Journal of Islamic Monetary Economics and Finance, Vol. 9, No. 4 (2023), pp. 725 - 750
p-ISSN: 2460-6146, e-ISSN: 2460-6618

BIBLIOMETRIC ANALYSIS OF SHARIAH COMPLIANT CAPITAL ASSET PRICING MODELS

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ABSTRACT

This study conducts a bibliometric analysis of the literature on shariah compliant asset pricing based on Scopus-indexed publications. The data on publications are collected employing a search string encompassing various keywords related to Islamic finance and asset pricing. Simple statistical techniques are applied, complemented by the utilization of VOS viewer software to analyze document trends by year, country, source, and patterns of collaboration among authors, co-citations, and keywords co-occurrence. The bibliometric analysis reveals a proliferation of publications across 127 journals, with the Pacific Basin Finance Journal being the most prominent. Collaboration among authors spans 56 countries, with Malaysia emerging as a key contributor. Notably, keywords like "Islamic finance" and "Shariah-compliant" have seen increased importance in recent years. The statistical results demonstrate a substantial surge in Scopus-indexed publications related to Shariah-compliant compliant Capital Asset Pricing Models, particularly in the past five years, reflecting the growing popularity and research opportunities within Islamic finance and asset pricing.

Keywords: Bibliometric analysis, VOS viewer, Scopus, Asset pricing, Islamic finance.
JEL classification: G11; G12; G15.

Article history:
Received : September 17, 2023
Revised : November 5, 2023
Accepted : November 30, 2023
Available online : December 1, 2023

https://doi.org/10.21098/jimf.v9i4.1849

I. INTRODUCTION

1.1. Background

The field of Islamic finance has seen a spectacular expansion and prominence, triggered by a noticeable increasing demand for Shariah-compliant financial services and products (Askari et al., 2010; Imam & Kpodar, 2013). This growth can be dedicated to two factors. The first is the increase in the global Muslim population that has reached 2,014,875,752 individuals worldwide (according to the Global Muslim Population website on September 12, 2023) representing more than 25% of the world's total population of 8,059,503,007. And second, it is spurred by the growth of awareness and understanding of Islamic finance specially after the 2008's global financial crisis (Kayed & Hassan, 2011). Within this dynamic environment, the development of Shariah-compliant Capital Asset Pricing Models (CAPMs) has emerged as an important area of research, intending to integrate Islamic finance principles into conventional financial theory.

The conventional Capital Asset Pricing Models provided a framework for explaining the risk and return relationship of assets within an interest-based financial system. Nevertheless, Islamic finance principles based on Shariah law prohibit charging or receiving interest (riba) and discourage speculative activities (gharar) (Uddin, 2015). As a result, to comply with the characteristics of Islamic financial markets, a modified version of the CAPM is required (Hanif, 2010).

A growing number of scholars have conducted studies on Shariah-compliant asset pricing models in recent years (Derbali et al., 2017; Faisol et al., 2022). However, no bibliometric study specifically focusing on Shariah-compliant asset pricing models exists in literature. Bibliometric analysis provides researchers with an important instrument to perceive new developments and trends within a particular area of research. Identifying the challenges and advancements in Shariah-compliant asset pricing models necessitates a recognition of patterns, trends, and key contributors in the field.

1.2. Objective

This paper intends to contribute to literature by employing bibliometric analysis to examine the Scopus-indexed publications related to Shariah-compliant asset pricing models. It lists the top-producing nations, sources, and authors in this discipline, in addition to the main concepts and patterns relating to this topic. The obtained information will benefit academics and practitioners by helping them fathom the challenges of pricing Shariah-compliant equities and providing possibilities for further research. Therefore, this study attempts to resolve the two following questions:

Which authors, countries, and sources are the most productive in this specific area of research?

What are the main trends, topics, and gaps in the shariah-compliant asset pricing model literature?

The structure of the paper is as follows: The first section concentrates on the development of shariah-compliant capital asset pricing models. The second section outlines the data sources used and methods employed in this investigation.

Third, several analytical methods, including co-authorship, co-occurrence, and co-citation, are used in order to identify publications, countries, organizations, and authors having the largest influence on the subject. Finally, the conclusion describes the main results and recommendations.

II. LITERATURE REVIEW

2.1. Background

The Islamic equity market is a distinctive subset of the broader financial market. It operates under specific Islamic financial principles and guidelines, setting it apart from conventional financial markets. Companies wishing to be a part of this market must undergo a rigorous screening process based on Shariah criteria. The criteria typically prohibits involvement in activities such as alcohol, gambling, pork-related products, and interest-bearing financial transactions. Only companies that pass this screening process are considered Shariah-compliant and can be included in the Islamic equity market.

What is notable is that participation in the Islamic equity market is not exclusive to Islamic investors. Both Islamic and conventional investors have the opportunity to participate in this market. Conventional investors may choose to diversify their investment portfolios by including Shariah-compliant stocks. This inclusivity broadens the investor base and promotes diversity within the market, making it more accessible and appealing to a broader range of investors.

The Islamic equity market aligns with the principles of ethical and faith-based investing. It appeals to those investors who seek to invest in companies that adhere to Islamic values and principles, while still aiming for competitive financial returns. As a result, this market not only offers financial opportunities but also allows investors to invest in a manner that aligns with their ethical and faith-based convictions.

It is important to note that, like the conventional equity market, the Islamic equity market comes with its own set of risks and potential returns. Investors who participate in this market should be aware of these factors and conduct thorough research to make informed investment decisions. Understanding the nature of the Islamic equity market, its unique criteria, and its appeal to a diverse range of investors can aid individuals in making more informed choices when considering investments in this market.

Over the last several decades, the growth of the Islamic financial markets has been remarkable. Islamic investment is centered on five key principles: no interest (riba), no excessive ambiguity (gharar), no speculating (maysir), risk and reward sharing, and no investing in "unethical" businesses (Uddin, 2015).

Islamic finance has inspired the creation of a new version of the Capital Asset Pricing Model (CAPM) that abides by these rules. Several scholars have suggested various approaches to replace interest in Islamic economics.

2.2. Previous Studies

2.2.1. Theorical Foundation of Capital Asset Pricing Models:

The cornerstone for current investing theories is established by Markowitz (1952), who show that a portfolio is efficient if it has the highest anticipated return for a given risk, as well as if it has the lowest risk for a particular expected return. Based on Markowitz's earlier research, Sharpe (1964) and Lintner (1965) develop the capital asset pricing model (CAPM) for evaluating risky assets. The CAPM is a single-factor model that focuses on the relationship between the expected rate of return for an asset and its systematic risk. The risk is composed of:

- Systematic risk (also known as market risk), is the risk that cannot be diversified away and is associated with the overall market movements. It's calculated by Beta.
- Unsystematic risk (also known as specific risk) is the risk that can be diversified away through proper portfolio diversification and is unique to each individual asset.

