Bibliometric Analysis of Emerging Bond Market Research: Performance Insights and Science Mapping

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Abstract

This bibliometric paper investigates the research landscape in emerging bond market literature, spanning 1993 to 2023, and encompasses a total of 325 research articles. Employing a multifaceted approach, it begins by examining publication trends, core journals, prominent authors, influential articles, and keyword dynamics, providing a comprehensive overview of research dynamics in this domain. Beyond performance analysis, the study ventures into science mapping using co-word analysis to uncover the underlying conceptual structure of the emerging bond market field. The bibliographic data has been drawn from Scopus and analyzed using the Bibliometrix R package, providing insights into the current dimensions of emerging bond market studies. This analysis facilitated the identification of five major keyword clusters, i.e., sovereign bonds, the impact of financial crises, yield curve, corporate bonds, and Islamic bonds in the emerging bond market space. Based on these themes, the study also suggests avenues for future scholarly exploration in this specialized field.

Keywords: *Emerging Bond markets, Science mapping, Bibliometric analysis, Conceptual structure, Performance Insights.*

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1. Introduction

The landscape of portfolio capital flows in emerging bond markets has witnessed substantial changes in the aftermath of the global financial crisis, largely attributed to the low-interest-rate environment prevailing in advanced economies (Garcia-Lopez et al., 2021). This has prompted institutional investors to seek higher yields in riskier assets, driving a surge in investment in emerging market bonds, particularly local currency bonds issued by governments and corporations in emerging nations (Belke & Verheyen, 2014). Figure 1 illustrates these dynamics, showcasing significant jumps in portfolio investment after 2008 and 2015.
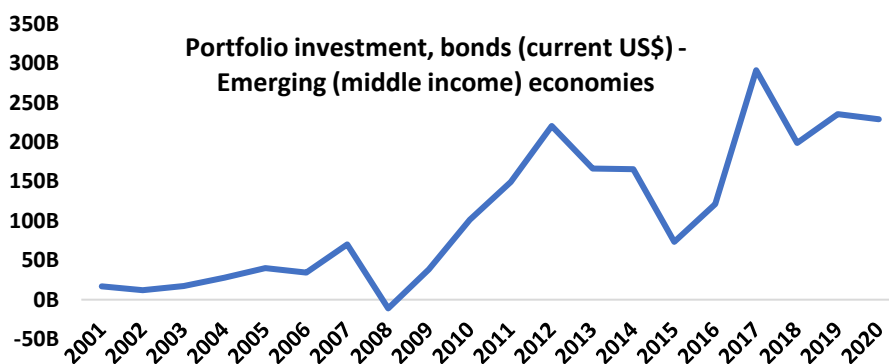

Figure 1. Portfolio investment in bonds of Emerging (middle-income) economies

Source: World Bank data Retrieved from
https://data.worldbank.org/indicator/DT.NFL.BOND.CD?end=2020&locations=XP&start=2001

These emerging market bonds, known for their appealing yield enhancement and diversification benefits, have rapidly become a significant segment of the global bond market, holding a 17% market share in 2020, up from 5% in 2010 (SIFMA, 2021). As academic interest in understanding the dynamics of emerging bond markets grows, researchers continue to delve deeper into the various factors that influence market behavior, risk assessment, and investment strategies. Thus, this manuscript aims to perform a bibliometric analysis to explore the development trends, influential contributors, and conceptual structure of the emerging bond market field. The study seeks to identify key journals, chart significant publications and authors, conceptual structure, and propose directions for future research.

Bibliometric analysis, known for its objectivity in interpreting vast amounts of unstructured data, employs two major techniques in this study: performance analysis and science mapping (Vogel & Güttel, 2013; Donthu et al., 2021). Performance analysis provides insights into the field's development and prolific research constituents, including authors, institutions, countries, and journals. This may include charting the publication trend and identifying core journals, prominent authors, and influential articles in the field. On the other hand, science mapping

explores the structural and dynamic aspects of scientific disciplines by creating visual networks that illustrate how different concepts, authors, or articles are interconnected. This has been done using quantitative methods like citation analysis, co-citation, bibliographic coupling, co-word analysis, and co-authorship analysis. This approach stands in contrast to traditional narrative-based reviews, ensuring a rigorous and unbiased examination of the existing literature (Tranfield et al., 2003).

The use of bibliometric analysis has gained prominence in the social sciences and related fields, with recent applications in business and finance, such as studies on airline revenue management (Raza et al., 2020), recycling behavior (Phulwani et al., 2020), volatility spillover (Chen & Yang, 2021), electronic word of mouth (Donthu et al., 2021), behavioral finance (Kumar & Choudhary, 2023) and sustainable finance (Kumar et al., 2022). These studies highlight the increasing importance of employing bibliometric analysis to explore and map the structures of literature in social sciences and allied fields.

This review study will help to provide a fresh and expansive perspective on the emerging bond market field. The study uses publication- and citation-based metrics for performance analysis and enrichment techniques such as PageRank and centrality for science mapping, as suggested by (Donthu et al., 2021). The study focuses on the following research questions.

- What are the trends in the annual publication volume and growth rate of research articles in the emerging bond market?
- Which articles have been most influential in shaping the field of the emerging bond market, as indicated by citation patterns, and who are the most prolific authors contributing to this field?
- Which journals have been the most prominent outlets for emerging bond market research?
- What constitutes the conceptual structure of the field of emerging bond market?
- What are the future research directions for emerging bond market research?

