



FEDERAL UNIVERSITY  
OF CEARÁ

ISSN 1678-2089  
ISSNe 2178-9258

[www.periodicos.ufc.br/contextus](http://www.periodicos.ufc.br/contextus)

## Evolution of scientific production on the Efficient Market: Bibliometric study

*Evolução da produção científica sobre o Mercado Eficiente: Estudo bibliométrico*

*Evolución de la producción científica en el Mercado Eficiente: Estudio bibliométrico*

<https://doi.org/10.19094/contextus.2024.92462>

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### Article Information

Uploaded on 07/11/2023  
Final version on 16/02/2024  
Accepted on 19/02/2024  
Published online on 16/04/2024

Interinstitutional Scientific Committee  
Editor-in-chief: Diego de Queiroz Machado  
Evaluation by the double blind review system (SEER / OJS - version 3)



### ABSTRACT

**Contextualization:** The text highlights the importance of Market Efficiency in the dynamic and complex market environment, which has been widely studied and analyzed. The approach to this topic arouses interest in academia and has been the subject of several studies.

**Objective:** The study aims to map scientific production related to the concept of Efficient Market, analyzing the evolution of academic work and research on the topic over time.

**Method:** The research adopts a descriptive approach with a quantitative focus and bibliometric analysis to measure scientific productivity indices on a specific topic. 478 relevant articles were identified in the Web of Science and Scopus databases from 1977 to 2023. The EndNote and Bibliometrix R software were used for analysis, followed by the creation of statistical tables and graphs for presentation in the biblioshiny and VOSviewer software.

**Results:** Data analysis revealed a constant increase in publications in the field of finance related to the topic, with emphasis on specific journals. Journal affiliations were mainly concentrated in the regions of America, Europe and Asia, in areas such as statistics, economics, business and management. Important references and topics covered included market efficiency, behavioral finance and stock market efficiency. Eugene Fama was highlighted as the most influential author. As for future trends, areas such as market efficiency analysis, risk management and predictability in periods of global conflicts have been identified, requiring complex and innovative methods.

**Conclusions:** These results contribute to expanding knowledge and understanding about market efficiency, encouraging the search for innovative and complex approaches to further advance this field of study.

**Keywords:** finance; efficient market; scientific production; bibliometric analysis; future studies agenda.

### RESUMO

**Contextualização:** O texto destaca a importância da Eficiência de Mercado no ambiente dinâmico e complexo do mercado, que tem sido amplamente estudada e analisada. A abordagem desse tema desperta interesse no meio acadêmico e tem sido objeto de diversos estudos.

**Objetivo:** O estudo tem como objetivo mapear a produção científica relacionada ao conceito de Mercado Eficiente, analisando a evolução dos trabalhos acadêmicos e pesquisas sobre o tema ao longo do tempo.

**Método:** A pesquisa adota uma abordagem descritiva com enfoque quantitativo e análise bibliométrica para mensurar os índices de produtividade científica em um tema específico. Foram identificados 478 artigos relevantes nas bases de dados do Web of Science e Scopus no período de 1977 a 2023. Os softwares EndNote e Bibliometrix R foram utilizados para análise, seguida pela elaboração de tabelas e gráficos estatísticos para apresentação nos softwares Biblioshiny e VOSviewer.

**Resultados:** A análise dos dados revelou um aumento constante nas publicações no campo das finanças relacionadas ao tema, com destaque para periódicos específicos. As afiliações dos periódicos se concentraram principalmente nas regiões da América, Europa e Ásia, em áreas como estatística, economia, negócios e gestão. Referências importantes e temas abordados incluíram eficiência de mercado, finanças comportamentais e eficiência do mercado de ações. Eugene Fama foi destacado como o autor mais influente. Quanto às tendências futuras, áreas como análise da eficiência de mercado, gestão de risco e previsibilidade em períodos de conflitos globais foram identificadas, requerendo métodos complexos e inovadores.

**Conclusões:** Esses resultados contribuem para a ampliação do conhecimento e entendimento sobre eficiência de mercado, incentivando a busca por abordagens inovadoras e complexas para avançar ainda mais nesse campo de estudo.

**Palavras-chave:** finanças; mercado eficiente; produção científica; análise bibliométrica; agenda de estudos futuros.

## RESUMEN

**Contextualización:** El texto destaca la importancia de la Eficiencia del Mercado en el dinámico y complejo entorno del mercado, la cual ha sido ampliamente estudiada y analizada. El abordaje de este tema despierta interés en el ámbito académico y ha sido objeto de varios estudios.

**Objetivo:** El estudio tiene como objetivo mapear la producción científica relacionada con el concepto de Mercado Eficiente, analizando la evolución del trabajo académico y de las investigaciones sobre el tema a lo largo del tiempo.

**Método:** La investigación adopta un enfoque descriptivo con enfoque cuantitativo y análisis bibliométrico para medir índices de productividad científica sobre un tema específico. Se identificaron 478 artículos relevantes en las bases de datos Web of Science y Scopus desde 1977 hasta 2023. Para el análisis se utilizaron los software EndNote y Bibliometrix R, seguido de la creación de tablas estadísticas y gráficos para su presentación en los software biblioshiny y VOSviewer.

**Resultados:** El análisis de los datos reveló un aumento constante de publicaciones en el campo de las finanzas relacionadas con el tema, con énfasis en revistas específicas. Las afiliaciones a revistas se concentraron principalmente en las regiones de América, Europa y Asia, en áreas como estadística, economía, negocios y gestión. Las referencias y temas importantes cubiertos incluyeron la eficiencia del mercado, las finanzas conductuales y la eficiencia del mercado de valores. Eugene Fama fue destacado como el autor más influyente. En cuanto a las tendencias futuras, se han identificado áreas como el análisis de la eficiencia del mercado, la gestión de riesgos y la previsibilidad en períodos de conflictos globales, que requieren métodos complejos e innovadores.

**Conclusiones:** Estos resultados contribuyen a ampliar el conocimiento y la comprensión sobre la eficiencia del mercado, fomentando la búsqueda de enfoques innovadores y complejos para avanzar aún más en este campo de estudio.

**Palabras clave:** finanzas; mercado eficiente; producción científica; análisis bibliométrico; agenda de estudios de futuro.

### How to cite this article:

Moraes, A. K., Furtini, A. A. S., Prado, J. W., Castro, L. G., Júnior, & Ceretta, P. S. (2024). Evolution of scientific production on the Efficient Market: Bibliometric study. *Contextus – Contemporary Journal of Economics and Management*, 22, e92462. <https://doi.org/10.19094/contextus.2024.92462>

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## 1 INTRODUCTION

Financial markets play a crucial role in trading complex and dynamic assets such as stocks, currencies, fixed-income securities, investment funds, derivatives, and commodities. In this context, various theories, such as Market Efficiency, Modern Portfolio Theory, Real Options, Asset Pricing, and Intertemporal Choice, are extensively studied to explain the behavior of assets and the agents operating within them. Modern Finance theories offer distinct perspectives and approaches to understand and model the functioning of financial markets. The Efficient Market approach is central to Modern Finance, attracting the attention of various academics such as Fama (1970), French (1992), Jensen (1978), Shiller (1981), Hansen (1982), Schwert (1983), Malkie (1989), Moy and Lee (1991), Ball (2005), who have researched its application in the financial market, contributing significantly to the understanding of Market Efficiency and its implications for investors and the economy as a whole.