The calculation for the required return is determined by applying the following equation:

$$ERi = Rf + \beta i\ (ERm - Rf)$$

where ERi is expected return on asset i, Rf is risk-free rate, βi is beta of the investment, and (ERm−Rf) is market risk premium. Although the CAPM model receive support from some studies (Fama et al., 1969; Fama & MacBeth, 1973), there are additional research findings that present opposing outcomes(Black, 1972; Merton, 1973; Ross, 1976).

In its critique of CAPM, Ross (1976) brings into question the adequacy of relying solely on market beta to account for the entirety of cross-sectional disparities in stock returns. The APT is based on a multifactor asset pricing model that takes into consideration various facets of risk, aiming to elucidate the most comprehensive range of variations in stock returns.

Fama & French (1993) introduce a three-factor asset pricing model that serves as an expansion of the conventional CAPM. This enhanced model introduces two supplementary factors: the small minus big size effect and the high minus low-value effect. Carhart (1997) extends the Fama and French three-factor model by incorporating the momentum effect, resulting in the introduction of the four-factor model. This newly added fourth factor in Carhart's model accounts for the difference between the returns on a diversified portfolio of short-term winners and losers, effectively explaining the cross-sectional momentum effect. The four-factor model, as proposed by Carhart (1997), surpasses its predecessor, the three-factor model, in capturing cross-sectional variations in asset returns. Subsequently, Fama & French (2015) introduce a five-factor asset pricing model that delves into the connection between a company's characteristics and the cross-sectional variability of stock returns. This updated model is an extension of their earlier work in 1993, encompassing two additional factors: profitability and investment. The expanded five-factor model draws its theoretical foundation from the dividend discount model, which incorporates insights from Miller & Modigliani (1961) to establish relationships between cross-sectional returns and the book-to-

price ratio, profitability, and investment. These established connections provide a robust theoretical basis for the five-factor model, enabling it to offer a more comprehensive explanation for the broad range of cross-sectional variations in average returns, thereby surpassing its predecessors.

2.2.2. The Assumptions of the Traditional CAPM from Shariah Perspective:
Even with its limitations, the CAPM is still widely applied in modern finance. The following discussion offers an overview of the assumptions that underpin the development of the CAPM, while considering their compatibility with Shariah principles. Certain assumptions may appear to be overly simplistic and not entirely reflective of real-world complexities, such simplifications serve to render the CAPM more mathematically manageable.

No Transaction Cost: In order to simplify the model, the CAPM assumes that there are no transaction costs. This presumption conforms to the guidelines of Shariah. However, it is important to recognize that adding transaction costs to models, particularly for frequent trading, may introduce potential distortions and give rise to concerns regarding the introduction of extreme uncertainty (gharar) and speculative behavior (maysir) in Islamic finance, as well as misleading results.

Absence of individual income tax: Since there is no such thing as an income tax in Islam, the CAPM's assumption that there is no personal income tax is compliant with Shariah law. Rather, zakat on affluence is prescribed by Islam.

Divisibility and marketability of assets: In accordance with Shariah principles, the CAPM assumes that assets are marketable and infinitely divisible. Although actual circumstances might not always match this assumption exactly, easing these restrictions can produce more reliable empirical findings.

Anticipated return and variance drive investor decisions: Because the CAPM assumes that all anticipated returns, variance, and covariance are known, investors are free to base their decisions just on expected return and variance. This is consistent with the Islamic precepts of "al-kharaj bil daman" and "al-ghunm bil ghurm", which recognize the intrinsic relationship between risk and return.

Short Sales: Although the CAPM assumes short sales for mathematical reasons, this is against Islamic finance norms, especially the ban on selling what you do not own. Short selling is often not permitted in Islamic finance since it introduces speculative components, or maysir.

Unlimited lending and borrowing at a risk-free Rate: The mathematical derivation of the CAPM depends on the assumption of limitless lending and borrowing at a risk-free rate. Although the ban on interest in Islamic finance makes risk-free assets nonexistent, this presumption can be modified by utilizing Shariah-compliant substitutes like sukuk (Islamic bonds).

Homogeneity of expectations: In the context of Islamic finance, where investors are encouraged to engage in Shariah-compliant investments with the expectation of earning a return in a generally accepted manner, the CAPM's assumption that all investors have homogeneous expectations is reasonable. This may cause expectations to become uniform, especially if prices are marked in accordance with market rates.

Stock prices are not affected by investors: The notion that stock prices are not influenced by the purchasing and selling activities of investors aligns with the Shariah principle, which states that investors are not allowed to manipulate prices through their transactions. This idea is supported by the uniformity of expectations in Islamic finance.

In conclusion, the majority of the classic CAPM's underlying assumptions do not conflict with Shariah law.

2.2.3. Islamic CAPM:

Due to differences between conventional and Islamic finance principles, various researchers have proposed alternative instruments to replace interest in order to price shariah compliant assets.

Tomkins & Karim (1987) propose eliminating the risk-free rate. According to their research, they draw inspiration from Islamic finance, which strictly prohibits usury. Similarly, El-Ashker (1987) argues that zakat should take the place of the risk-free rate as the required minimum return for investors, emphasizing that interest is prohibited by Islamic law. Consequently, investors may avoid investing if there is no minimum return requirement.

Shaikh, (2010), for his part, recommends substituting the risk-free rate with Gross Domestic Product (GDP). According to Shaikh (2010) , the use of interest is in conflict with Islamic principles and the economic activity—rather than time—is what increases the worth of money. Additionally, he asserts that the utilization of interest leads to capital shortages and market imbalances. In line with this perspective, Shaikh (2010) proposes replacing the interest rate, creating an adjusted CAPM model.

Hanif (2010) takes a different approach and suggests a modified CAPM model by replacing the risk-free rate component with the inflation rate. Hanif's argument is based on the fact that the risk-free rate consists of both inflation and interest components. Even though the use of inflation instruments is still up for dispute regarding asset value fluctuations, considering inflation becomes crucial in predicting profit levels in practical Islamic finance. Consequently, Hanif (2010) names the modified CAPM model the Sharia Compliant Asset Pricing Model (SCAPM). The empirical study by Hanif & Dar (2011) using a nine-year data comparison on the Pakistani Karachi Stock Exchange reveals that SCAPM has a higher explanatory power than CAPM for medium-capitalization portfolios. Sadaf & Andleeb (2014) also conduct empirical research in Pakistan, where they investigate variants of sharia-compliant asset pricing models using data from the Karachi Meezan Index (KMI-30). They conclude that the return estimated by conventional CAPM is the same as the return by the Sharia model variant employing the inflation rate. As a result, they suggest that when making return forecasts, the inflation rate may be used in place of the risk-free rate.

Additionally, Hakim et al. (2016) performed a study on the Malaysia Stock Exchange, comparing the SCAPM with the conventional CAPM using data from 3 years and 10 years. According to their results, the two models may be employed interchangeably to explain portfolio returns. In line with the exploration of alternative asset pricing models, Derbali et al. (2017) use Sukuk (Islamic bonds)

rate as a substitute of the risk-free interest rate. They also follow the tenets of Islamic principles by including zakat and returns from sukuk as a charge on market profits. The model created by Derbali et al. (2017) also introduces the formula for market purification, which purifies market returns.