The analysis answers these questions by providing publication trends, influential articles, core journals, and prolific authors using performance analysis. Next, the study employs a science mapping tool to identify conceptual structures using co-word clustering. Lastly, the study uses these identified clusters (themes) to analyze the gaps in the literature and suggest future research directions.

The study's findings can be utilized in a variety of ways. First, researchers in the emerging bond market field may obtain an overview of the publishing trend over time to understand the significant jumps in publications and associated events. Second, future authors can quickly locate relevant publications (influential articles), prominent research outlets (core journals), and prolific authors. Third, prospective authors can use the conceptual bases revealed through this study to identify the evolution and critical studies of the field. Fourth, the study will assist future

researchers by providing future research directions and gaps in the emerging bond market field.

The rest of the paper is organized as follows. Section two describes the methodology, data retrieval process, and various bibliometric techniques, including co-word analysis used in the study. Next, section three discusses the results of the performance and science mapping analysis. Section four suggests future research directions. Finally, section five concludes with the study's key findings and limitations.

2. Methods and Materials

The study employs the SPAR-4-SLR protocol to ensure proper procedure for conducting the bibliometric review. The SPAR-4-SLR protocol, in particular, consists of three major stages, namely assembling, arranging, and assessing (Paul et al., 2021), the details of which are discussed in the following sections.

3.1 Assembling

The assembling stage comprises two sub-stages, namely identification, and acquisition of research domain data. In the first sub-stage, the study identified research questions (Performance and science mapping of the emerging bond market literature), data source (Journals), and source quality (Scopus). Next, to retrieve the bibliographic data, a search query in the operator "Title-Abs-key" of the Scopus database "emerging*" and "bond market*" was run, resulting in 409 research documents as of 24 November 2023. The study used Scopus due to its better journal coverage and ease of extraction than other databases, such as the Web of Science and Google Scholar, especially in the Social Sciences field (Mongeon & Paul-Hus, 2016; Paul et al., 2021; Phulwani et al., 2020). The bibliometric data was collected on 24 November 2023, encompassing all the studies published up to that date.

3.2 Arranging

The arranging stage deals with two sub-stages, namely, organizing code and purification. The study uses the organizing code in Scopus to filter the search results according to subject area, language, document type, and source type. The review incorporates subject areas of the emerging bond market, namely "business, management, and accounting," "economics, econometrics, and finance," "decision sciences," "environmental science," "mathematics," "arts and humanities," "computer science," and "social sciences." The interdisciplinary nature of asset class research is exemplified by the diverse range of subject areas contributing to the field, as shown in the study by Gairola and Dey (2023). Subjects such as 'Business, management, and accounting' and 'Decision Sciences' intersect significantly with traditional financial domains, showcasing the need to include broader subject filters in the bibliometric analysis. Thus, a variety of interdisciplinary subject areas are included to extend beyond the core finance subject filters to embrace influences from other subjects. Next, for purification, documents not in English were removed

due to limited language proficiency in languages other than English. Non-journal sources, such as books, book chapters, and conference proceedings, were discarded because they may not have been subjected to rigorous peer review. Other than that, editorials were also left out due to their non-peer-review nature. In all, 325 documents were returned after the organizing code and the purification of search results in the arranging stage.

3.3 Assessing

With different types of qualitative and quantitative literature review methods available (Knopf, 2006), the present study employs bibliometric analysis to evaluate the emerging bond market. Bibliometric analysis, a sub-form of domain-based systematic review, refers to the quantitative approach to evaluating and studying scientific communications (Donthu et al., 2021; Vogel & Güttel, 2013; Zupic & Čater, 2014). The study implements bibliometric analysis through performance analysis and science mapping using Biblliometrix R-package (Aria & Cuccurullo, 2017). The performance analysis depicts the publication trend, core journals, prominent authors, influential articles, and keyword dynamics, whereas science mapping identifies the conceptual structure of the domain. Furthermore, the study indicates the gaps and potential research directions through article readings to propose the agenda. Finally, with regard to reporting, the study uses a combination of words, figures, and tables as reporting conventions, and it admits its limitations at the end.

4. Results and Discussion

The results of this study are divided into two parts: 1) Performance Analysis and 2) Science mapping. The performance analysis helps measure the field's academic richness, such as publication trends, core journals, prominent authors, influential articles, and keyword dynamics. In contrast, science mapping assists in investigating the intellectual and conceptual structure of the field.

4.1 Performance Analysis

4.1.1 Publication Trend over the Years

Figure 2 presents the publication trend in emerging bond market literature. The first paper on the emerging bond market was published in a Scopus-indexed journal by Rhee (1993), which discussed the growth of emerging bond markets in southeast Asia and obstacles to their development. Following this foundational work, research on emerging bond markets has increased significantly over the last three decades, as indicated by a 12.99% compound annual growth rate in publications. This growth rate significantly exceeds that of option pricing models, which is 6%, indicating that the latter is a well-established domain (Nisha et al., 2024).