In the field of financial economics, the relevance of Efficient Market was highlighted in 2013 when economists Eugene Fama, Robert Shiller, and Lars Peter Hansen were awarded the Nobel Prize. They stood out for applying innovative quantitative methods to analyze market behavior and, more broadly, financial economics, offering distinct perspectives on the pricing of financial assets and the prediction of long-term price variations. Fama (1970) gained prominence in modern finance by conceptualizing the Efficient Market, which essentially considers the prices of financial assets, such as stocks, bonds, certificates, among others, reflecting all available information to economic agents, such as investors and producers, who make decisions rationally to maximize benefits and minimize costs. While Fama's research aimed to define Efficient Market and test the efficient behavior of markets, with agents making perfectly rational decisions (Fama, 1970), Shiller analyzed the market from the perspective of investor irrationality, observing excessive volatility in asset prices that could not be explained solely by new information, highlighting anomalies in the Efficient Market Hypothesis (EMH). Contrary to Fama's view, Shiller concluded that the market is inefficient (Shiller, 1981). Subsequently, Shiller (1987) published "Irrational Exuberance," arguing that stock markets are susceptible to bursts of investor irrationality, possibly resulting in bubbles in the financial market. Shiller's works were considered pioneering in the field of behavioral finance, seeking to understand and explain the irrational behavior of investors in the financial market, especially during periods of economic crisis. Another approach to Efficient Market was introduced in the field of financial economics by Hansen (1982) by developing the Generalized Method of Moments (GMM), based on the rationality hypothesis, to estimate scenarios in which information is limited. Additionally, he popularized the Markowitz Efficient Frontier, which allowed for an understanding of the limits of the empirical distribution of

asset returns. Considering the literatures of Efficient Market and Behavioral theories, Lo (2004) in his study "The adaptive markets hypothesis: market efficiency from an evolutionary perspective" proposes that markets are adaptive, meaning market efficiency occurs cyclically, emerging periodically due to changes in market conditions and the behavioral aspects of agents, resulting in biases in their investment decisions. Thus, the level of market efficiency is associated with environmental factors such as competitiveness, the magnitude of available profit opportunities, and the adaptability of market agents. Therefore, the Adaptive Markets Hypothesis (AMH) proposed by Lo (2004) allows for examining the adaptability of the financial market, especially the predictability of asset returns in the long term, due to the hypothesis that market efficiency can emerge periodically due to changes in market conditions. The dissemination of market efficiency proposed by Fama (1970) in financial markets has led to numerous academic discussions on whether the market is indeed efficient or behavioral, such as those of Shiller (1981, 1987), Hansen (1982), and Lo (2004, 2005). Therefore, this study aims to map the evolution of scientific production on Efficient Market in the literature and identify the main strands on the subject through a bibliometric study. Bibliometric analyses provide highly concise, easily manipulable, and potentially objective information, which is essential for understanding the structure of the research field in finance, as well as evaluating academic performance and scientific progress. It is especially true in the context of the Efficient Market Theory. When investigating this topic, it is crucial to seek recent studies that represent the current state of scientific production in the field of finance. In this context, researchers such as Camargos and Barbosa (2003), Anache and Laurencel (2013), Titan (2015), Ying et al. (2019), Navia-Rodríguez, Cobos-Lozada, and Mendoza-Becerra (2020), Jiang (2021), Pinto et al. (2020) have devoted themselves to a systematic review of the literature, aiming to analyze qualitative content and gain a comprehensive understanding of the current debate on the topic. These researchers emphasized issues such as the efficient market hypothesis, anomalies/returns, dividend policy, and prediction models in the stock market. Additionally, Chun-Hao and Jian-Min (2012), Silva, Santos, and Pereira (2019), Ali and Bashir (2022), Khan et al. (2022), Dosso and Aysan (2022), Abubakar and Aysan (2022) sought to provide guidance for future research in the field of finance, using the bibliometric approach to conduct a literature review focusing on asset pricing, FinTech, behavioral finance, social finance, and financial risk.

Bibliometric studies have identified areas that have not been sufficiently explored or that require further investigation. They have also provided valuable insights for academic researchers and have pointed towards promising directions for future research. For example, Chun-Hao and Jian-Min (2012) conducted a bibliometric study on financial risk and revealed that the majority of literature consisted of English-language journals and articles, with the United

States leading in productivity in the sector. Additionally, literature productivity was focused on dissertation works in economics and business.

In contrast, Silva, Santos, and Pereira (2019) conducted a bibliometric study with an emphasis on behavioral finance, analyzing Brazilian journals with the aim of filling a research gap. They observed an average annual growth of 20% in publications, with the main theme based on replicating Kahneman and Tversky. However, they identified gaps in terms of target audience such as financial managers and investors, and in addressing biases and heuristics. These findings provided guidance for researchers in future investigations.

The bibliometric study by Ali and Bashir (2022) aimed to provide guidance for future research in asset pricing. The analysis revealed a significant increase in the number of publications in 2019, indicating a growing interest among researchers in this topic. Furthermore, affiliation data suggest that research is concentrated in the US and other developed nations, opening opportunities to explore the risk-return dynamics in emerging markets.

The bibliometric work by Khan et al. (2022) focused on the field of finance, identifying four clusters of literature: studies focusing on literature reviews on trending topics; analysis of articles employing emerging econometric techniques; studies grouped around specific fundamental topics such as market dynamics, behavioral finance, and corporate governance; and studies focused on the retrospective celebration of specific finance journals. Additionally, the authors noted that the economics field has been more inclined to publishing bibliometric studies than in finance.

Regarding FinTech, Dosso and Aysan (2022) conducted a bibliometric study with an emphasis on technological innovation in finance focusing on the credit market. The results confirmed a steady increase in publications in this area, especially in the last six years from 2015, led by the US and China, pioneers in FinTech studies. The growing research highlights the technological impact on financial products and services, influencing lifestyles in the new global digital economy.

Abubakar and Aysan (2022) aimed to provide a mapping of the field of finance with an emphasis on social finance, to identify gaps in the literature and its role in development economics. They found that researchers in the field closely link social finance to sustainability and sustainable development concepts. It was discovered that Malaysia and Indonesia are leading in research in the field of social finance.

These bibliometric studies on asset pricing, FinTech, behavioral finance, social finance, and financial risk highlighted the significant increase in the number of publications and the concentration of research in developed countries, opening opportunities to explore these topics in emerging markets. Considering the relevance of the bibliometric studies by Chun-Hao and Jian-Min (2012), Silva, Santos, and Pereira (2019), Ali and Bashir (2022),

Khan et al. (2022), Dosso and Aysan (2022), Abubakar and Aysan (2022) for the field of finance and their importance for researchers interested in the science and understanding of the financial market, there is an opportunity to conduct a comprehensive and up-to-date bibliometric analysis on scientific production related to the Efficient Market Theory. Such an analysis aims to provide a robust understanding of the structure of this research field, identify existing gaps, and support the definition of a future research agenda to stimulate new work in the area.

Developing a well-defined research agenda can facilitate collaboration between researchers and institutions, promoting advancements in the field as a whole (Khan et al., 2022; Dosso & Aysan, 2022; Abubakar & Aysan, 2022). In this context, the contributions of mapping the evolution of scientific production on the Efficient Market include analyzing the temporal evolution of publications, identifying the main countries, institutions, journals, articles, and authors that publish most on the topic. It also involves evaluating the networks that make up the conceptual, social, and intellectual structure related to the Efficient Market, and developing a map of a future research agenda on the subject to help researchers stay updated on the topic.

Exploring the intricate web of financial markets through a future research agenda on the Efficient Market hypothesis will not only allow us to unravel the mysteries behind asset pricing, but also pave the way for the development of more solid theories and more insightful investment strategies. Following this introduction, the second section details the study methodology, focusing on conducting a bibliometric analysis. The third section presents the results and discussions related to the bibliometric analysis. Finally, the conclusion addresses the study limitations and suggests possible directions for future research.