Faisol et al. (2022) modify the conventional capital asset pricing model introducing the SCAPM Model, which integrates mudharabah as an alternative to the conventional risk-free rate. The study employs a quantitative descriptive methodology, utilizing data from the Jakarta Islamic Index and Jakarta Composite Index from January 2014 to December 2018. The research modifies the CAPM regression model and employs significance testing to confirm the importance of the mudharabah variable. It also compares the SCAPM and CAPM models, finding no significant differences between them. Consequently, the study suggests that the mudharabah SCAPM model can serve as a valid alternative to the classic CAPM.

III. METHODOLOGY

The bibliometric analysis is a quantitative study that uses statistical methods to analyze the relationships between different elements such as authors, publications, journals, and citations (Ellegaard, 2018). In recent years, it has gained immense popularity in business research (Donthu et al., 2021). Scholars employ bibliometric analysis for several purposes, including analyzing the intellectual structure of a particular topic and identifying new trends in journal performance, collaboration patterns, and research elements (Chen & Yang, 2021). To perform a bibliometric analysis of the current literature, four steps were included in the analysis:

3.1. Literature Inquiry

We use the academic database Scopus for literature search. The following search string is employed: Islamic risk and return OR Islamic capital asset pricing OR Islamic asset pricing OR Islamic capital asset pricing model OR Shariah compliant asset pricing OR Shariah compliant asset pricing model OR Modelling asset pricing in Islamic finance OR Modelling capital asset pricing in Islamic finance. We find 255 scholarly publications covering from January 2009 to June 2023.

3.2. Information Gathering and Bibliometric Evaluation

We gather information on publications pertaining to Islamic capital asset pricing models, such as titles, authors, research fields, document types, keyword phrases, nations, and years of publication. We then use the VOS Viewer program to do a bibliometric study. This analysis is conducted to determine current research trends and track the field's development over time. Researchers and practitioners may gain from the knowledge by using it to better understand the difficulties in pricing Shariah-compliant stocks and to identify potential areas for further research. Through this study, it is also possible to comprehend how research was distributed in terms of time and place. This information is exploited to pinpoint the most successful writers and the most pertinent papers.

3.3 Keyword Research

On the VOS Viewer, we performed a keyword co-occurrence analysis that includes a network graph visualization of the connections between the keywords. To determine the most used terms, we also perform a keyword frequency study. The findings are helpful in identifying the most frequently discussed topics in relation to our subject.

3.4. Analysis of Clusters and Content

Similar items in a dataset are arranged using the cluster analysis approach. We employ cluster analysis to group related key words based on how often they appear together. The cluster analysis on VOS Viewer produces a cluster theme map as a visual depiction of the links between the keywords and the grouping of related terms. In textual data, clustering may be helpful for spotting patterns, trends, and linkages that are not immediately apparent from reading the text alone. We used cluster analysis to identify important clusters and themes.

IV. RESULTS AND ANALYSIS

4.1. Results

4.1.1. Publication by Year

The analysis of the 255 documents indexed in Scopus related to Shariah-compliant asset pricing models reveals a steady growth in interest in this topic over the years. The data in Figure 1 show that the first document is published in 2009 and from 2009 to 2018 the literature is almost scarce with a limited number of publications per year. However, a significant increase has been noticed since 2019. The year 2021 has the highest number of publications (47), followed by 2022 (44) and 2020 (34).

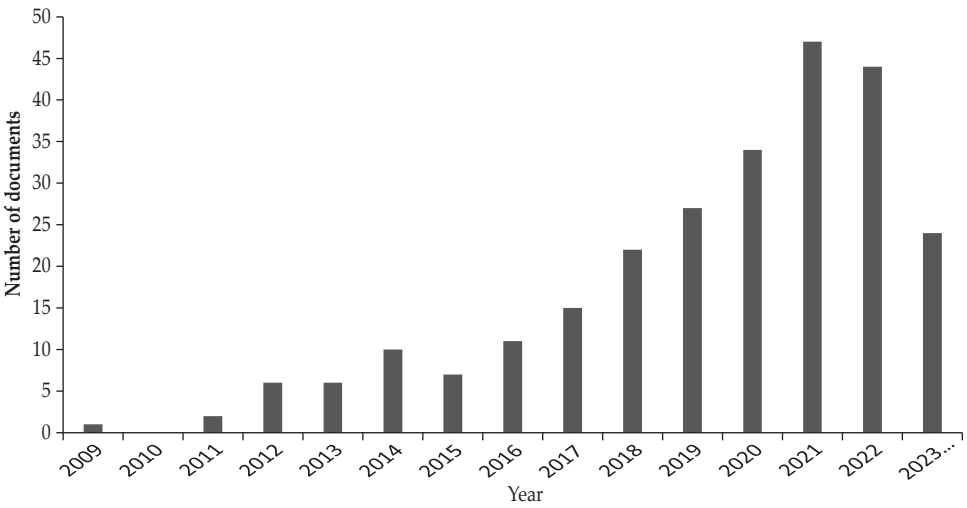

Figure 1.
Classification of Publications by Year

4.1.2. Contribution by Journal

The top 10 most cited journals are listed in Table 1 along with their ranks and scores based on Cite Score, Source Normalized Impact per Paper (SNIP), and SC Imago Journal Rank (SJR). While Cite Score measures the average number of citations per document and SNIP is calculated by dividing a journal's citation count by the expected citation rate of the journal's field, it should be noted that SJR takes the reputation of the citing journal and the subject field into account when weighting the citations received by the journal. By examining the citation trends of all the journals in that given subject, it is possible to estimate the predicted citation rate. To eliminate any biases that may result from variations in citation patterns across various scientific domains, SNIP is normalized.

The rankings show the wide range of journals in this area in terms of quality and rating, which reflects the importance of the topic and the enthusiasm among publishers and editors. The top ten journals and proceedings published around 22.13% of the papers in this field out of the 127 journals and proceedings included in the study. The journal "Pacific-Basin Finance Journal" has the most articles and citations overall.

Table 1.
The Rankings and Scores of the Top 10 Most Cited Journals

Source	Documents	Citations	SJR	SNIP	Cite score	PUBLISHER
Pacific basin finance journal	15	359	0.824	1.493	4.1	Elsevier
Economic systems	4	192	0.752	1.437	4.0	Elsevier
Journal of business ethics	4	114	2.438	2.863	10.8	Springer Nature
International journal of Islamic and middle eastern finance and management	13	101	0.501	1.464	3.8	Emerald Publishing
International review of economics and finance	5	86	0.748	1.345	3.9	Elsevier
Journal of corporate finance	4	75	2.103	2.670	5.4	Elsevier
Research in international business and finance	5	72	1.043	1.856	6.9	Elsevier
Journal of Islamic accounting and business research	12	66	0.359	0.828	2.2	Emerald Publishing
International journal of emerging markets	4	53	0.508	1.218	4.0	Emerald Publishing
Journal of international financial markets, institutions and money	4	38	1.310	2.164	6.2	Elsevier

4.1.3. Country Analysis

The data illustrated in Table 2 present the distribution of the publications about Islamic asset pricing models by countries. The literature on this subject is the contribution of 56 countries.