Compared to the unpredictable yet exponential growth witnessed in Bitcoin research (Jalal et al., 2021) and the market-correlated swings in gold-focused studies (Corbet et al., 2019), emerging bond markets appear as a subject characterized by both

strong growth and intellectual vigor. Figure 2 depicts the financial research community's involvement in emerging bond markets amidst the changing dynamics of global financial systems. Other than that, a significant jump in publication growth can be seen after 2008 and 2015 due to the global financial crisis and negative real interest rates in advanced economies, respectively.
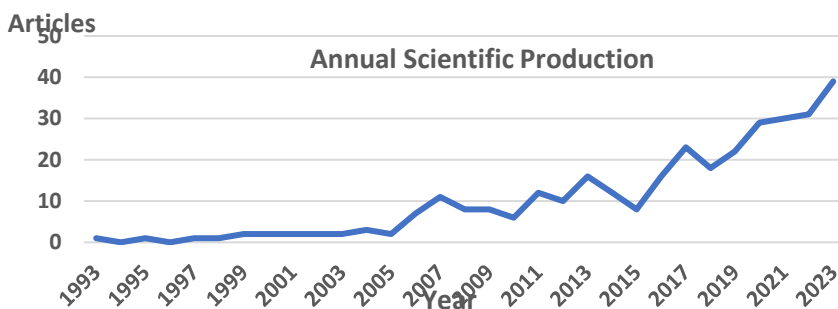

Figure 2. Publication Trend over the year
Source: Authors' Calculations

4.1.2 Core journals

Table 1 presents a detailed view of these journals, quantifying their influence through bibliometric indices such as the h-index, g-index, and m-index and capturing their scholarly output through total citations (TC) and number of publications (NP).

Table 1. Core journals in the emerging bond market

Journals	h_index	g_index	m_index	TC	NP
Journal of International Money and Finance	9	14	0.45	201	15
Emerging Markets Review	9	11	0.429	288	11
Emerging Markets Finance and Trade	4	6	0.333	43	9
Journal of Banking and Finance	7	8	0.412	244	8
International Review of Economics and Finance	5	7	0.278	243	7
Journal of International Financial Markets, Institutions and Money	6	7	0.286	126	7
Finance Research Letters	5	6	0.625	131	6
Journal of Emerging Market Finance	2	3	0.087	16	6
Managerial Finance	4	6	0.148	148	6
Economic Modelling	4	5	0.308	173	5
International Review of Financial Analysis	2	5	0.4	40	5
Journal of International Economics	2	5	0.105	82	5
Journal of Multinational Financial Management	4	5	0.211	134	5
North American Journal of Economics and Finance	3	5	0.12	47	5
Applied Financial Economics	2	4	0.087	27	4
Borsa Istanbul Review	3	4	0.3	45	4

Note: TC= Total Citations, NP=Number of Publications

The Journal of International Money and Finance emerges as a pivotal publication, leading the core cluster with the highest h-index, g-index, and m-index and featuring 15 publications, as shown in Table 1. The Emerging Market Review, while having fewer publications, leads in total citations, emphasizing its critical role in disseminating research with a notable impact, closely followed by the Journal of Banking and Finance and the International Review of Economics and Finance. This concentration of citations and indices in these top journals underscores their significant influence on the literature concerning emerging bond markets.

Utilizing Bradford's law, Figure 3 clusters journals in the emerging bond market (Bradford, 1934). The core zone includes 16 journals, contributing 33% of publications.
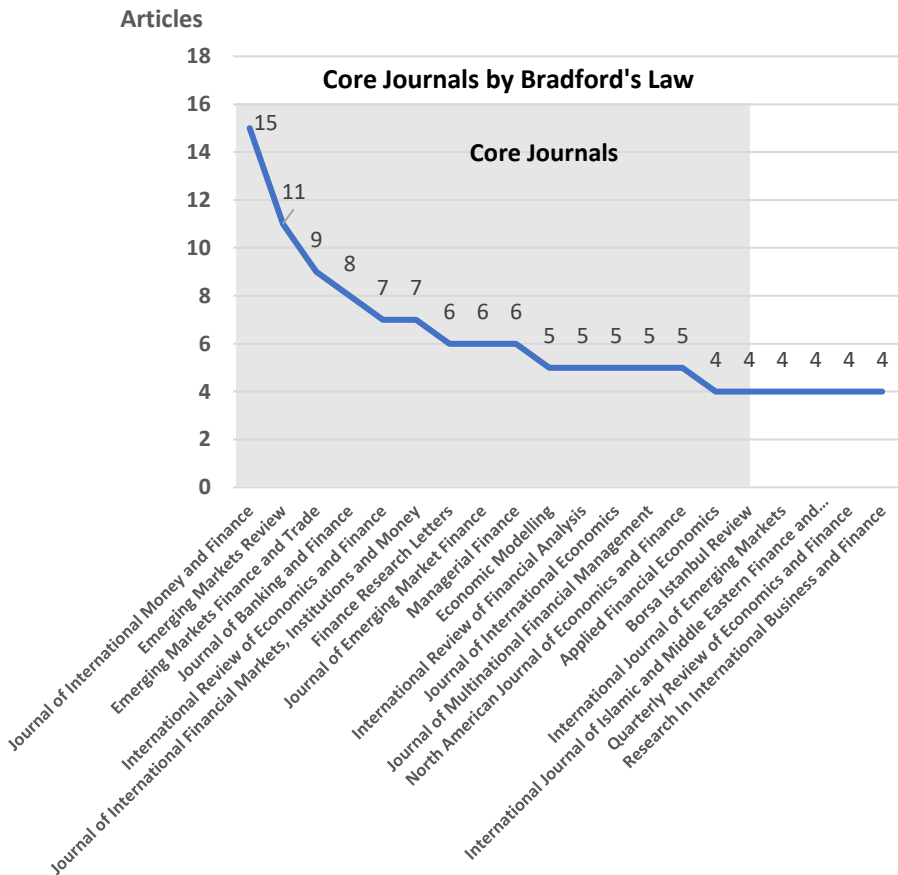

Figure 3. Core Journals

Source: Authors' Calculations

4.1.3 Prominent authors

Table 2 lists the prominent contributors to emerging bond market research, detailing their key citation-and publication-related metrics in assessing the impact and productivity of researchers. The h-index measures an author's productivity and citation impact by counting the number of publications that have each received at least as many citations as the number of publications. The g-index enhances this by focusing on the most cited papers, calculated by finding the largest number of articles that together have squared total citations of at least g^2, thus emphasizing peak academic output. The m-index normalizes the h-index by the years the researcher has been active, facilitating comparisons across different career stages.