## 2 METHODOLOGY

This study aims to map the evolution of scientific production on the Efficient Market. Mapping scientific production is a complex and challenging task as it involves a systematic analysis covering academic publications in a specific research area (Aria & Cuccurullo, 2017; Filser et al., 2017). This process includes the identification, collection, organization, and analysis of relevant data present in scientific articles (Aria & Cuccurullo, 2017). Furthermore, scientific mapping provides relevant empirical contributions on key annual publications, volume, most cited authors, and most cited publications in the literature, as well as future research trends on the topic (Filser et al., 2017).

The research is descriptive in nature, with a quantitative approach and bibliometric analysis, as it quantitatively measures scientific productivity indices regarding a specific theme (Van Eck & Waltman, 2014; Filser et al., 2017; Maia et al., 2019). Bibliometrics is a quantitative and statistical technique widely used to assess the production and dissemination of scientific knowledge in

various research areas (Zupic & Ater, 2014; Filser et al., 2017; Maia et al., 2019). Through the analysis of scientific production mapping, literature reviews, organization of research fields, identification of key schools of thought, and evaluation of a country's scientific production on a specific

topic, bibliometrics offers a rigorous approach to evaluating scientific publications (Zupic & Ater, 2014; Filser et al., 2017; Maia et al., 2019). Based on this, Table 1 presents the steps and procedures of the bibliometric analysis, with each step detailed in the subsections.

**Table 1**  
Steps and procedures for bibliometric analysis of research

Steps	Procedures
1. Operationalization of Research	1.1. Choice of scientific basis;
	1.2. Delimitation of terms that represent the field;
	1.3. Delimitation of other terms to determine the results.
2. Search Procedures Filters	2.1. Title (field terms);
	2.2. Use of characters ("*") and connectors ("AND" and "OR");
	2.3. Filter 1: only open articles and reviews;
	2.4. Filter 2: every year;
	2.5. Filter 3: all areas;
	2.6. Filter 4: all languages.
3. Database Selection Procedures	3.1. Download of references: EndNote software;
	3.2. Download references in spreadsheet format;
	3.3. Download of references for use in R, RStudio and Bibliometrix software;
	3.4. Organization of references in EndNote;
	3.5. Organization of analysis matrix in electronic spreadsheet;
	3.6. Import of data into analysis software.
4. Data Adequacy and Organization Procedures	4.1. Elimination of duplicate articles in the database;
	4.2. Elimination of articles through floating reading;
	4.3. Elimination through polysemy of terms;
	4.4. Search for full articles in PDF in EndNote.
5. Analysis of the Research Front	5.1. Analysis of literature databases;
	5.2. Temporal evolution of publications on the topic;
	5.3. Analysis of sources in literature;
	5.4. Analysis of the most relevant articles and authors in the literature;
	5.5. Analysis of the scientific production of the countries most cited in the literature;
	5.6. Analysis of keywords covered in the literature;
	5.7. Coupling map.
6. Base Analysis	6.1. Analysis of the literature competition network;
	6.2. Analysis of the literature collaboration network;
	6.3. Analysis of the literature co-citation network.
7. Future Studies Agenda	7.1. Presentation of topics for future studies.

Source: Adapted from Prado et al. (2016).

### Step 1: Research Operationalization

In this study, the Coordination for the Improvement of Higher Education Personnel (CAPES) journal portal was used to access the Web of Science (WoS) - Core Collection (Clarivate Analytics) and Scopus databases. The purpose was to extract journals of review articles and open access, both international and national, on the topic of Efficient Market in the field of finance. The relevance of using WoS and Scopus databases is justified by the fact that they are repositories that gather scientific production that has undergone a rigorous evaluation process (Filser et al., 2017). Additionally, the use of these databases helped reduce the risk of document loss due to different publication coverages and search algorithms (Filser et al., 2017).

### Step 2: Search Filter Procedures

To conduct data searches, the following search strings were used: in WoS: TI = ("market efficienc\*" OR "adapted\* market hypothes\*") AND TS = ("finan\*" OR "commodit\*"); in Scopus: TITLE ("market efficienc\*" OR "adapted\* market hypothes\*") AND TITLE-ABS-KEY ("finan\*" OR "commodit\*"). The adoption of these strings was due to the databases having different search

mechanisms (Filser et al., 2017). In the strings, the symbol "\*" was used to include possible variations in search terms, and the operators "AND" and "OR" were also applied to relate the search terms. Scientific articles meeting the search criteria and available in the databases were considered. Furthermore, techniques such as "title," "topic," and "keywords" were combined, and the search was delimited by areas of knowledge in the field of finance, with the research conducted in the English language. Thus, 249 journals were extracted in WoS, published between the periods of 1977 to 2023, and in Scopus, 387 journals were extracted, published between the periods of 1977 to 2023, totaling a volume of 636 articles.

### Step 3: Database Selection Procedures

For the export of article metadata from the WoS and Scopus databases, RIS files (EndNote, Reference Manager format) and CRV (Excel) files were downloaded and then imported to Microsoft Excel® Office 2019, which allows downloading results as text-files. Thus, the searches resulted in 636 articles. In Excel, the metadata was organized as follows: journal title, authors, source title, year of publication, and DOI (Digital Object Identifier).

**Step 4: Data Adjustment and Organization Procedures**

The metadata was imported into EndNote® X7 software, where the databases were unified, and duplicate articles were excluded, resulting in a corpus of 478 publications on the study of Efficient Market in the field of finance. EndNote® is a reference management software developed by Thomson Reuters (Filser et al., 2017).

**Step 5: Research Front Analysis**

For the analysis of the research front, the metadata of the 478 publications from the WoS and Scopus databases were imported into the Bibliometrix R software. In this work, bibliometrics was programmed in the R software, as this tool is flexible and can be quickly updated and integrated with other statistical packages of R (Aria & Cuccurullo, 2017). Additionally, Biblioshiny and VOSviewer were used. Biblioshiny combined with the functionality of the bibliometrix package with the ease of use of web applications using the Shiny package environment, displaying the results in the form of graphs and tables, while VOSviewer is a tool for building and visualizing bibliometric networks (Van Eck & Waltman, 2014).

**Step 6: Base Analysis (conceptual, social, and intellectual)**

An analysis of the conceptual, social, and intellectual structure of the Efficient Market was conducted. The conceptual analysis focuses on the themes, concepts, and categories present in the database; the social analysis investigates authorship, collaborations, and research networks of the authors; and the intellectual analysis examines the quality and relevance of the publications present in the database (Aria & Cuccurullo, 2017). These analyses are essential for understanding the context and nature of the Efficient Market theme, aiding in the interpretation and validity of the results obtained in the bibliometric research.