Malaysia has been the most active country in term of publications on this topic, with a total of 81 papers published. The United States comes in second place

with 38 publications. Pakistan and Indonesia, two countries with large Muslim populations, also rank highly in terms of the number of publications on this topic, with 30 and 28 papers respectively. Other countries that feature prominently in the analysis include Saudi Arabia, Australia, and the United Kingdom, all of which have published more than 20 papers on the topic.

Table 2.
Distribution of the Publications about Islamic Asset Pricing Models by Countries

Country	Number of Documents
Malaysia	81
United States	38
Pakistan	30
Indonesia	28
Saudi Arabia	25
Australia	22
United Kingdom	22
United Arab Emirates	21
Tunisia	10
Turkey	10
France	9
New Zealand	8
Canada	7
India	7
Bangladesh	5

Our analysis aims also to show the level of communication and influence between countries in the realm of Islamic capital asset pricing models. So, in Figure 2, we present a visualization of co-authorship among countries.

4.1.4. Visualization of co-Authorship among Countries

Country co-authorship promotes global collaboration, information sharing, and diversity in research. International collaboration among academics produces more significant results because it brings together a variety of perspectives, skills, and resources. These connections foster international cooperation, scientific diplomacy, and access to more resources and financing options. Significant countries are represented by the larger nodes, and their cooperation are shown by the links between nodes. The degree of collaboration is indicated by the thickness of the linkages and the spacing between nodes. Malaysia appears as the central node in this network. United states, Pakistan, Indonesia, Saudi Arabia, Australia, and United Kingdom are the principal partners.

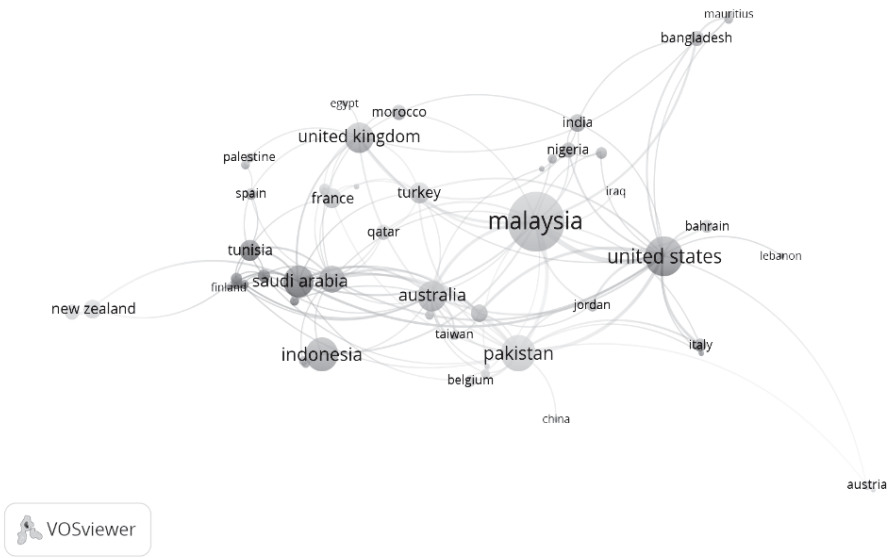

Figure 2.
The Co-Occurrence by Countries of Publications on Capital Asset Pricing Models

4.1.5. Influence of Authors

The authorship analysis of papers on shariah-compliant asset pricing models reveals that while there are many authors, only a small number of them have published significantly. Hassan M. K. has published 14 documents, which is the highest number out of the 505 writers, followed by Masih M. and Achraf, D., each with 6 publications.

When examining an author's expertise or impact in a particular field, it is crucial to take into consideration the relationship between authors. Co-authorship is thus taken into account and shown in Figure 3.

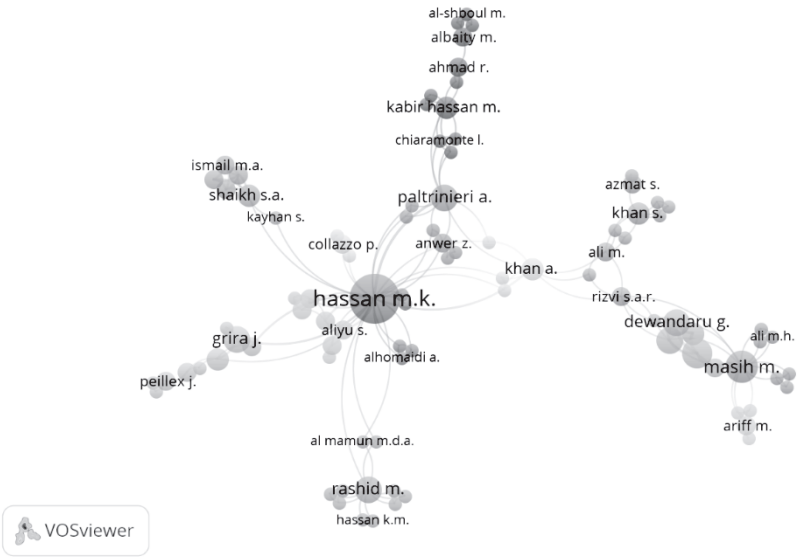

Figure 3.
The Co-Authorship Based on Publications on Capital Asset Pricing Models

A different image appears, however, if we use the quantity of citations as a gauge of an author's authority and influence on the subject. The citation counts of the 505 writers have been compared and show a large variation among them. As an example, Hassan M. K. has the most citations (331), followed by Achraf D. with 212. Balii.F. and Mohd-Rachid.R, on the other hand, have very low citation counts despite publishing 5 publications, with just 30 and 24 citations, respectively.

Figure 4 shows a network of authors who have received over 20 citations. Primary and secondary authors are not distinguished in the co-citation analysis. The most frequently mentioned author, M.K. Hassan, is prominently displayed at the network's core. Based on the degree of cooperation between the authors, the network may be separated into groups, each represented by a distinct color. The lines between the circles denote collaboration links, while the size of the circles denotes the frequency of occurrence for each author. It should be noted that key authors within one category could have weak collaborative relationships with authors in other groups.