Within this framework, V. Piljak from the University of Vaasa in Finland stands out as the most prolific author, with the highest h-index of 4 and a g-index of 6, through a compact yet impactful set of six publications. Followed closely by J. Beirne from the Asian Development Bank Institute in Japan and C.Y. Park and D. Park from the Asian Development Bank in the Philippines, each with an h-index of 4 and a g-index of 4 across four publications. R.A. Bhuiyan distinguishes himself with the highest m-index of 0.429, indicating rapid academic influence relative to his career duration. Additionally, D. Kenourgios from the National and Kapodistrian University of Athens in Greece is the most cited author, with 244 citations reflecting his significant impact on the field.

Table. 2 Prominent authors in the field

Element	h-index	g-index	m-index	TC	NP
Piljak, V.	4	6	0.333	130	6
Beirne, J.	4	4	0.364	79	4
Park, C-Y.	4	4	0.25	83	4
Burger, J.D.	3	4	0.158	173	4
Swinkels, L.	3	4	0.375	21	4
Warnock, F.E.	3	4	0.158	173	4
Prasanna, K.	2	3	0.25	12	4
Bhuiyan, R.A.	3	3	0.429	63	3
Kenourgios, D.	3	3	0.231	244	3
Park, D.	3	3	0.5	9	3

Note: TC= Total Citations, NP=Number of Publications
Source: Authors' Calculations

4.1.4 Influential articles

Table 3 reveals the top 20 influential articles in the emerging bond market domain based on their total citations. Banga (2019) is the leading work, with 168 citations, critically examines the green bond market, identifying the barriers that developing countries face, such as institutional weaknesses and high issuance costs, while proposing the use of development banks as facilitators.

Table 3. Influential articles

Author	Article Title	Year	Total Citations	Normalized Total Citations
Banga, J.	The green bond market: a potential source of climate finance for developing countries	2019	168	28.00
Kenourgios, D.	Islamic financial markets and global crises: Contagion or decoupling?	2016	112	12.44
Kenourgios, D.	Emerging markets and financial crises: Regional global or isolated shocks?	2012	105	8.08
Demirer, R.	Oil price shocks, global financial markets, and their connectedness	2020	95	19.00
Dungey, M.	Contagion in international bond markets during the Russian and the LTCM crises	2006	83	4.37
Claessens, S.	Government Bonds in Domestic and Foreign Currency: The Role of Institutional and Macroeconomic Factors	2007	78	4.33
Lee, J.W.	Green Finance and Sustainable Development Goals: The Case of China	2020	75	15.00
Ciocchini, F.	Does corruption increase emerging market bond spreads?	2003	74	3.36
Burger, J.D.	Local Currency Bond Markets	2006	71	3.74
Burger, J.D.	Foreign participation in local currency bond markets	2007	69	3.83
Ahmad, W.	Financial connectedness of BRICS and global sovereign bond markets	2018	66	9.43
Livingston, M.	Are Chinese credit ratings relevant? A study of the Chinese bond market and credit rating industry	2018	66	9.43
Gravelle, T.	Detecting shift-contagion in currency and bond markets	2006	63	3.32
Bali, T.G.	Do Hedge Funds Outperform Stocks and Bonds?	2013	59	4.92
Nowak, S.	Macroeconomic fundamentals, price discovery, and volatility dynamics in emerging bond markets	2011	57	4.07
Zaremba, A.	Term spreads and the COVID-19 pandemic: Evidence from international sovereign bond markets	2022	55	18.33
Albagli, E.	Channels of U.S. monetary policy spillovers to international bond markets	2019	51	8.50
Dittmar, R.F.	Do Sovereign Bonds Benefit Corporate Bonds in Emerging Markets?	2008	51	3.00
Piljak, V.	Bond markets co-movement dynamics and macroeconomic factors: Evidence from emerging and frontier markets	2013	50	4.17
Dimic, N.	Impact of Financial Market Uncertainty and macroeconomic factors on stock-bond correlation in emerging markets	2016	50	5.56

Source: Authors' Calculations

Following this, Kenourgios et al. (2016) article, with 112 citations, explores the resilience of Islamic financial markets during global financial crises, suggesting a protective decoupling effect that shields these markets from broader economic shocks. This notion supports the idea that Islamic bonds could serve as a stabilizing factor in investment portfolios during turbulent times. Lastly, Kenourgios and Padhi's (2012) study, which gathered 105 citations, provides a detailed analysis of contagion effects across financial crises in stock and bond markets of emerging economies, offering crucial insights into the dynamics of market responses and the significant role of stock and bond markets in transmitting shocks during the subprime crisis.

