements on the volatility spillovers and persistence | VAR-BEKK-GARCH, VAR-DCC-GARCH | Empirical models are flexible enough to capture the dynamic structure of the return interactions, volatility spillovers, and conditional correlations. |
| • Sang Hoon Kanga, Aviral Kumar Tiwari, Claudiu Tiberiu Albulescud, Seong-Min Yoone | Empirical | Exploring the time-frequency connectedness and network among crude oil and agriculture commodities V1 | frequency domain connectedness between oil and agriculture commodity prices | frequency domain spillover method, D.Y. Spillover Index | vegetable oil prices are net volatility transmitters at any frequency band. |
| • Sang Hoon Kanga, Seong-Min Yoonb | Empirical | Dynamic spillovers between Shanghai and London nonferrous metal futures markets | examines the dynamic return and volatility spillovers between the Shanghai Futures Exchange (SFE) and the London Metal Exchange (LME) | new spillover index of Diebold and Yilmaz | LME nonferrous metal futures have a more significant impact on SFE nonferrous metal futures. |
| • Walid Mensi, Shawkat Hammoudeh, Xuan Vinh Vo, Sang Hoon Kang, | Empirical | Volatility spillovers between oil and equity markets and portfolio risk implications in the U.S. and | frequency dynamics of volatility spillovers between Brent crude oil and stock markets in the U.S., Europe, Asia, GIPSI, Ireland, | Methods by Diebold and Yilmaz, and Barunik and Krehlik, AR (1)-FIGARCH | Spillover effect between the oil and the stock markets is conidered time-varying, crisis-sensitive, and frequency-dependent. |

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| | | vulnerable E.U. countries | Portugal, Spain and Italy | | |
| • Mohamed El Hedi Arouri, Amine Lahiani, Duc Khuong Nguyen | Empirical | Return and volatility transmission between world oil prices and stock markets of the GCC countries | return links and volatility transmission between oil and stock markets in the Gulf Cooperation Council (GCC) countries | VAR-GARCH, GCC-GARCH | Oil stock return and volatility linkages could compare their causality across GCC countries and other oil-exporting and oil-importing countries. |
| • Walid Mensi, Shawkat Hammoudeh, Idries Mohammad Wanas Al-Jarrah, Khamis Hamed Al-Yahyaee, Sang Hoon Kang | Empirical | Risk spillovers and hedging effectiveness between significant commodities and Islamic and conventional GCC banks | dynamic risk spillovers and hedging effectiveness between two important commodity markets (Oil and Gold) | DECO-FIGARCH, spillover index of Diebold and Yilmaz | Gold offers the best hedging effectiveness for UAE, Qatar and Saudi Arabia, which are major oil exporters, while oil provides the highest hedging effectiveness for Bahrain, which is a minor oil producer. |
| • Perry Sadorsky | Empirical | Correlations and volatility spillovers between oil prices and the stock prices of clean energy and technology companies | analyze the volatility spillovers between oil prices and the stock prices of clean energy companies and technology companies | MGARCH, BEKK | Stock prices of clean energy companies correlate reasonably highly with the stock prices of technology companies. Portfolio of clean energy stocks and oil futures can be built, and oil futures can be used to hedge an investment in clean energy stock prices. |
| • S. Narayan, S. Srianantha kumar, S.Z. Islam | Empirical | Stock market integration of emerging Asian economies: Patterns and causes | patterns and causes of stock market integration of selected emerging Asian nations against the U.S., Australia, China, and India | GARCH-DCC, EGARCH | Monthly correlations were least influenced; six Asian markets were relatively more correlated with the Chinese stock market than those of India, Australia, or the U.S.. |
| • Walid Mensi, Shawkat Hammoudeh, Seong-Min Yoon | Empirical | Structural breaks, dynamic correlations, asymmetric volatility transmission, and hedging strategies for petroleum prices and USD exchange rate | Influence of structural changes on the asymmetry of volatility spillovers, asset allocation and portfolio diversification between the USD/euro exchange market and each of six major spot | Bivariate DCC-EGARCH Model | Volatility spillovers from the petroleum prices to the dollar/euro exchange rate have implications for import inflation and the general price level; portfolio strategies are sensitive to the |

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| | | | petroleum markets, including WTI, Europe Brent, kerosene, gasoline and propane. | | petroleum-currency nexus. |
| • Aktham I. Maghyereh, Basel Awartani, Elie Bouri | Empirical | The directional volatility connectedness between crude oil and equity markets: new evidence from implied volatility indexes | directional connectedness between oil and equities in eleven major stock exchanges | VAR, KPSS H-Step | The study exploited newly introduced implied volatility indices and directional connectedness measures to study the risk transfer between the oil market and a group of global equity markets. |
| • Chia-Lin Chang, Chia-Ping Liu, Michael McAleer | Empirical | Volatility spillovers for spot, futures, and ETF prices in agriculture and energy | relationship and the interactions on price and volatility, and on the covolatility spillover effects for agricultural and energy industries | Full BEKK and DCC, | Volatility spillovers exist for all four financial assets in three different markets, though there are some differences in the quantitative results. |