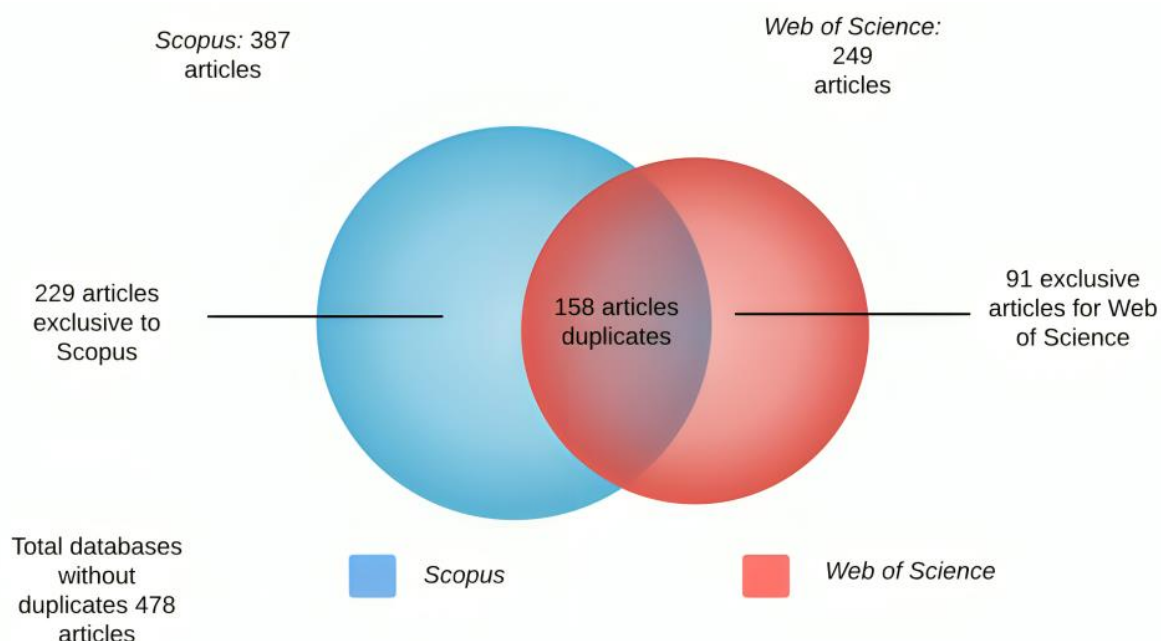
**Step 7: Future Studies Agenda**

For the analysis of future trends, articles published between 2022 and 2023 from the WoS and Scopus databases were used to identify possible gaps in the Efficient Market literature. Additionally, the article by Filser et al. (2017) was revisited as a reference to assess the main topics of future research agenda and discuss the theme.

The empirical analysis of this study consists of four stages as described below. Initially, results regarding the databases of Efficient Market literature are discussed. Next, an analysis of the most relevant sources, authors, and articles in the Efficient Market literature is conducted. Following that, the conceptual, intellectual, and social structure of the Efficient Market literature is evaluated. Finally, based on the findings of the analysis, a map of future research on the Efficient Market is developed.

**3 ANALYSIS AND DISCUSSION OF RESULTS****3.1 Data from the databases on Efficient Market literature**

Figure 1 presents a Venn diagram illustrating the quantity of articles related to Efficient Market in the field of finance in the Scopus and Web of Science databases, as well as the number of duplicate articles present in both databases. Figure 1 shows that Scopus has a higher number of articles ( $n=387$ ) when compared to Web of Science ( $n=249$ ). After the removal of 158 duplicate articles, the total remaining was 478 articles. Following this exclusion, 223 unique articles were identified in Scopus and 91 in Web of Science on the topic. The results presented indicate that the Scopus database contains a significantly larger number of articles related to Efficient Market in the field of finance compared to Web of Science. After the removal of duplicate articles, Scopus contributed 58.19% of the literature, while Web of Science represented 41.81%.

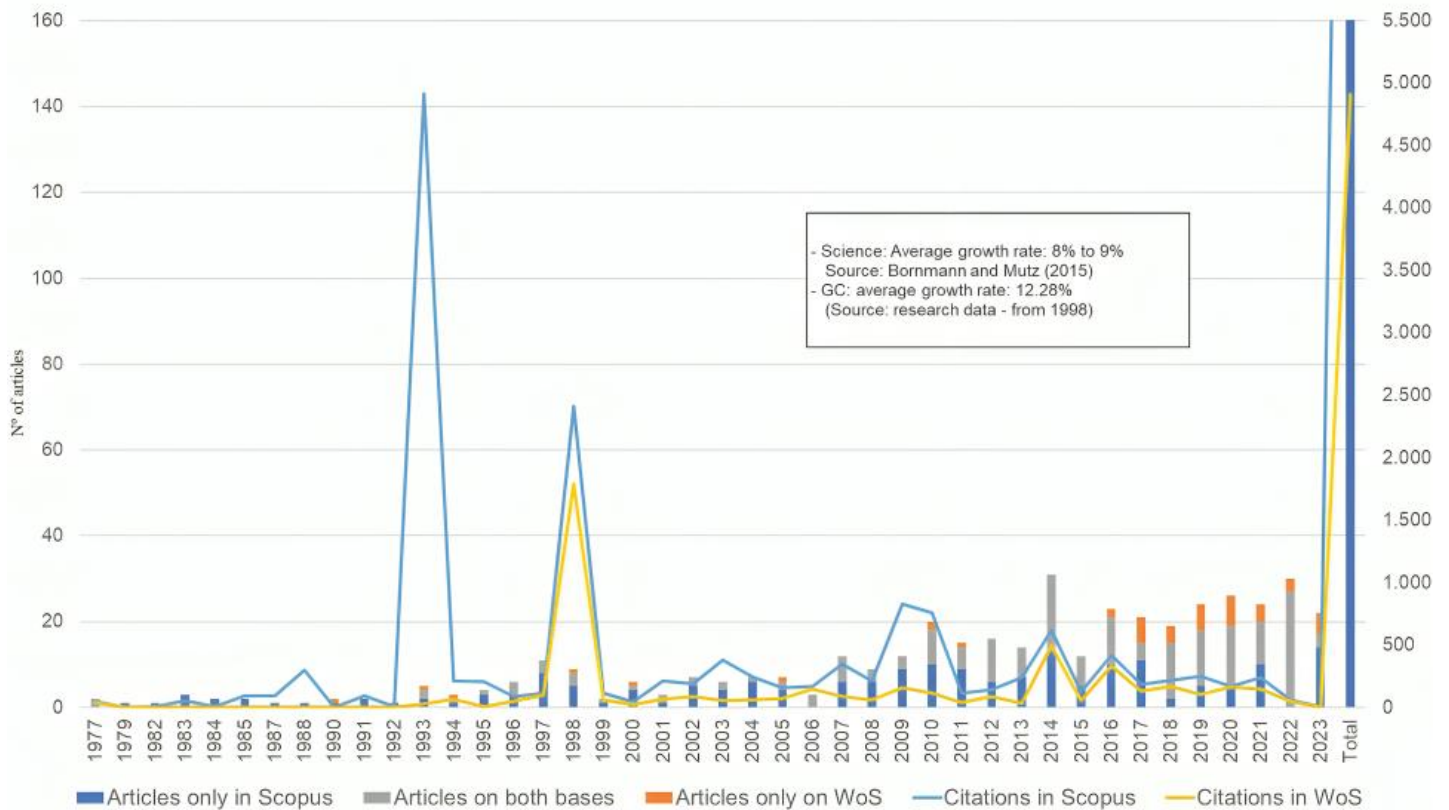


**Figure 1.** Articles on Efficient Market in the Scopus and Web of Science databases.

Source: Research data.

This suggests that Scopus offers a broader range of resources for a comprehensive bibliometric analysis in this specific area. It is important to note that Scopus may offer a more comprehensive and richer source of information on the Efficient Market in the financial context. "Therefore, researchers conducting research or literature reviews on this topic may benefit from consulting the Scopus database for a more comprehensive and in-depth view of the existing literature.

The results presented in Figure 2 demonstrate the evolution of publications in the Scopus and Web of Science databases on Efficient Market in the field of finance, covering the period from 1977 to 2023. Firstly, the evolution of publications on Efficient Market in the field of finance shows an average growth rate of 12.28% from 1998, indicating growing and continuous interest in this area of study over the past decades. This suggests that the topic remains relevant and attracts the attention of researchers and academics.



**Figure 2.** Temporal evolution of literature publications on Efficient Market in the Scopus and Web of Science database. Source: Research data.