Moreover, while traditional citation counts are insightful, normalized total citation scores offer a refined measure of influence adjusted for field-specific citation behaviors. Although Zaremba et al. (2021) article is not the most cited, it holds the highest normalized total citation score of 10.57, reflecting its significant impact. This paper delves into the effects of the COVID-19 pandemic on the term structure of interest rates across international sovereign bond markets, utilizing a comprehensive dataset from both developed and emerging countries. It is closely followed by Banga (2019), with a score of 9.48. Together, these seminal articles significantly shape the discourse on emerging bond markets, providing foundational insights and novel strategies to address global financial challenges effectively.

3.2 Science Mapping (Conceptual Mapping)

The conceptual structure, also known as co-word analysis, establishes relationships within the documents through the co-occurrence of keywords present in authors' keywords, keywords plus, titles, or abstracts. This method employs a network or map of these keywords to understand the cognitive and conceptual structure of the domain, as described by Börner et al. (2003). It is also instrumental in suggesting future directions of the research field Donthu et al. (2021).

In this study, authors' keywords were preferred due to their comprehensiveness in representing the articles' content, as suggested by Zhang et al. (2016). The co-occurrence matrix generated using the Bibliometrix R package leads to a network graph, where the nodes are keywords and edges represent their co-occurrences, with edge weights proportional to the frequency of these occurrences. The network utilizes the Louvain clustering algorithm and the Kamada-Kawai layout to enhance clarity and accuracy in visual representation, as suggested by Blondel et al. (2008) and Zupic and Čater (2014). Co-occurrences are normalized using similarity measures with association strength to ensure meaningful clustering. This method not only clarifies the current research landscape in terms of clusters but also assists in identifying emerging trends and areas that have not been sufficiently explored within the field of emerging bond markets.

Figure 4 depicts the co-occurrence network of keywords within the field, and all the clusters are closely related. In contrast, Table 4 reveals a detailed look at the results

using three major network metrics techniques: betweenness, closeness, and PageRank score.
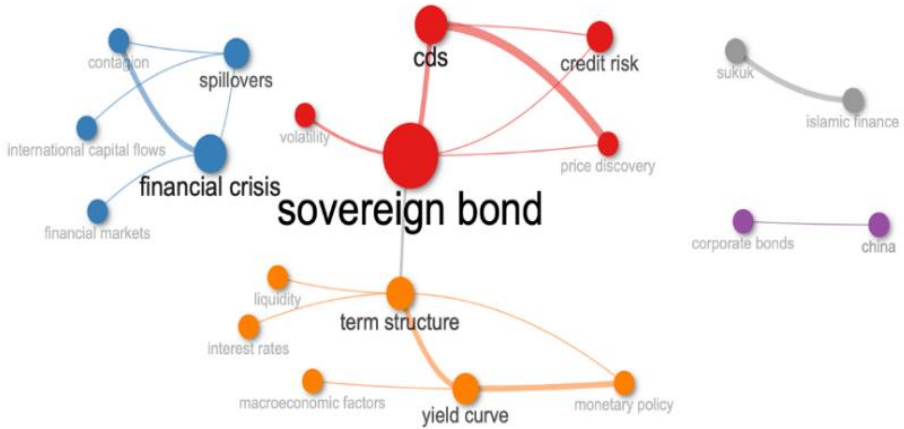

Figure 4. Co-word network

Source: Authors' Calculations

Table 4. Keyword cluster

Keyword	Cluster	Betweenness	Closeness	PageRank
sovereign bond	1	37.28571429	0.058823529	0.078129638
CDs	1	0.714285714	0.04	0.050992825
credit risk	1	0	0.038461538	0.021354397
volatility	1	0	0.037037037	0.017624325
price discovery	1	0	0.038461538	0.033175461
financial crisis	2	3	0.2	0.054632156
spillovers	2	3	0.2	0.043044508
contagion	2	0	0.166666667	0.040587024
financial markets	2	0	0.125	0.016781747
international capital flows	2	0	0.125	0.017368358
yield curve	3	10	0.041666667	0.054044366
term structure	3	37	0.058823529	0.069486164
macroeconomic factors	3	0	0.029411765	0.014359956
monetary policy	3	0	0.04	0.032634151
liquidity	3	0	0.037037037	0.014259066
interest rates	3	0	0.037037037	0.014259066
China	4	1	0.5	0.050326188
corporate bonds	4	0	0.333333333	0.026561044
Islamic finance	5	0	1	0.034482759
sukuk	5	0	1	0.034482759

Note: OC = Occurrence
Source: Authors' Calculations

Five clusters, namely sovereign bonds (red cluster), financial crisis (blue cluster), the yield curve (orange cluster), corporate bonds (violet cluster), and Islamic bonds (grey cluster), have been identified. The summaries of each cluster are presented next.

Cluster 1 Sovereign Bonds (Red): The first cluster relates to emerging financial markets' sovereign bond market segment. The most prominent keywords in this cluster are sovereign bonds and CDS, has the highest betweenness and closeness scores of 37.2857 and 0.05882, respectively, which highlight their high knowledge dissemination and influential potential to other clusters in the network. Sovereign bonds also have the highest PageRank score of 0.0781, which signifies their prominent nature in the cluster. Other significant keywords in the sovereign bonds cluster include CDS, credit risk, volatility, and price discovery. This cluster comprises a total of 24 papers, reflecting a focused yet substantial body of research within this sub-domain. This research cluster explores the dynamics of price discovery in sovereign bond markets, highlighting studies like those by Aktug et al. (2012) and Hassan et al. (2015), which examine the intricate interactions between CDS and bond markets in response to credit risk information. Li and Scrimgeour (2021) carry forward this by assessing the impact of CDS-bond deviations on market volatility, noting increased risks during high volatility periods.