## References


Acedo, F. J., & Casillas, J. C. (2005). Current paradigms in the international management field: An author co-citation analysis. *International Business Review*, *14*(5), 619–639. https://doi.org/10.1016/j.ibusrev.2005.05.003

Alon, I., Anderson, J., Munim, Z. H., & Ho, A. (2018). A review of the internationalization of Chinese enterprises. *Asia Pacific Journal of Management*, *35*(3), 573–605. https://doi.org/10.1007/s10490-018-9597-5

Apriliyanti, I. D., & Alon, I. (2017). Bibliometric analysis of absorptive capacity. *International Business Review*, *26*(5), 896–907. https://doi.org/10.1016/j.ibusrev.2017.02.007

Aria, M., & Cuccurullo, C. (2017). bibliometrix: An R-tool for comprehensive science mapping analysis. *Journal of Informetrics*, *11*(4), 959–975. https://doi.org/10.1016/j.joi.2017.08.007

Aria, M., Misuraca, M., & Spano, M. (2020). Mapping the Evolution of Social Research and Data Science on 30 Years of Social Indicators Research. *Social Indicators Research*, *149*(3), 803–831. https://doi.org/10.1007/s11205-020-02281-3

Bajaj, V., Kumar, P., & Singh, V. K. (2022). Linkage dynamics of sovereign credit risk and financial markets: A bibliometric analysis. *Research in International Business and Finance*, *59*(March 2021), 101566. https://doi.org/10.1016/j.ribaf.2021.101566

Balcilar, M., Demirer, R., Gupta, R., & Wohar, M. E. (2020). The effect of global and regional stock market shocks on safe haven assets. *Structural Change and Economic Dynamics*, *54*, 297–308. https://doi.org/10.1016/j.strueco.2020.04.004

Baruník, J., Kočenda, E., & Vácha, L. (2016a). Asymmetric connectedness on the U.S. stock market: Bad and good volatility spillovers. *Journal of Financial Markets*, *27*, 55–78. https://doi.org/10.1016/j.finmar.2015.09.003

Baruník, J., Kočenda, E., & Vácha, L. (2016b). Asymmetric connectedness on the U.S. stock market: Bad and good volatility spillovers. *Journal of Financial Markets*, *27*, 55–78. https://doi.org/10.1016/j.finmar.2015.09.003

Baruník, J., Kočenda, E., & Vácha, L. (2017). Asymmetric volatility connectedness on the forex market. *Journal of International Money and Finance*, *77*, 39–56. https://doi.org/10.1016/j.jimonfin.2017.06.003

Baruník, J., & Křehlík, T. (2018a). Measuring the frequency dynamics of financial connectedness and systemic risk. *Journal of Financial Econometrics*, *16*(2), 271–296. https://doi.org/10.1093/jjfinec/nby001

Baruník, J., & Křehlík, T. (2018b). Measuring the frequency dynamics of financial connectedness and systemic risk. *Journal of Financial Econometrics*, *16*(2), 271–296. https://doi.org/10.1093/jjfinec/nby001

BenSaïda, A. (2019). Good and bad volatility spillovers: An asymmetric connectedness. *Journal of Financial Markets*, *43*, 78–95. https://doi.org/10.1016/j.finmar.2018.12.005

Bouri, E. (2015). Oil volatility shocks and the stock markets of oil-importing MENA economies: A tale from the financial crisis. *Energy Economics*, *51*, 590–598. https://doi.org/10.1016/j.eneco.2015.09.002

Bouri, E., de Boyrie, M. E., & Pavlova, I. (2017). Volatility transmission from commodity markets to sovereign CDS spreads in emerging and frontier countries. *International Review of Financial Analysis*, *49*, 155–165. https://doi.org/10.1016/j.irfa.2016.11.001

Bouri, E., Lucey, B., Saeed, T., & Vo, X. V. (2020). Extreme spillovers across Asian-Pacific currencies: A quantile-based analysis. *International Review of Financial Analysis*, *72*, 101605. https://doi.org/10.1016/j.irfa.2020.101605

Brown, G. (2012). *Why Are U . S . Stocks More Volatile ? ABSTRACT*. *LXVII*(4).