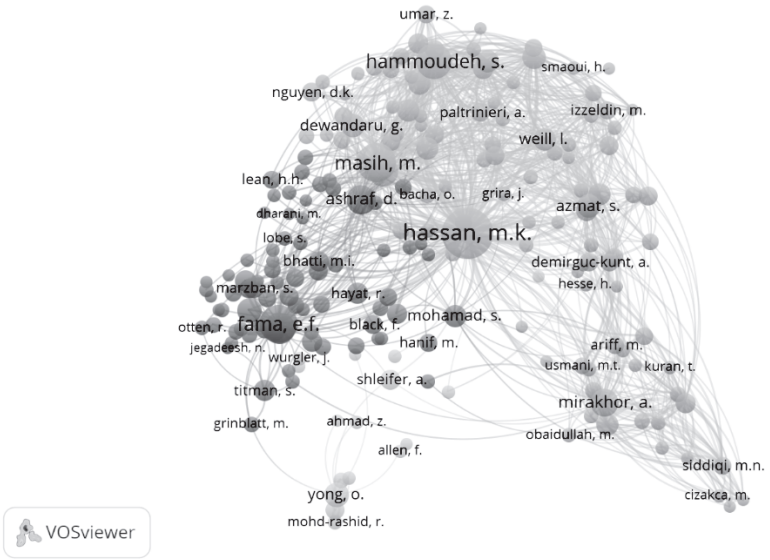

Figure 4.
The Co-Citation of Publications on Capital Asset Pricing Models

4.1.6. Keyword Analysis of Research Hotspots

In order to determine research hotspots and themes, bibliometrics researchers employ the keyword co-occurrence approach (Unal & Aysan, (2021)); Hassanein & Mostafa, 2023). It enables the disclosure of the most prominent and pertinent words employed in a particular area of study as a supplemental support for scientific inquiry (Ellegaard & Wallin, 2015).

Author keywords and index keywords are both taken into consideration for this investigation. In addition, we utilize VOS viewer's "temporal display" function and the minimum of 3 keywords co-occurrences to evaluate our data. This exhibit highlights three key characteristics: Colorful nodes in the co-word map demonstrate the corresponding recentness of various topics as they appear in the articles that are analyzed, while the size of the nodes on the co-word map points out the relative frequency. Proximity and links in the co-citation map also shed light on the relationships between topics.

This temporal approach is useful for identifying emerging topics in the literature, sometimes referred to as the "research front" (Chen & Yang, 2021). The co-occurrence of words in the assessed papers, as shown in Figure 5, permits the identification of research topics that have attracted more interest recently as well as the connections between them. The co-occurrence of terms in the evaluated publications, as shown in Figure 5, enables the identification of the study fields that have attracted greater attention recently as well as the connections between them.

The findings of our investigation indicate that, with 49 occurrences and 237 connections to other terms, the keyword "Islamic Finance" is the most often used. In addition, "Asset Pricing" has 58 links and is mentioned 13 times. Additionally,

according to our research, the terms "Shariah compliant model" and "CAPM" each has 11 occurrences and 54 connections.

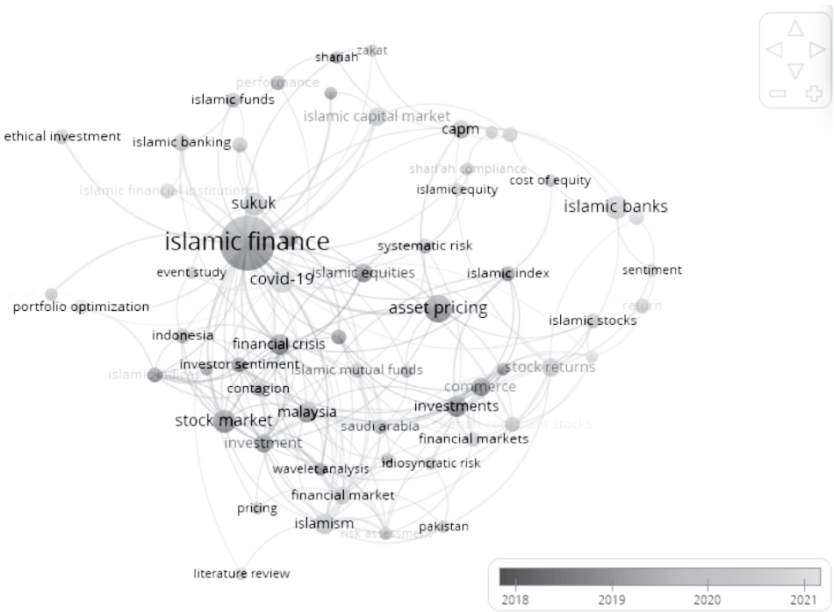

Figure 5.
Keyword Co-Occurrence Network

4.1.7. Cluster Analysis

The keyword co-occurrence analysis identifies the research front in terms of topical trends. The cluster visualization (Figure 6) is used to create a holistic intellectual landscape of our subject. Co-occurrences are utilized to decipher the underlying patterns in the document set under consideration. We discovered nine clusters using the cluster visualization.

A cluster is a collection of terms that occur together. Clusters are traditionally labeled in VOS viewer using cluster numbers and colors. The color of each point in the item density visualization represents the density of things at that position.

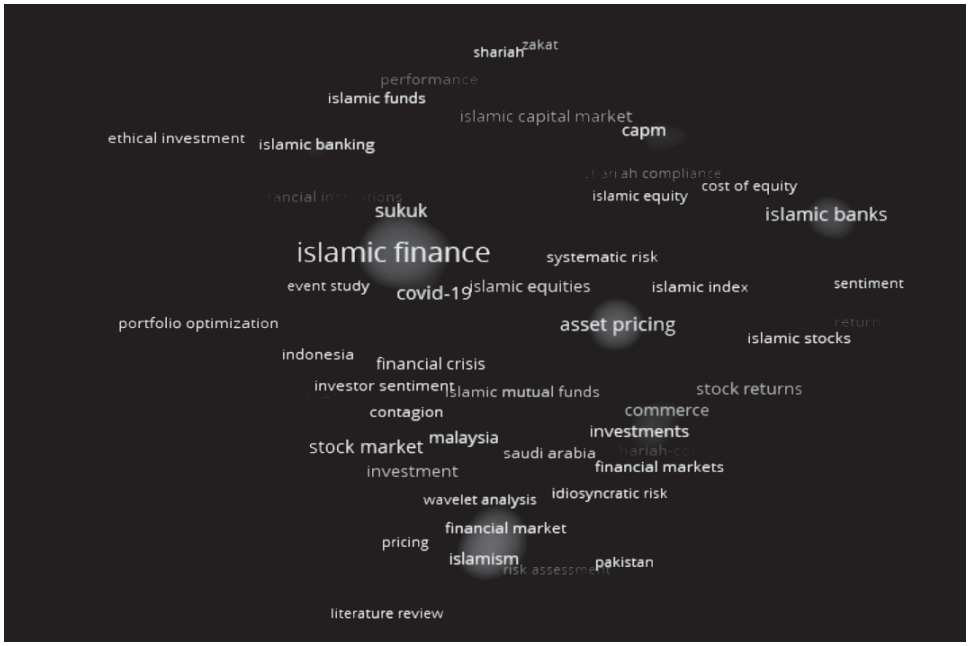

Figure 6.
Cluster Density Visualization

With the use of Vos viewer and the database exported from Scopus we organized the keywords with a minimum number of occurrences of 2 into 9 clusters. In addition to the color (given by VOS by default), we provide a label to each cluster to provide a clearer categorization. The label's name is chosen with the goal of describing the elements contained in each cluster (Table 3).