Additionally, the analysis of citations reveals that Scopus stands out with a significantly higher number of citations compared to Web of Science. This indicates that publications in Scopus have received more attention and recognition in the academic community, which may be indicative of the relevance and impact of these works. Specific examples of highly cited articles, such as Jegadeesh et al. (1993) "Returns to Buying Winners and Selling Losers: Implications for Stock Market Efficiency" with 4,914 citations, published in *The Journal of Finance*, and Fama (1998) "Market efficiency, long-term returns, and behavioral finance" published in the *Journal of Financial Economics*, with 2,414 citations, demonstrate the importance of these works as significant references on the topic of Efficient Market. Furthermore, the mention of earlier works by Fama (1970; 1991) highlights the significant contribution of this author to the academic and investment community in the field of finance. The analysis also emphasizes the importance of considering journal coverage in both databases, as some publications may only be

present in one of the databases due to exclusive publication or subscription agreements. This can result in restrictions on access to certain journals or periodicals, such as the *Advances of Financial Economics* (ISSN 1569-3732), not included in Web of Science, and *REGE-Revista de Gestão* (ISSN 1809-2276), also unavailable in Scopus. Therefore, the use of both databases provides access to a wider variety of journals addressing Efficient Market in the field of finance, thus providing a more comprehensive basis for future research. In summary, these results provide researchers with a demonstration of the evolution, relevance, and impact of literature on Efficient Market, as well as the importance of considering multiple databases for a comprehensive and in-depth analysis.

### 3.2 Analysis of the research front on Efficient Market literature

The results presented in this section provide a quantitative overview of the evolution of scientific production in the literature on Efficient Market. The analysis of the most

cited journals, the most relevant references, the distribution of scientific production by country, the co-authorship network among organizations, the key terms over time, and the coupling map of articles extracted from the Scopus and Web of Science databases offer valuable insights into the current state and trajectory of this area of study. During this analysis, the most influential journals were identified, and we used indicators such as the JCR (Journal Citation

Reports) impact factor, produced by Clarivate Analytics, and the SJR (SCImago Journal Rank), calculated using Google's PageRank algorithm (Oyewola & Dada, 2022). These metrics, JCR and SJR, are valuable for evaluating the importance and impact of academic journals, taking into account both the number of citations received and the origin of these citations.

**Table 2**

Most cited periodicals in the literature on Efficient Market

Periodicals	Freq.		Impact factor (2023)		Quote		Total
	N°	%	SJR	JCR	Scopus	WoS	
<i>The Journal of Finance</i>	82	4.37%	18.318	5.397	18,117	15,879	33,996
<i>Journal of Financial Economics</i>	48	2.56%	12.489	5.162	6,718	5,641	12,359
<i>Journal of Corporate Finance</i>	40	2.13%	1.461	2.215	1,015	630	1,645
<i>Journal of financial and Quantitative Analysis</i>	37	1.97%	3.636	2.049	1,539	1,262	2,801
<i>Journal of Banking and Finance</i>	36	1.92%	1.503	1.931	1,730	1,381	3,111
<i>Financial Review</i>	32	1.70%	0.663	-	149	-	149
<i>Corporate Ownership and Control</i>	30	1.60%	0.115	-	14	-	14
<i>Applied Financial Economics</i>	27	1.44%	0.371	-	575	-	575
<i>Financial Management</i>	26	1.39%	1.081	0.968	720	1,048	1,768
<i>Managerial Finance</i>	26	1.39%	0.210	-	274	-	274
Total		20%			30,851	25,841	56,692

Source: Bibliometrix.

The results presented indicate that out of the 384 journals analyzed, 10 stand out for their influence, based on criteria such as the number of articles published on the topic and the volume of citations received, underscoring the importance of these publications in the field of finance. It is interesting to note that these journals have a high impact factor in both the Journal Citation Reports (JCR) and the Scimago Journal Rank (SJR). These indices indicate the widespread citation and influence of these publications in the academic community. Moreover, The Journal of Finance, with high impact factors in both the Journal Citation Reports (JCR) and the Scimago Journal Rank (SJR), underscores its broad citation and influence in the academic community. This journal is recognized as a reference in scientific research across all major areas of finance and is the most cited in both finance and the entire field of economics (The Journal of Finance, 2023).

These results demonstrate the relevance and recognition of the selected journals, indicating that they play a significant role in disseminating and advancing knowledge on Efficient Market in the financial field. Hence, this information is important for researchers and academics seeking to understand the current landscape of scientific production in this area and identify the most influential and reliable sources for their own research and studies. In summary, the results presented in Table 2 offer a comprehensive and detailed view of scientific production on Efficient Market, providing researchers with a solid foundation for understanding the current scenario and trends in this area of study.

Among the most impactful references on Efficient Market, three articles stand out for their influence and relevance (see Table 3).

**Table 3**

Most relevant references in the Efficient Market literature and total citations

References	Author(s)	Year	Total citations
<i>Returns to Buying Winners and Selling Losers: Implications for Stock Market Efficiency</i>	Jegadeesh, et al.	1993	4883
<i>Market efficiency, long-term returns, and behavioral finance</i>	Fama, E.F.	1998	3946
<i>Blockholder trading, market efficiency, and managerial myopia</i>	Edmans A.	2009	479
<i>Presidential Address: Sophisticated Investors and Market Efficiency</i>	Stein, J.C.	2009	308
<i>Risk aversion, uncertain information, and market efficiency</i>	Brown, et al.	1988	299
<i>Do market efficiency measures yield correct inferences? A comparison of developed and emerging markets</i>	Griffin, et al.	2010	261
<i>Anomalies and market efficiency</i>	Schwert G.W.	2003	212
<i>Tests of random walk and market efficiency for latin american emerging equity markets</i>	Urrutia J.L.	1995	171
<i>Product market competition, insider trading, and stock market efficiency</i>	Peress J.	2010	165
<i>Market efficiency and accounting research: A discussion of 'capital market research in accounting' by S.P. Kothari</i>	Lee C.M.C.	2001	142

Source: Bibliometrix.

The first of these is the groundbreaking work by Jegadeesh et al. (1993), titled "Returns to Buying Winners

and Selling Losers: Implications for Stock Market Efficiency," which is recognized as a pioneering and



influential study in the field of finance. Published in the respected *The Journal of Finance*, this article has garnered widespread attention, with over 4883 citations, showcasing its significant influence and relevance in academic literature. By challenging the conventional idea that abnormal returns in the stock market are solely due to systematic risk or late market reactions, the authors offered fascinating insights into the dynamics of the stock market over time. By delving into the complex world of buying and selling strategies in the stock market, Jegadeesh et al.'s study (1993) questioned market efficiency, advancing understanding of this crucial topic in finance. Therefore, it is evident that Jegadeesh et al.'s work (1993) represents a significant contribution to understanding market efficiency and continues to influence researchers and academics in the field of finance.