Chang, C. L., McAleer, M., & Tansuchat, R. (2010). Analyzing and forecasting volatility spillovers, asymmetries and hedging in major oil markets. *Energy Economics*, *32*(6), 1445–1455. https://doi.org/10.1016/j.eneco.2010.04.014

Chang, E. C., Cheng, J. W., & Pinegar, J. M. (1999). Does futures trading increase stock market volatility? the case of the Nikkei stock index futures markets. *Journal of Banking and Finance*, *23*(5), 727–753. https://doi.org/10.1016/S0378-4266(98)00069-7

Cobo, M. J., López-Herrera, A. G., Herrera-Viedma, E., & Herrera, F. (2011). An approach for detecting, quantifying, and visualizing the evolution of a research field: A practical application to the Fuzzy Sets Theory field. *Journal of Informetrics*, *5*(1), 146–166. https://doi.org/10.1016/j.joi.2010.10.002

Ederington, L. H., & Guan, W. (2010). How asymmetric is U.S. stock market volatility? *Journal of Financial Markets*, *13*(2), 225–248. https://doi.org/10.1016/j.finmar.2009.10.001

Engle, R. F., Ito, T., & Wenlong, L. (1990). Metor Shower? Heteroskedastic Intra-Daily Volatility in the Foreign Exchange Market. *Econometrica*, *58*(3), 525–542.

Fetscherin, M., & Heinrich, D. (2015). Consumer brand relationships research: A bibliometric citation meta-analysis. *Journal of Business Research*, *68*(2), 380–390. https://doi.org/10.1016/j.jbusres.2014.06.010

Forbes, K. J., & Rigobon, R. (2002). No contagion, only interdependence: Measuring stock market comovements. *Journal of Finance*, *57*(5), 2223–2261. https://doi.org/10.1111/0022-1082.00494

Hu, M., Zhang, D., Ji, Q., & Wei, L. (2020). Macro factors and the realized volatility of commodities : A dynamic network analysis. *Resources Policy*, *68*(July), 101813. https://doi.org/10.1016/j.resourpol.2020.101813

Ji, Q., Bouri, E., Keung, C., Lau, M., & Roubaud, D. (2018). PT. *International Review of Financial Analysis*, #pagerange#. https://doi.org/10.1016/j.irfa.2018.12.002

Ji, Q., Bouri, E., Kristoufek, L., & Lucey, B. (2019). Realised volatility connectedness among Bitcoin exchange markets. *Finance Research Letters*, 101391. https://doi.org/10.1016/j.frl.2019.101391

Kang, S. H., McIver, R., & Yoon, S. M. (2017). Dynamic spillover effects among crude oil, precious metal, and agricultural commodity futures markets. *Energy Economics*, *62*, 19–32. https://doi.org/10.1016/j.eneco.2016.12.011

Kim, J. M., & Jung, H. (2018). Dependence Structure between Oil Prices, Exchange Rates, and Interest Rates. *Energy Journal*, *39*(2), 233–258. https://doi.org/10.5547/01956574.39.2.jkim

Kim, S., Moshirian, F., & Wu, E. (2006). *Evolution of international stock and bond market integration : Influence of the European Monetary Union*. *30*, 1507–1534. https://doi.org/10.1016/j.jbankfin.2005.05.007

Kumar, S., Pradhan, A. K., Tiwari, A. K., & Kang, S. H. (2019). Correlations and volatility spillovers between oil, natural gas, and stock prices in India. *Resources Policy*, *62*(November 2018), 282–291. https://doi.org/10.1016/j.resourpol.2019.04.004

Li, H., & Majerowska, E. (2008). *Testing stock market linkages for Poland and Hungary : A multivariate GARCH approach*. *22*, 247–266. https://doi.org/10.1016/j.ribaf.2007.06.001

Li, L., Yin, L., & Zhou, Y. (2016). Exogenous shocks and the spillover effects between uncertainty and oil price. *Energy Economics*, *54*, 224–234. https://doi.org/10.1016/j.eneco.2015.11.017

Li, Y., Huang, J., Gao, W., & Zhang, H. (2021). Analyzing the time-frequency connectedness among oil , gold prices and BRICS geopolitical risks ☆. *Resources Policy*, *73*(April), 102134. https://doi.org/10.1016/j.resourpol.2021.102134

Liu, C., & Yang, H. (2016). Systemic risk in carry-trade portfolios. *Finance Research Letters*, *0*, 1–7. https://doi.org/10.1016/j.frl.2016.09.007

Liu, L. (2013a). International stock market interdependence: Are developing markets the same as developed markets? *Journal of International Financial Markets, Institutions and Money*, *26*(1), 226–238. https://doi.org/10.1016/j.intfin.2013.06.003

Liu, L. (2013b). Journal of International Financial Markets , Institutions & Money International stock market interdependence : Are developing markets the same as developed markets ? *"Journal of International Financial Markets, Institutions & Money," 26*, 226–238. https://doi.org/10.1016/j.intfin.2013.06.003