Additionally, the integration of sovereign bonds with other asset markets is also investigated. Balli et al. (2020) investigate spillover effects from developed to emerging markets, while Dimic et al. (2021) look at how global uncertainties affect stock-bond correlations. These studies suggest that global factors often dominate over local influences, as supported by Inaba (2021), who finds that sovereign bond returns are cyclically dependent on global factors across 41 economies.

Further research by Khalid and Ahmad (2023) and Qin et al. (2023) highlights regional disparities in market integration and suggests that expanding geographical scope and incorporating diverse financial instruments could enrich understanding. Collectively, these studies provide deep insights into how sovereign bonds interact with global financial markets, offering a foundation for future research on economic policies and financial stability's impact on these markets.

Cluster 2 Impact of Financial Crises on Emerging Market Bonds (Blue): This cluster delves into the impact of financial crises on emerging market (EM) bonds, accentuated by keywords such as 'financial crisis,' 'spillovers,' 'contagion in financial markets,' and 'international capital flows.' These terms collectively define the cluster's thematic focus, with 'financial crisis' notably having the highest betweenness and closeness scores of 3 and 0.2, respectively, and the highest PageRank score of 0.05463, indicating its significant influence within the cluster.

The cluster comprises 26 papers and explores the transmission of volatility and returns during financial crises, with a strong emphasis on the effects of major central bank policies on EM economies. The studies include Apostolou and Beirne (2019) which found EM bond markets are highly sensitive to balance sheet adjustments by

the Federal Reserve and European Central Bank. Azis et al. (2021) further revealed that during crises like the 2008 financial crisis and the COVID-19 pandemic, U.S. monetary policy has a pronounced impact on EM bonds and equity markets. Similarly, Kearns et al. (2023) observed a growing influence of the European Central Bank on bond yields, in contrast to the steady impact of the Federal Reserve, while MacDonald (2017) identifies how capital market frictions affect responses to unconventional asset purchases in EM markets. Additionally, Naqvi (2019) underscored the dominance of external push factors in shaping EM government policy and capital flows, pointing out the minimal control these governments have over their financial environments. These studies collectively highlighted the nuanced and significant effects of international monetary policies on market volatility, investment decisions, and economic policy in emerging markets.

Cluster 3 Yield Curve (Orange): The third cluster mainly deals with the effects of macroeconomic policy on the yield curve factors. A total of six major keywords have been identified in this cluster, namely yield curve, term structure, macroeconomic factors, liquidity, and interest rates. The term structure is the cluster's most influential and prolific keyword due to its high betweenness, closeness, and PageRank score. The cluster encompasses 20 papers, indicating a concentrated and significant exploration of this theme. Specifically, the articles under this cluster evaluate the impact of local macroeconomic and financial factors (Mbarek et al., 2019; Paweenawat, 2017; Sowmya & Prasanna, 2018) and global macroeconomic policy (Candelon & Moura, 2023; Cepni et al., 2021; Christensen et al., 2021; Özbek & Talaslı, 2020). For instance, Mbarek et al. (2019) showed that monetary policy shocks in Tunisia significantly affect the short end of the yield curve during economic uncertainty, a finding that aligns with Paweenawat (2017), who demonstrated that the term structure of Thai government bonds provides key information on future interest rates and GDP growth despite market illiquidity.

Expanding further, Sowmya and Prasanna (2018) investigated the bi-directional influences between yield curve movements and macroeconomic factors across nine Asian markets, highlighting how policy rates and inflation impact short-term rates. This interplay between domestic and global influences is further explored by Candelon and Moura (2023) and Cepni et al. (2021), who noted how global uncertainties and macroeconomic conditions impact yield curves in emerging markets, emphasizing the substantial role of international policies.

Additionally, Christensen et al. (2021) discussed how foreign investments influence financial stability in Mexican sovereign bonds through changes in liquidity premiums. Similarly, Özbek and Talaslı (2020) examined the role of domestic and international factors in determining term premia across various emerging markets.

Together, these studies shed light on the complex interactions of local and global policies on yield curves, providing critical insights for shaping future monetary strategies and understanding their implications on market stability in emerging economies.

Cluster 4 Corporate Bonds (Violet): The fourth cluster contains keywords that focus on corporate bond risk modeling and consists of 10 research papers. This cluster comprises only two major keywords: corporate bonds and China. China has the highest closeness and PageRank scores of 0.5 and 0.0503, respectively, highlighting its importance in this cluster and having an influential impact on other clusters.

This cluster explores recovery rates of defaulted corporate bonds in emerging markets through studies like Mili et al. (2018), who found that firm characteristics significantly influence these rates, particularly during financial crises. Furthermore, Lin and Milhaupt (2017) assessed China's corporate bond market, identifying how a state-centric network has driven its growth despite institutional weaknesses, impacting its functionality and its interconnectedness with China's shadow banking system.

Collectively, these research efforts provide a detailed understanding of how both domestic conditions and wider systemic influences affect the dynamics of the corporate bond market in emerging economies. By highlighting the unique challenges and characteristics of emerging markets, particularly China, this cluster provides invaluable insights into managing risks and understanding the complex interdependencies that influence corporate bonds globally. These contributions are crucial for policymakers, investors, and researchers who navigate or study the complexities of corporate finance in volatile and politically intricate markets.