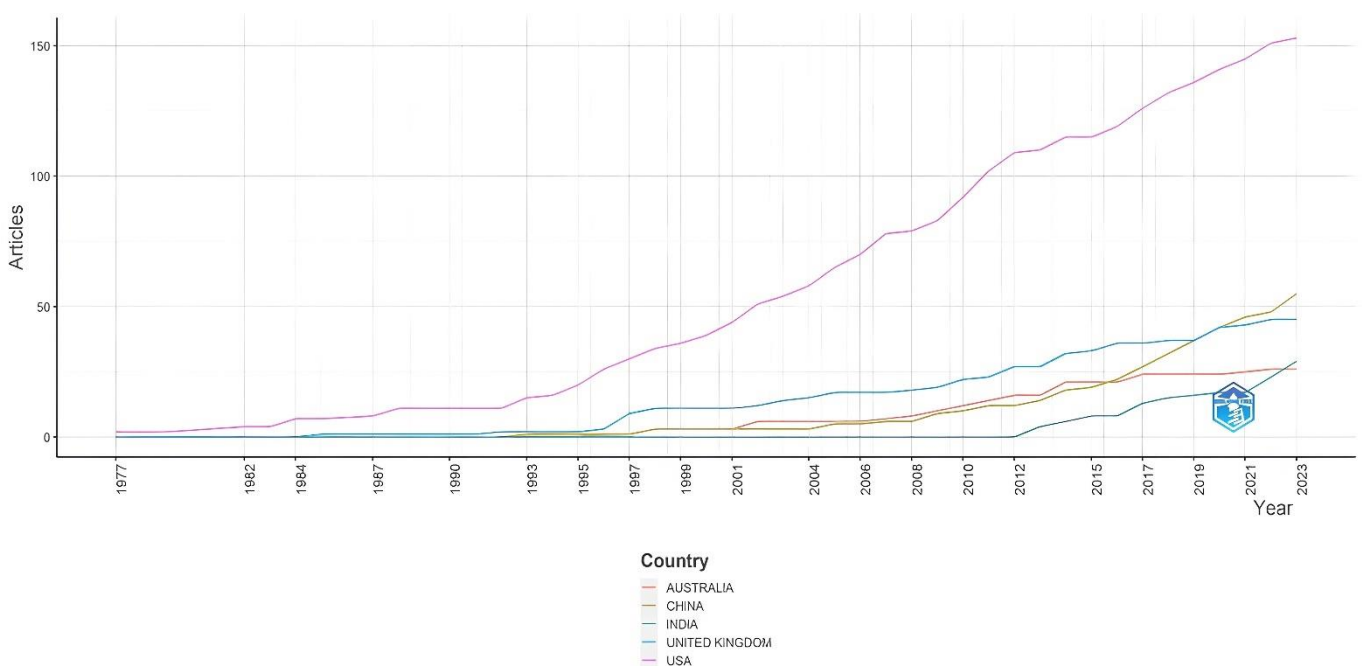
The second notable article was written by Fama (1998), titled "Market efficiency, long-term returns, and behavioral finance," published in the *Journal of Financial Economics*. With 3946 citations, this work not only challenges traditional notions of market efficiency but also sheds light on human behavior and its implications in financial markets. Fama convincingly argues that market anomalies stem from complex behavioral patterns rather than mere accidents. His visionary approach invites us to rethink how markets function and how we can leverage these insights to improve investment strategies.

While Jegadeesh and Fama explore the predictability of returns in the stock market, the innovative study by Edmans (2009), titled "Blockholder trading, market efficiency, and managerial myopia," published in *The Journal of Finance*, with 479 citations, offers a unique perspective on corporate governance. Edmans emphasizes the pivotal role of majority shareholders in fostering management practices that prioritize long-term company growth. His insightful research underscores the importance of active shareholder engagement in fostering the long-term stability and success of organizations.

These works challenge established conceptions about financial markets and corporate management, prompting deeper and more creative reflections on investment dynamics and corporate governance. They serve as foundational pillars in building financial knowledge, inspiring new research and fostering innovative approaches in the field.

The United States of America (USA) emerges as the leading country in terms of scientific production on Efficient Market (see Fig. 3), with a significant total of 2,239 publications over time. Next, the United Kingdom stands out with 442 publications, followed by Australia with 285, China with 245, and India with 115 publications. These figures indicate a clear predominance of the USA in research on this topic, spanning both the fields of finance and economics. These results are consistent with previous studies, such as that of Maia et al. (2019), which pointed to the leadership of the USA and the United Kingdom in scientific production in finance.

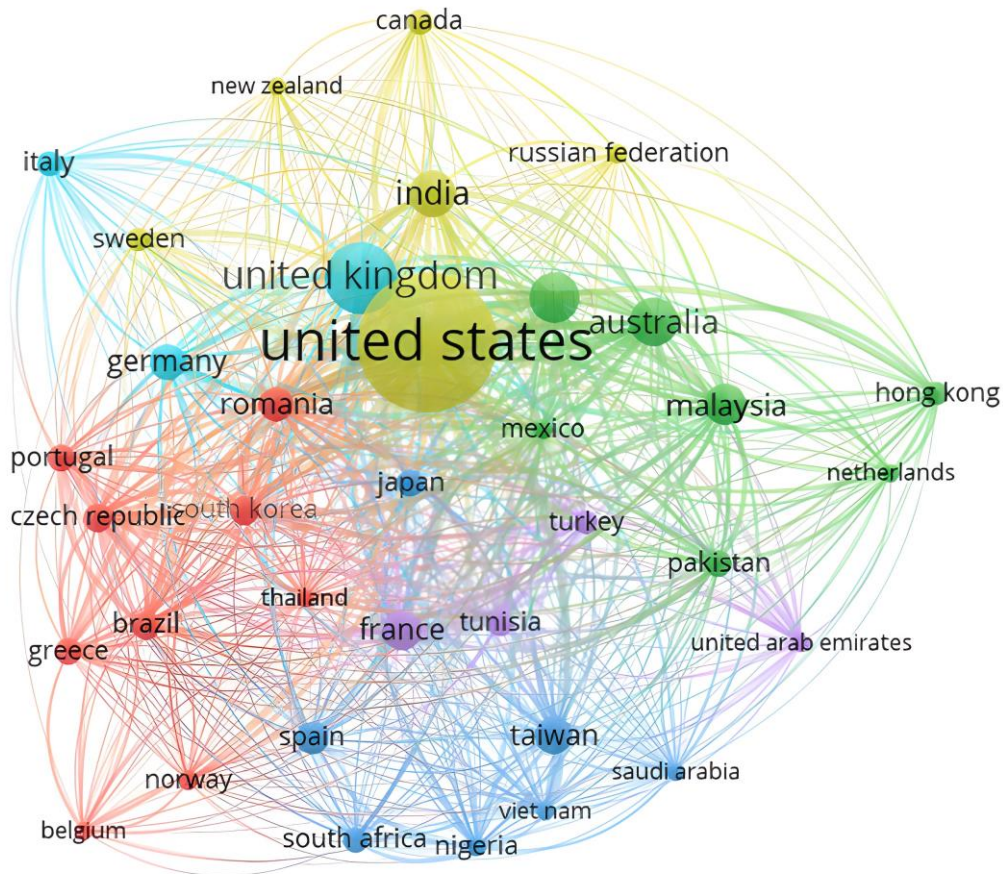
The results demonstrate that the United States of America (USA) lead scientific production on the Efficient Market, with a significantly higher number of publications compared to other countries. This suggests that universities and research institutions in the USA play a prominent role in generating knowledge on the Efficient Market and related topics, both in the field of finance and of economics. Furthermore, the presence of the United Kingdom, Australia, China, and India in the list of countries with a substantial number of publications indicates that these countries also actively contribute to research in this field, albeit to a lesser extent compared to the USA. These data provide important insights for researchers, highlighting the geographical distribution of scientific production and the influence of different countries in advancing knowledge on the Efficient Market.



**Figure 3.** Scientific production of countries over time on the topic. Source: Bibliometrix.

Analyzing the networks among the most cited countries on the Efficient Market in the field of finance offers insights into international collaboration and the distribution of scientific production. In Figure 4, the top 10 clusters of researchers highlight the most prominent countries in this research area. These results underscore the geographical diversity of researchers involved in the study of the Efficient Market, with a significant representation of countries from

different continents. This suggests global collaboration and knowledge exchange that transcends borders. While the United States of America leads in citations, indicating its strong influence and leadership in research on this topic, other countries such as France, the United Kingdom, Malaysia, Australia, and China also demonstrate their contributions.