Table 3.
Label and Main Items of Each Cluster

Cluster	Main Items	Cluster Label
Cluster 1	Efficient frontier, equity market, financial crisis, garch,investor sentiment, Islamic equities, Islamic indexes, Islamic mutual funds, liquidity risk,macroeconomis variables,market timing, mutual fund, portfolio diversification, contagion, shariah compliant equity stock market, systematic risk, volatility.	Islamic financial market, Investment Management and Financial Crisis.
Cluster 2	Diversification,efficiency,efficient market, efficient market hypothesis,higher-order moments,performance,portfolio,purification,risk premia,shariah,shariah-compliant stocks,systematic risk, wavelet analysis, zakat.	Portfolio Management and Market Efficiency in Islamic Finance.
Cluster 3	Agency cost, compliance, corporate governance,corporate social response,earnings management, earnings quality, firm size,herding,investment,Islamic capital market,profitability,shariah compliance, shariah-compliant investment.	Corporate Governance and Investment in Islamic Capital Markets.

Table 3.
Label and Main Items of Each Cluster (Continued)

Cluster	Main Items	Cluster Label
Cluster 4	Asset allocation, conventional stocks, interest rate risk, Islamic stocks, Islamic values,portfolio optimization,return,risk,sentiment, shariah-compliant stocks,sharp ratio, stock returns.	Asset Allocation and Portfolio Optimization in Islamic Capital Markets.
Cluster 5	Cost of equity, ethical investments,firm characteristics,idiosyncratic risk,Islamic equity investment, Islamic funds,Islamic index,Islamic stock,leverage,mutual funds, ownership structure,portfolio management, stock liquidity, capital structure, cost of equity capital, emerging markets, etfs,international portfolio diversification, Islamic equity,political risk,shariah compliance,stock market liquidity.	Islamic Equity Investment, Firm characteristics and Emerging Markets.
Cluster 6	Asset pricing model, ethical investment, Islamic finance, Islamic investment, Islamic mutual fund,musharakah,portfolio selection,shariah investment, Shariah screening,shariah compliance.	Shariah-Compliant Asset Pricing and Ethical Investment
Cluster 7	Asset pricing, book to market, capm,cash flow yield,performance evaluation, risk and return, size.	Modeling Risk-Return Relationship and Fundamentals
Cluster 8	Capital market, covid19, event studies, Islamic stocks.	Impact of COVID-19 on the Islamic Capital Market
Cluster 9	Islamic finance, asset pricing models, riba, gharar, haram activities, ethical screening, profit-and-loss sharing, risk-sharing, time value of money, ownership and leasing, sharia compliance, islamic assets, conventional assets, sharia principles.	Differences between Islamic and Conventional Asset Pricing Models

4.2. Analysis

With the increasing interest in Islamic finance, the creation of shariah-compliant capital asset pricing models becomes important. Accordingly, we can understand the increase in the number of articles and theses related to this subject. The highest number of publications is reached in 2021 due to the effect of covid 19 and change in the market structure worldwide. The contribution of journals shows that many scientific journals accept articles on this topic, which shows its importance.

The country analysis shows that Malaysia has the highest number of publications on this topic. This is not surprising, as Malaysia remains the largest Islamic banking market in the Asia-Pacific region with 62.7% of the total Islamic banking assets, according to S&P Global Ratings ("Malaysia to Remain Region's Top Islamic Banking Market over next 2 Years," n.d.). The United States comes in second place with 35 publications, which is notable given that the US is not typically associated with Islamic finance. However, this may be a reflection of the growing interest in ethical investing and socially responsible finance in the US. Pakistan and Indonesia, two countries with large Muslim populations, also rank highly in terms of the number of publications on this topic, with 28 and 24 papers, respectively. Other countries that feature prominently in the analysis include Saudi Arabia, Australia and the United Kingdom. The Saudi Islamic finance sector holds the top position worldwide in terms of asset size, with a combined value

of $842 billion by the end of 2020 (*Saudi_IF_Report_2021_Final_DIGITAL_v3.Pdf*, n.d.). Australia and the United Kingdom's interest in Islamic finance stems from their focus on ethical and sustainable financial practices. These countries are likely to have a significant impact on the development of this topic in the future. Overall, this analysis highlights the growing trend towards Shariah compliant capital asset pricing models. The fact that so many countries have published on this topic indicates that it is an area of significant interest and importance to the global financial community not only for Muslim countries.

The co-authorship analysis shows that there are few specialized experts in this field, as the majority of authors have only a limited number of publications. Because over the 505 authors only 27 have published more than 3 papers. The most influential authors including in terms of citations are Hassan, M.K., Masih.,M and Achraf., D.

The keyword analysis identifies correlations between terms that occur together. The recurring nature of these keywords helps the researcher in identifying unique study trends. As previously stated, shariah compliant models and Islamic asset pricing have been the topic of contemporary research.

The cluster analysis shows the main themes and trends related to shariah compliant capital asset pricing models. These clusters are:

Cluster 1: Islamic financial market, Investment Management and Financial Crisis: This cluster covers fundamental concepts such as the efficient frontier and portfolio diversification, highlighting the importance of balancing risk and return in investment decisions. Additionally, it delves into specialized areas like Islamic equities, Islamic mutual funds, and Shariah-compliant equity stock markets, underscoring the significance of ethical and religious considerations in investment choices. Moreover, the mention of financial crises, liquidity risk, and systematic risk underscores the need for robust risk management strategies in investment management. The inclusion of terms like GARCH and macroeconomic variables suggests a quantitative approach to analyzing financial markets, while investor sentiment and market timing shed light on the behavioral and psychological aspects that can influence investment outcomes in the Islamic equity market.

Cluster 2: Portfolio Management and Market Efficiency in Islamic Finance: This cluster deals with the management of portfolios of investments in Islamic financial markets. This field is a relatively new one, but it is growing rapidly as Islamic finance becomes more popular. There are a number of challenges to portfolio management and market efficiency in Islamic finance. These challenges include:

- *Lack of liquidity*: Islamic financial markets are often less liquid than conventional financial markets. This means that it can be difficult to buy and sell securities quickly, which can make it difficult to manage portfolios efficiently. For example, Al-Awadhi & Dempsey (2017) find that the liquidity of Islamic stock markets is lower than that of conventional stock markets.
- *Shariah compliance*: Islamic finance is based on Shariah law, which prohibits certain activities, such as interest payments. This can create challenges for portfolio managers, who need to ensure that their portfolios are compliant with Shariah law. For example, Abozaid (2016) discusses the challenges of regulating conventional finance in a way that is both effective and Shariah-compliant.

Despite these challenges, there are ways to manage portfolios in an Islamic financial market. These methods include:

- *Asset allocation*: This involves choosing the right mix of assets for a particular portfolio. For example, Charfeddine et al. (2016) find that asset allocation can be an effective way to improve the performance of Islamic portfolios.
- *Use of Islamic investment vehicles*: Wilson (1997) finds that Islamic mutual funds can be a good way for investors to gain exposure to Islamic finance.
- *Active management*: This involves actively managing a portfolio by buying and selling securities to achieve certain investment goals. For example, a portfolio manager may use active management to take advantage of market inefficiencies or *to hedge against risk.*

The cluster focuses on portfolio management within the framework of Islamic finance, addressing issues like shariah-compliant stocks and market efficiency. Within the realm of CAPM, this cluster sheds light on how Islamic finance principles intersect with portfolio theory and market efficiency, providing a unique perspective for researchers in the field.