Cluster 5 Islamic bonds (Grey): The sixth and final cluster pertains to Islamic bonds (Sukuk) and comprises two major keywords, namely Islamic finance and Sukuk, and it includes five papers. However, both the keywords have the same PageRank and closeness score of 0.0344 and 1, respectively, highlighting their prestigious and influential nature within the cluster. The research within this cluster investigates the financial integration between Sukuk and conventional bonds on a global scale, as well as the co-movement with other asset classes and their underlying determinants. Bhuiyan et al. (2018) utilized wavelet coherence and Multivariate GARCH analyses to demonstrate that Sukuk offers significant international diversification benefits by examining volatilities and correlations with bonds from emerging markets. In another study, Bhuiyan et al. (2019) further identified the bidirectional causality between the Malaysian Sukuk and various Asian bond markets, although interactions with China's bond market were notably limited. Furthermore, Hassan et al. (2018) found that Sukuk exhibits lower volatility and greater stability during market shocks compared to conventional bonds, with correlations notably strengthening during economic downturns, underscoring its resilience as a financial instrument.

5. Future Research Directions

Notably, a thorough review of articles within each keyword cluster revealed numerous observations, highlighting potential avenues for future research that could significantly enrich the field of the emerging bond market. Reflecting on these gaps, the study formulated 15 research questions. These are summarized in Table 5,

which organizes them across six thematic areas identified as key future research directions for the emerging bond market field.

To develop these research questions, a comprehensive literature review was undertaken, involving a detailed analysis of all papers associated with each co-word cluster. Questions were either directly extracted from the papers where they were explicitly stated or inspired by the identified gaps and emerging trends. Furthermore, Table 5 includes a 'Supporting Source' column, which cites the specific research papers from which the questions were derived or that provide the foundational context for the newly developed inquiries. This methodological approach ensures that each question is both firmly grounded in and contributes to advancing the scholarly discourse within these thematic areas.

Building on this foundation, the following sections will delve into the gaps the study identified and discuss the future research questions that emerged. This exploration aims to bridge the current knowledge voids and guide further investigations into the dynamic landscape of the emerging bond market.

5.1. Price discovery in the sovereign bond market

Price discovery related to the sovereign bond market is becoming a more significant area to examine as investors' exposure to sovereign debt markets grows. Although the general issue of relative efficiency between CDS and bond markets has been thoroughly explored, historical findings in the sovereign sector have been ambiguous, in contrast to corporate bonds (Raja et al., 2020). Another interesting issue in the CDS and sovereign bond market is their level of integration and impact on the market's volatility as a whole. However, some studies have examined this issue (see, e.g., Li & Scrimgeour (2021)), but the sample size used for the study was limited to only three emerging markets. Thus, extending these studies to include a larger country sample and more benchmark instruments is important. Other than that, the impact of micro-economic policies on sovereign market instruments has not yet been studied systematically (Mosley et al., 2020).

5.2 Understanding the yield curve dynamics through a macroeconomic perspective

Given the global investors' "search for yield" behavior, a large amount of capital has flowed into EM economies via debt instruments (Cepni et al., 2021), making the region vulnerable to macroeconomic shocks. Although researchers in these markets are studying the effect of global and local macroeconomic factors on the term structure but have failed to incorporate important factors such as illiquidity, quantitative easing, global financial cycle, and foreign holdings (Ahi et al., 2018; Christensen et al., 2021) Other than that, increasing the sample size would help in improving generalization of the results (Candelon & Moura, 2023). Furthermore, the future research direction should evaluate the performance of benchmark yield curve

models such as Nelson-Siegel and Nelson-Siegel-Svensson in different portfolio optimization strategies.

Table 5. Future research agenda proposal for the emerging bond market

Future research	Research questions	Supporting source
Price discovery in the sovereign bond market	1. Which market is more efficient in price discovery, sovereign bonds or CDS? 2. How well is the leading market in price discovery integrated with global financial markets? 3. Which market offers the most accurate and timely assessment of microeconomic risks during price discovery?	Li and Scrimgeour (2021), Mosley et al. (2020) and Raja et al. (2020)
Understanding the yield curve dynamics through a macroeconomic perspective	4. How do macroeconomic factors and global financial cycles affect the yield curves and risk premiums of sovereign bonds in emerging markets? 5. What are the impacts of monetary policy shocks, quantitative easing, and unconventional monetary policies on the term structure of interest rates in emerging markets? 6. How can the term structure of emerging market bonds be estimated in environments with missing data? 7. What is the performance of the Nelson-Siegel-Svensson model in various portfolio optimization contexts, and what information can be derived from the term structure of the yield curve?	Ahi et al. (2018); Cepni et al. (2021); Christensen et al. (2021); Nagy (2020); Özbek and Talaslı (2020)
Examining the spillover effects of financial contagion	8. How does quantitative easing, including its spillover effects, impact the return, volatility, and capital flows into emerging bond markets? 9. What are the effects of quantitative easing on various asset prices during crisis periods?	MacDonald (2017); Naqvi (2019); Tsang et al. (2021)
Credit risk modeling in the corporate bond market of emerging markets	10. How do local government policies influence the spread of quasi-national bonds in emerging economies? 11. What effect does the political environment have on the corporate bond market in emerging economies? 12. What are the determinants of recovery rates in defaulted corporate bonds and the major factors driving corporate bond issuance in these markets?	Lin and Milhaupt (2017); Mili et al. (2018); Schweizer et al. (2021); Walker et al. (2021)
Integration of Sukuk with other developed and emerging bond markets	13. What is the correlation and co-movement between Sukuk and conventional financial assets, and how do sectoral Sukuks relate to each other? 14. What are the lead-lag relationships between global bonds and the Sukuk market index? 15. How do Sukuks perform in terms of returns and volatility, and what are the determinants of this performance?	Bhuiyan et al. (2018, 2019); Hassan et al. (2018)