**Figure 4.** Network among the most cited countries on the topic  
Source: VOSviewer.

In terms of scientific production, the USA leads with 107 published articles, followed by the United Kingdom, which recorded 37 articles. In third and fourth places are China, with 21 articles, and Australia, with 20 articles. Next, Malaysia and France occupy the fifth and sixth positions, with 15 and 14 articles, respectively. Rounding out the top 10 countries are India, Germany, Romania, and Taiwan, with a number of publications ranging from 10 to 7 articles. Together, these six countries total 203 articles out of the 478 in the sample, representing about two-thirds of the publications on the topic.

These results corroborate the research of Chun-Hao and Jian-Min (2012) and Cruz, Prado, and Carvalho (2023), which identified the USA and the United Kingdom as the main drivers of interconnectedness in finance and economics research. Furthermore, these countries host the top journals cited in the literature on the Efficient Market (see Table 2), such as *The Journal of Finance*, *Journal of Financial Economics*, *Journal of Corporate Finance*, *Journal of Financial and Quantitative Analysis*, among others.

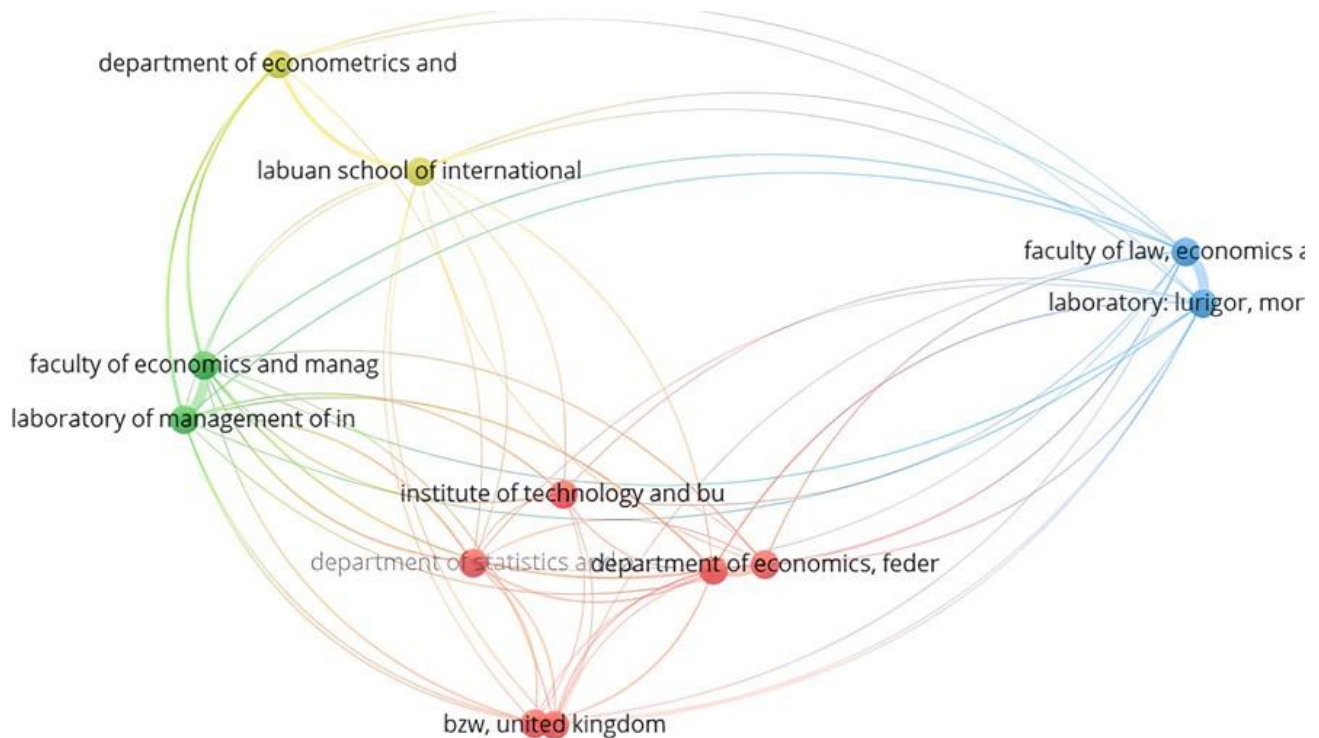
Analyzing the networks among the most cited countries on the Efficient Market reveals significant global collaboration and knowledge exchange that transcends borders. The presence of various countries in researcher clusters highlights the geographical diversity of those involved in studying the Efficient Market, indicating active international collaboration.

The USA leads scientific production on the Efficient Market, followed by the United Kingdom, China, Australia, Malaysia, France, and other countries. These findings align with previous research such as Chun-Hao and Jian-Min (2012) and Maia et al. (2019) and Cruz, Prado, and Carvalho (2023), which emphasized the influence and leadership of the USA and the United Kingdom in the interconnectedness of research in finance and economics. Additionally, these countries host the top journals cited in the literature on the Efficient Market, further underscoring their influence in the field. Together, these data provide a comprehensive view of the distribution of scientific production on the Efficient Market, highlighting the

importance of international collaboration and the influence of different countries in research in this field.

Figure 5 reveals the top organizations involved in this research, showcasing the geographical diversity and the existence of partnerships among researchers from different institutions. Among the top 10 organizations that stood out in the sample, Monash University in Australia, with its Department of Econometric and Business Statistics, leads the list. In second place is Universiti Malaysia Sabah in Malaysia, with the Labuan School of International Business

and Finance. Third is Kingdon University in the United Kingdom, with its Barclays de Zoete Wedd - BZW and London Business School departments. Fourth is the University of Monastir with the Faculty of Economic Sciences and Management of Mahdia, and the University of Sousse with the Laboratory of Management of Innovation and Sustainable Development (LAMIDED), located in Tunisia. Finally, the fifth place is occupied by the Institute of Technology and Business, representing the Czech Republic.



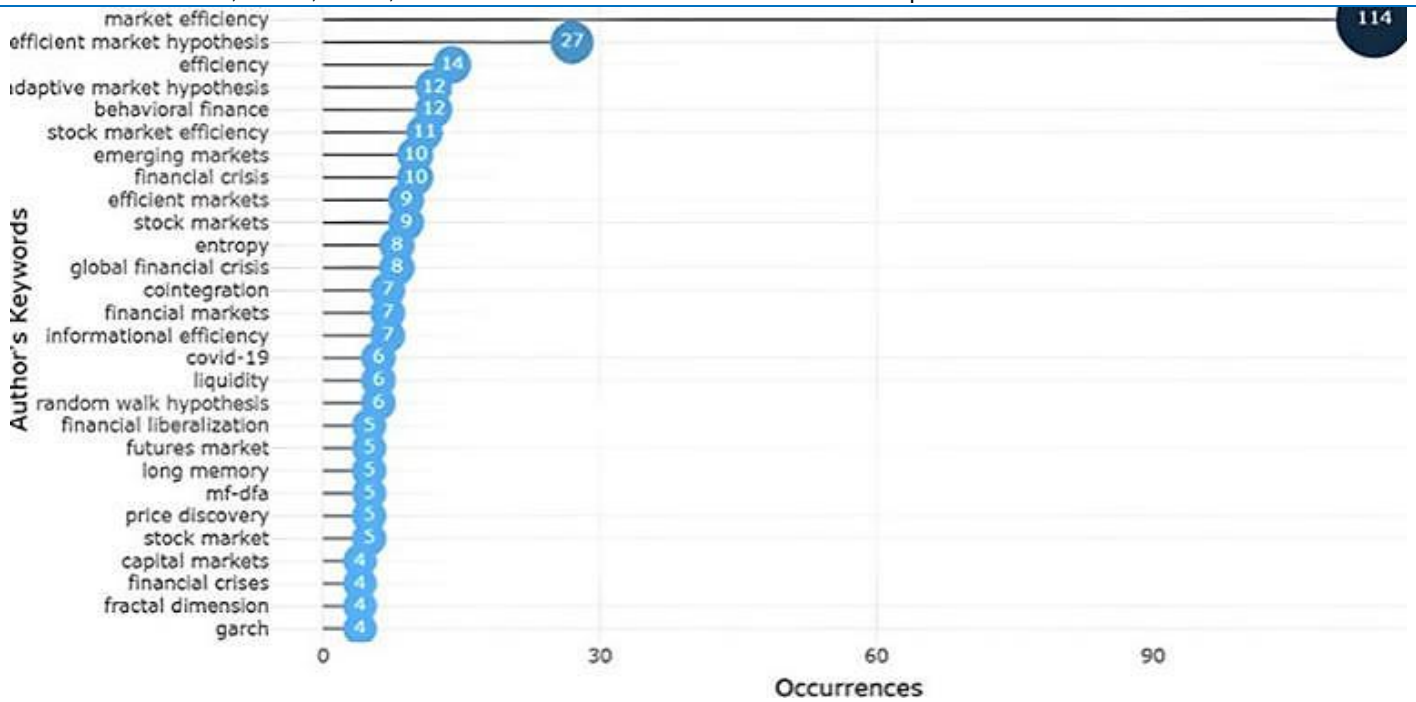
**Figure 5.** Co-authorship network between organizations (Universities)  
Source: VOSviewer.