Cluster 3: Corporate Governance and Investment Analysis in Islamic Capital Markets: Corporate governance refers to the system of rules, practices, and processes by which a company is directed and controlled. Investment analysis is the process of evaluating a company's financial performance and prospects in order to make investment decisions.

In Islamic capital markets, corporate governance is important for many reasons. First, Islamic law (Shariah) places a strong emphasis on the ethical conduct of business. Second, Islamic investors are often concerned about the social and environmental impact of their investments. Third, Islamic capital markets are still relatively young and developing, so there is a need for strong corporate governance practices to help promote investor confidence.

Cluster 4: Asset Allocation and Portfolio Optimization in Islamic Capital Markets: Asset allocation, a fundamental concept, entails deciding how to distribute investments across various asset classes. Conventional stocks and interest rate risk suggest a comparison with conventional finance, highlighting differences in risk and investment vehicles in Islamic finance. Islamic stocks and values emphasize the importance of aligning investments with Shariah principles, ensuring compliance with ethical and religious guidelines.

Portfolio optimization plays a crucial role in constructing well-balanced portfolios, considering return and risk factors. Sentiment and stock returns point to the behavioral aspect of investment decisions and their impact on portfolio performance. The Sharpe ratio is likely mentioned as a key performance measure, while the term "return" encompasses the financial gains from investments.

Overall, this cluster underscores the unique considerations and challenges in optimizing portfolios within the framework of Islamic capital markets.

Cluster 5: Islamic Equity Investment, Firm Characteristics and Emerging Markets: Islamic equity investment is the process of investing in securities that comply with Islamic law (Shariah). This means that the securities must not involve any activities that are prohibited by Shariah, such as interest-based lending or speculation.

This cluster delves into the intersection of Islamic finance and equity investment, emphasizing compliance with shariah principles. It encompasses topics related to risk management, ethical considerations, firm financial characteristics, portfolio diversification, and valuation. Researchers within this cluster likely explore how Islamic equity investments align with ethical guidelines, manage risk, assess firm characteristics, and integrate financial principles while adhering to Islamic ethics.

In addition, this cluster focuses on emerging markets. There is a growing interest in Islamic equity investing in emerging markets (Hussain et al., 2016). This is due to the following factors:

- *The growth of Islamic finance*: The global Islamic finance industry is growing rapidly, and this growth is being driven by demand from emerging markets.
- *The potential for high returns*: Emerging markets can offer the potential for high returns, which can attract investors who are looking for growth opportunities.
- *The diversification benefits*: Investing in emerging markets can help to diversify a portfolio and reduce risk.

However, there are also some risks associated with Islamic equity investing in emerging markets:

- *Political and economic instability*: Emerging markets can be prone to political and economic instability, which can lead to volatility in the stock market.
- *Lack of liquidity*: Emerging market stock markets can be less liquid than developed market stock markets, which can make it difficult to buy and sell securities quickly.
- *Limited information*: There is often limited information about companies in emerging markets, which can make it difficult to assess the risks and returns of these investments.

Overall, Islamic equity investing in emerging markets can be a good way to generate attractive returns and diversify a portfolio. However, it is important to be aware of the risks involved.

Cluster 6: Shariah-Compliant Asset Pricing and Ethical Investment: This cluster centers on the intersection of Shariah-compliant asset pricing and ethical investment within the context of Islamic finance. It involves key elements such as the asset pricing model, which is used to determine the fair value of assets in Islamic investment portfolios. Ethical investment is a prominent theme, highlighting the importance of aligning investments with ethical principles and values, which is a central aspect of Islamic finance. Islamic mutual funds are investment vehicles that adhere to Shariah compliance, offering investors an avenue to participate in ethical investments. Concepts like musharakah represent collaborative financing arrangements common in Islamic finance. Portfolio selection is crucial in constructing ethical and Shariah-compliant investment portfolios, focusing on asset choices that meet Islamic criteria. Shariah screening and compliance are fundamental aspects, ensuring that investments adhere to Islamic principles and legal requirements.

This cluster collectively emphasizes the ethical and financial considerations associated with investing in accordance with Islamic finance principles.

Cluster 7: Modeling Risk-Return and fundamentals: This cluster encompasses various critical aspects of financial analysis and asset pricing. At its core, it delves into the fundamental drivers of investment decisions and portfolio management.

The asset pricing models are used to estimate the expected return of an asset, given its risk. These models are based on the concept of risk-return trade-off, which states that investors demand a higher return for taking on more risk. There are several asset pricing models, including the capital asset pricing model (CAPM), the arbitrage pricing theory (APT), the Fama-French three-factor model and five factor model and Carhart four-factor model.

The book-to-market ratio is a crucial factor in assessing the value of a company's assets relative to its market value, providing insights into investment strategies like value investing. Size also captures a part of systematic risk and cash flow yield offer a granular examination of a company's financial health, aiding in performance evaluation and investment decision-making. In general fundamentals show to have a role in measuring and modeling variation in risk and return trade off.

Cluster 8: Impact of COVID-19 on the Islamic Capital Market: The COVID-19 pandemic has had a significant impact on the Islamic capital market. The pandemic has caused economic uncertainty and volatility, which has led to a decline in investment activity in Islamic capital markets (Hasan et al., 2021). In addition, the pandemic has also led to regulatory changes, which have made it more difficult for Islamic financial institutions to operate. These changes have included restrictions on travel and trade, as well as the closure of financial markets.

Research in this cluster examines the impact of external shocks on SCAPM and its relevance in times of crisis. Understanding how SCAPM adapts or requires modification in response to global events is of great significance for researchers and practitioners.

Cluster 9: Differences between Islamic and Conventional Asset Pricing Models: Islamic asset pricing differs from conventional asset pricing models in several keyways due to its adherence to Islamic finance principles, which are rooted in Sharia (Islamic law). The main differences include :

- *Prohibition of Riba (Usury)*: Islamic finance strictly prohibits earning or paying interest (riba). Conventional finance often relies on interest-based instruments like bonds and loans. Islamic finance uses profit-and-loss sharing arrangements, such as Mudarabah and Musharakah, to replace interest-based transactions. This prohibition significantly impacts the pricing of financial assets.
- *Prohibition of Gharar (Uncertainty)*: Islamic finance also prohibits excessive uncertainty (gharar) in contracts. Conventional finance often uses complex derivative instruments, which may involve a high degree of uncertainty. In Islamic finance, risk-sharing and clearly defined contracts are preferred.
- *Prohibition of Haram Activities*: Islamic finance avoids investing in businesses involved in activities deemed haram (forbidden) in Islam, such as alcohol, gambling, pork, and interest-based financial services. This avoidance affects the investment universe and asset pricing.
- *Ethical Screening*: Islamic finance may incorporate ethical screening to ensure investments comply with Islamic values. This screening can affect the selection and pricing of assets by excluding certain industries or companies from consideration.
- *Profit-and-Loss Sharing*: Islamic finance emphasizes profit-and-loss sharing between capital providers and entrepreneurs. As a result, returns on Islamic

financial assets are often based on the actual performance of the underlying investment, making them different from the fixed interest payments of conventional bonds.