Liu, L., Chen, C., & Wan, J. (2013). Is world oil market " one great pool " ?: An example from China ' s and international oil markets. *Economic Modelling*, *35*, 364–373. https://doi.org/10.1016/j.econmod.2013.07.027

Maghyereh, A. I., Awartani, B., & Bouri, E. (2016). The directional volatility connectedness between crude oil and equity markets : New evidence from implied volatility indexes. *Energy Economics*, *57*, 78–93. https://doi.org/10.1016/j.eneco.2016.04.010

Maghyereh, A. I., Awartani, B., & Tziogkidis, P. (2017). *PT CR*. https://doi.org/10.1016/j.eneco.2017.10.025

Malik, F., & Umar, Z. (2019). Dynamic connectedness of oil price shocks and exchange rates. *Energy Economics*, *84*(xxxx), 104501. https://doi.org/10.1016/j.eneco.2019.104501

Mensi, W., Hammoudeh, S., Nguyen, D. K., & Yoon, S. M. (2014). Dynamic spillovers among major energy and cereal commodity prices. *Energy Economics*, *43*(January 2002), 225–243. https://doi.org/10.1016/j.eneco.2014.03.004

Mensi, W., Hammoudeh, S., Vinh, X., & Hoon, S. (2021). Journal of International Financial Markets , Volatility spillovers between oil and equity markets and portfolio risk implications in the US and vulnerable EU countries. *Journal of International Financial Markets, Institutions & Money*, *75*(October), 101457. https://doi.org/10.1016/j.intfin.2021.101457

Mensi, W., Hammoudeh, S., & Yoon, S. (2014). AC NU. *Energy Economics*. https://doi.org/10.1016/j.eneco.2014.12.004

Mokni, K., Hammoudeh, S., Ajmi, A. N., & Youssef, M. (2020). Does economic policy uncertainty drive the dynamic connectedness between oil price shocks and gold price? *Resources Policy*, *69*(July), 101819. https://doi.org/10.1016/j.resourpol.2020.101819

Narayan, S., Sriananthakumar, S., & Islam, S. Z. (2014). Stock market integration of emerging Asian economies : Patterns and causes. *Economic Modelling*, *39*, 19–31. https://doi.org/10.1016/j.econmod.2014.02.012

Patel, R., Goodell, J. W., Oriani, M. E., Paltrinieri, A., & Yarovaya, L. (2022). A bibliometric review of financial market integration literature. *International Review of Financial Analysis*, *80*(December 2021), 102035. https://doi.org/10.1016/j.irfa.2022.102035

Sanchez-Nunez, P., Cobo, M. J., Heras-Pedrosa, C. D. Las, Pelaez, J. I., & Herrera-Viedma, E. (2020). Opinion Mining, Sentiment Analysis and Emotion Understanding in Advertising: A Bibliometric Analysis. *IEEE Access*, *8*(July), 134563–134576. https://doi.org/10.1109/ACCESS.2020.3009482

Snyder, H. (2019). Literature review as a research methodology: An overview and guidelines. *Journal of Business Research*, *104*(July), 333–339. https://doi.org/10.1016/j.jbusres.2019.07.039

Vieira, E. S., & Gomes, J. A. N. F. (2009). A comparison of Scopus and Web of science for a typical university. *Scientometrics*, *81*(2), 587–600. https://doi.org/10.1007/s11192-009-2178-0

Wang, Z., Li, Y., & He, F. (2020). Asymmetric volatility spillovers between economic policy uncertainty and stock markets: Evidence from China. *Research in International Business and Finance*, *53*(March). https://doi.org/10.1016/j.ribaf.2020.101233

Wu, F. (2019). ur l P re of. *International Review of Financial Analysis*, 101416. https://doi.org/10.1016/j.irfa.2019.101416

Xu, X., Chen, X., Jia, F., Brown, S., Gong, Y., & Xu, Y. (2018). International Journal of Production Economics Supply chain fi nance : A systematic literature review and bibliometric analysis. *Intern. Journal of Production Economics*, *204*(September 2016), 160–173. https://doi.org/10.1016/j.ijpe.2018.08.003

Yarovaya, L., Brzeszczyński, J., & Lau, C. K. M. (2016). Intra- and inter-regional return and volatility spillovers across emerging and developed markets: Evidence from stock indices and stock index futures. *International Review of Financial Analysis*, *43*, 96–114. https://doi.org/10.1016/j.irfa.2015.09.004

Zamore, S., Ohene Djan, K., Alon, I., & Hobdari, B. (2018). Credit Risk Research: Review and Agenda. *Emerging Markets Finance and Trade*, *54*(4), 811–835. https://doi.org/10.1080/1540496X.2018.1433658