5.3 Examining the spillover effects of financial contagion

Although studies examining the volatility and return spillovers aspect of financial contagion have garnered the attention of various academics, the underlying factors causing these spillovers to have not been studied extensively (Tsang et al., 2021). These factors include balance sheet adjustments by major central banks, trade interlinkage, credit flows, unconventional monetary policy, and interbank linkages. It is also necessary to evaluate their time-varying nature during good and bad periods. Another aspect of the spillover effects of financial contagion for future research should be quantifying these effects over the regional markets and economies (MacDonald, 2017). The extent of the spillover effects on GDP growth rate, change in local monetary policies, and asset market returns in absolute terms should also be explored.

5.4 Credit risk modeling in the corporate bond market of emerging markets

Ample studies exist on the trends and determinants of corporate bond market development, but there is limited literature available on the other subfields of the corporate bond market, such as credit risk modeling. This includes studies on the recovery rates in defaulted corporate bonds of emerging markets and their determinants (Mili et al., 2018). Thus, future studies can include country- and firm-specific variables with a bigger sample of emerging countries. One of the major country-specific variables could be the influence of the political environment on the corporate bond market in emerging economies. However, most of the studies on this aspect are on the Chinese corporate bond market (see Lin & Milhaupt (2017); Schweizer et al. (2021); Walker et al. (2021); there is hardly any study on other emerging markets of Asia and Latin America.

5.5 Integration of Sukuk with other developed and emerging bond markets

Islamic bonds (Sukuk) are receiving much attention from potential emerging market investors, but there are hardly any conclusive studies on the co-movement and lead-lag relationship between Sukuk, developed, and emerging market bonds in the short and long run (Bhuiyan et al., 2019). It would also be meaningful to study the financial integration between Sukuk and traditional bonds for diversification purposes (Bhuiyan et al., 2018). There is also a dearth of studies that examine the behavior of Sukuk in terms of dynamic correlations and volatility (Hassan et al., 2018). However, future research should incorporate a broader data sample with a bigger time sample and corporate Sukuk.

6. Conclusion and Limitations

This study employs bibliometric analysis using the Bibliometrix R package to analyze the performance and examine the intellectual structure of emerging bond market literature. Examining 325 articles, the publication trend reveals a 12.99% annual growth with a significant jump after 2015. Out of 170 sources, 16 have been identified as core journals, contributing approximately 33% to the field. Noteworthy

journals include the Journal of International Money and Finance, Emerging Market Review, and Emerging Markets Finance and Trade. Piljak emerges as a prominent author in the field with the highest number of publications. Sovereign bonds, yield curve, and contagion dominate keywords, highlighting local currency bond market and integration themes. The top 20 influential articles in the emerging bond market domain highlight critical insights into the dynamics of green, Islamic, and sovereign bond markets during crises, with Banga (2019) studying the barriers in green bond markets for developing countries being the most cited. Notably, Zaremba et al. (2021) article, which has the highest normalized total citation score of 10.57, delves into the impact of the COVID-19 pandemic on international sovereign bond markets, emphasizing its significant scholarly influence.

Next, the study employs science mapping to identify the conceptual structure and future research directions for the field. Through co-word analysis, five major keyword clusters have been identified within the domain of emerging bond markets: 1) Sovereign bonds, which focus on price discovery and market integration, prominently featuring keywords like "sovereign bonds" and "CDS" that underscore their central role in knowledge dissemination and influence across clusters; 2) Impact of financial crisis over EM bonds, exploring the effects of crises on EM bond markets through keywords like "financial crisis" and "contagion," highlighting the critical nature of these terms in assessing market volatility and capital flows; 3) Yield curve, dealing with the influence of macroeconomic policies on yield curve dynamics, where "yield curve" emerges as a pivotal term due to its significant influence shaped by local and global policy drivers; 4) Corporate Bonds, focusing on risk modeling and political impacts, particularly in China, underlining the importance of corporate bonds and their geopolitical influences; 5) Islamic bonds (Sukuk), which examine the integration and co-movement between sukuk and conventional bonds, indicating the profound impact of "Islamic finance" and "Sukuk" within this financial segment. Together, these clusters reveal diverse aspects and dynamics within the bond market, providing a comprehensive framework for understanding various influences and interactions in this field. The study identifies limited keywords within clusters related to key research themes such as price discovery, yield curve dynamics, contagion spillovers, corporate bond credit risk modeling, and Sukuk integration. Based on these findings, the study highlights unexplored areas in these themes and suggests several questions for future research directions. These questions aim to further investigate the gaps and extend the understanding of how these key areas influence and interact within the broader context of emerging bond markets.

Even though this bibliometric review provides a detailed analysis of the field's academic richness, intellectual bases, and future research themes, the study suffers from some drawbacks. First, the study data is confined to the correctness and thoroughness of articles found in the Scopus database. Thus, it would be interesting to see a bibliometric review using different data acquisition platforms, such as the Web of Science, and a comparative analysis of their results with this review article.

Second, other bibliometric analysis tools, such as co-citation analysis and country collaboration, could also be employed in the future.

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