- *Risk-Sharing*: Islamic finance encourages risk-sharing, and therefore, the pricing of Islamic assets may be influenced by the risk-sharing ratio between the parties involved in a contract.
- *Asset-Backed Financing*: Islamic finance typically requires that financial transactions be backed by tangible assets or services, which can affect the pricing and structure of Islamic financial products.
- *Time Value of Money*: While Islamic finance does not allow for fixed interest rates, it recognizes the time value of money. Instead of interest, it often uses concepts like discounting future cash flows and adjusting prices to reflect the time value of money in a Sharia-compliant manner.
- *Ownership and Leasing*: Islamic finance often involves leasing or asset ownership structures, such as Ijara, to facilitate financing. This can impact the pricing of assets compared to conventional finance models.
- *Sharia Compliance*: All Islamic financial products and transactions must be reviewed and approved by Sharia scholars to ensure compliance with Islamic law. This can lead to specific structuring and pricing considerations.

These differences make the pricing of Islamic financial assets more complex and often require specialized knowledge and expertise. Islamic finance practitioners use various financial contracts and structures to ensure compliance with Sharia principles, and these contracts can have different risk and return profiles compared to conventional financial instruments.

Based on the points discussed, the development of future Islamic asset pricing models put the researchers in front of a multitude of challenges. Scholars need to consider several key areas of development:

- Shariah-Compliant Assets: Islamic finance is based on Shariah principles, which prohibit investments in certain sectors or industries, such as alcohol, gambling, and pork-related businesses. Researchers need to further develop methods to identify and classify Shariah-compliant assets within the context of the CAPM.
- Risk Measurement: Islamic finance emphasizes risk-sharing and ethical investment. Researchers must develop new methods to measure risk that are in line with Islamic principles. This might involve developing alternative risk metrics that reflect the characteristics of Shariah-compliant assets and portfolios.
- Expected Returns: Estimating expected returns for Shariah-compliant assets is a critical aspect. Researchers need to develop models that consider the specific characteristics of these assets and their performance in line with Islamic finance principles. This can be challenging due to the absence of interest-based returns and the emphasis on profit and loss sharing.
- Risk-Free Rate: In Islamic finance, there is a need to determine an appropriate risk-free rate, which should not involve interest (riba). Researchers may need to develop methods for estimating a Shariah-compliant risk-free rate or reference benchmark.

- Market Risk Premium: The calculation of the market risk premium in the context of Islamic finance is another challenge. Researchers should work on developing models that consider the specific dynamics and correlations of Shariah-compliant assets within the broader market.
- Portfolio Diversification: Islamic finance promotes diversification but within the boundaries of Shariah compliance. Researchers can develop portfolio optimization techniques that take into account the restrictions on certain industries and the need to ensure ethical investment.
- Regulatory Framework: The regulatory environment for Islamic finance varies from one jurisdiction to another. Researchers should work on understanding and adapting to the specific regulatory constraints and opportunities in different markets.
- Investor Behavior: Understanding the behavior of Islamic investors and their preferences for ethical and Shariah-compliant investments is important for the Islamic CAPM. Researchers can conduct studies to better understand the unique aspects of Islamic investor behavior.
- Education and Awareness: Building awareness and educating market participants, including investors and financial professionals, on the principles of Islamic finance and the Islamic CAPM is essential for its successful adoption.

V. CONCLUSION AND RECOMMENDATIONS

The bibliometric analysis conducted in this study offers valuable insights into the current landscape of research on Shariah-compliant Capital Asset Pricing Models. One of the notable takeaways is the global reach of research in Shariah-compliant CAPMs. It underscores the fact that this area of study is not confined to a specific region but has garnered attention from scholars worldwide. This global perspective highlights the universal relevance and significance of Shariah-compliant financial practices. Additionally, the emphasis on collaboration among scholars, as evidenced by co-authorship patterns, suggests that researchers from different corners of the world are actively engaging with one another to advance knowledge in this domain. This collaboration can lead to the exchange of ideas, methodologies, and best practices.

Another important aspect is the statistical data showing an increase in the number of publications in Scopus-indexed journals related to Shariah-compliant CAPMs. It suggests that there is a growing interest in this area and an expanding body of knowledge. This growth is indicative of the maturation of the field and its increasing integration into mainstream financial research.

Furthermore, the analysis sheds light on the evolving keywords and themes in Shariah-compliant CAPMs research. This insight can help researchers stay current with the latest trends and areas of interest. By identifying emerging themes and keywords, scholars can strategically focus their research efforts to address gaps or explore innovative avenues. This adaptability to changing research landscapes is crucial for the continued development and relevance of Islamic finance.

These findings not only provide a snapshot of the current state of research but also serve as a roadmap for future exploration. Researchers can leverage this information to identify unexplored areas, research gaps, and opportunities for

further investigation. Policymakers can use these insights to inform regulations and policies related to Shariah-compliant finance, ensuring its sustainable growth and alignment with ethical principles.

Looking ahead, future bibliometric research in this area can consider utilizing other databases such as Web of Science to provide a more comprehensive view of literature. Moreover, while this bibliometric analysis covers various aspects such as country analysis, co-authorship, co-citations, source analysis, and keyword co-occurrence, there are still other dimensions that can be explored in future studies, such as in-depth document analysis.

This study is interesting for Islamic institutions, regulators, and banks because they play a crucial role in Islamic asset pricing. Unlike conventional finance, Islamic financial institutions (IFIs) adhere to Shari'a principles, which impose specific guidelines on asset pricing. Ensuring liquidity within the bounds of Shari'a compliance is a significant challenge for IFIs. Conventional finance has a broader range of options for liquidity, including interest-based instruments. In contrast, IFIs have limited choices due to Shari'a noncompliance risks associated with such instruments. This leads IFIs to consider investing in equities through stock exchanges. However, this approach raises concerns about speculation, which is prohibited by Islamic financial principles. IFIs must carefully select marketable securities for investment, through Shariah screening.

The introduction of Shari'a-compliant Capital Asset Pricing Model (SCAPM) is essential. As IFIs enter the equity market, understanding the risk-return trade-off and security pricing within the framework of Shari'a principles is crucial. Existing pricing models, such as CAPM, APT, and multifactor models, must be analyzed for alignment with Shari'a principles and adjusted as needed. Developing the core foundation of the Islamic CAPM is an ongoing process that requires collaboration between finance experts, Islamic scholars, and practitioners. It involves not only refining the existing financial models but also aligning them with the principles and values of Islamic finance. Additionally, addressing the challenges of data availability and regulatory compliance is essential to facilitate the practical implementation of the Islamic CAPM in the global financial market.

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