These findings reflect the global nature of research on the Efficient Market Theory. Furthermore, the presence of business management departments, such as the Department of Econometric and Business Statistics and the Labuan School of International Business and Finance, instead of economics departments, indicates an interdisciplinary and collaborative approach in investigating this topic. This deviates from expectations, as the vast majority of departments are from the field of economics. Moreover, it is relevant to highlight that in the co-authorship network of these organizations, countries such as Australia, Malaysia, the United Kingdom, Tunisia, and the Czech Republic, among others, demonstrate an interest in investigating the Efficient Market Theory in the financial market.

These results offer a comprehensive view of international partnerships and the diversity of approaches in research on the Efficient Market Theory, highlighting the

keen interest and collaboration of organizations from various countries in this field. This suggests knowledge exchange and a multidisciplinary approach in investigating the Efficient Market in the financial market.

A crucial aspect of the mapping of scientific production on the topic involves analyzing the keywords used by authors in their research. Figure 6 showcases a wide variety of investigative lines, as evidenced by the most prominent keywords identified in the 478 analyzed articles. A total of 289 different keywords were identified in the field of finance. The significant presence of terms such as "market efficiency" (114), "efficient market hypothesis" (27), "efficiency" (14), "adaptive market hypothesis" (12), "behavioral finance" (12), "stock market efficiency" (11), and the occurrence of other keywords ranging from 10 to 1 in the articles indicate the diversity of approaches and theoretical perspectives adopted by researchers in the study of the Efficient Market.

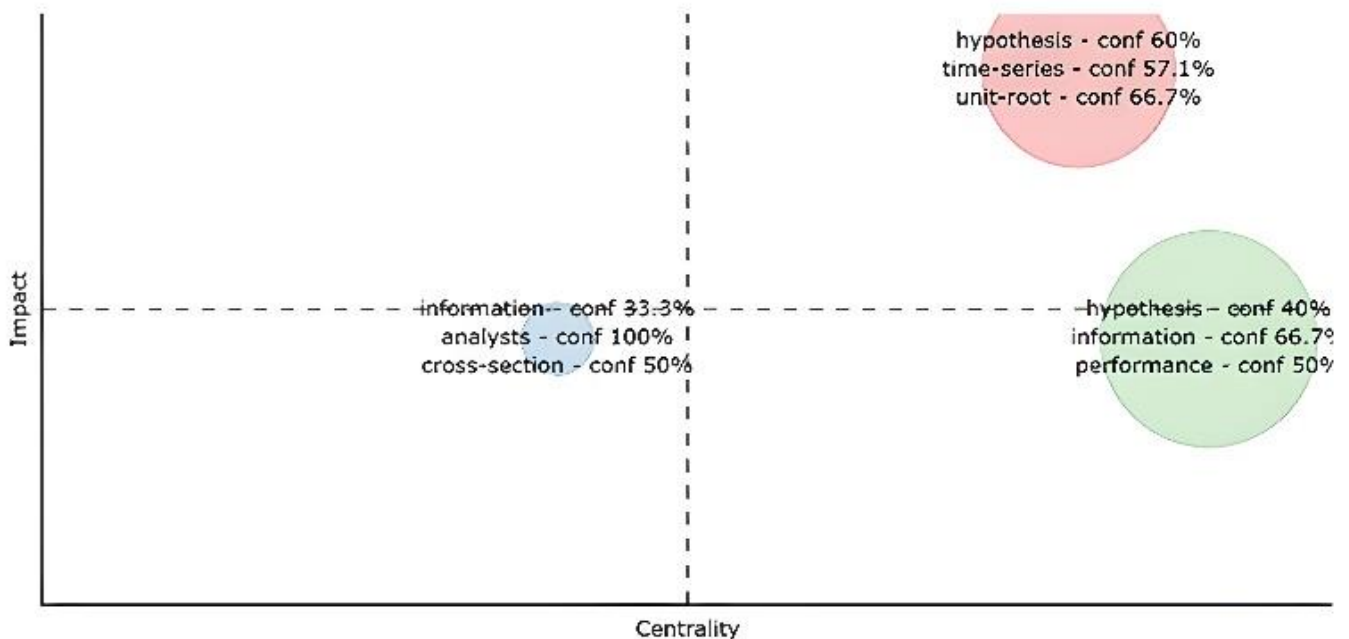


**Figure 6.** Keywords on the topic over time.  
Source: Bibliometrix.

Overall, it is possible to observe that research on the Efficient Market Theory presents various investigative lines, such as the adaptive market hypothesis and behavioral finance, among others which researchers can explore in the financial market. However, the low occurrence of terms such as "capital market," "financial crisis," "fractal dimension," and "GARCH" suggests that these topics are less addressed in the literature on the Efficient Market. This indicates a possible deficit in financial research regarding these specific topics.

The keywords used by authors serve as valuable indicators of trends and gaps in research on the Efficient Market Theory, shedding light on predominant focus areas and revealing potential opportunities for future investigations.

To conclude our analysis of the research front, we conducted a coupling mapping to gain a comprehensive view of the dynamics of research on the Efficient Market Theory. Figure 7 displays the coupling map, revealing three distinct clusters, each emphasizing specific areas of interrelation within the literature on the Efficient Market.



**Figure 7.** Coupling map analysis.  
Source: Bibliometrix.

The first cluster (red) indicates a strong research trend, focusing on themes such as "hypothesis" (conf. 60%), "time-series" (conf. 57.1%), and "unit-root" (conf. 66.7%). These results indicate that these themes are widely explored and represent consolidated areas of interest in the field of finance.

The second cluster (blue) highlights the association of publications with the financial market, exploring fundamental concepts such as "information" (conf. 33.3%), "analysts" (conf. 100%), and "cross-section" (conf. 50%). This demonstrates a significant focus on fundamental themes in the field of finance.

Lastly, the third cluster (green) reveals an association with themes such as "hypothesis" (conf. 40%), "information" (conf. 66.7%), and "performance" (conf. 50%), suggesting that these themes are considered emerging or less addressed in the field of finance. This analysis provides valuable insights for researchers and academics interested in the dynamics of the Efficient Market.

Furthermore, the analysis reveals that unforeseen events, such as the Covid-19 pandemic and the Russia-Ukraine War, have sparked researchers' interest in exploring these themes within the financial market, aiming to analyze the dynamics of asset prices in the capital market. Moreover, it was observed that topics such as market hypothesis, time series, and unit root represent a strong trend for prospective research endeavors.

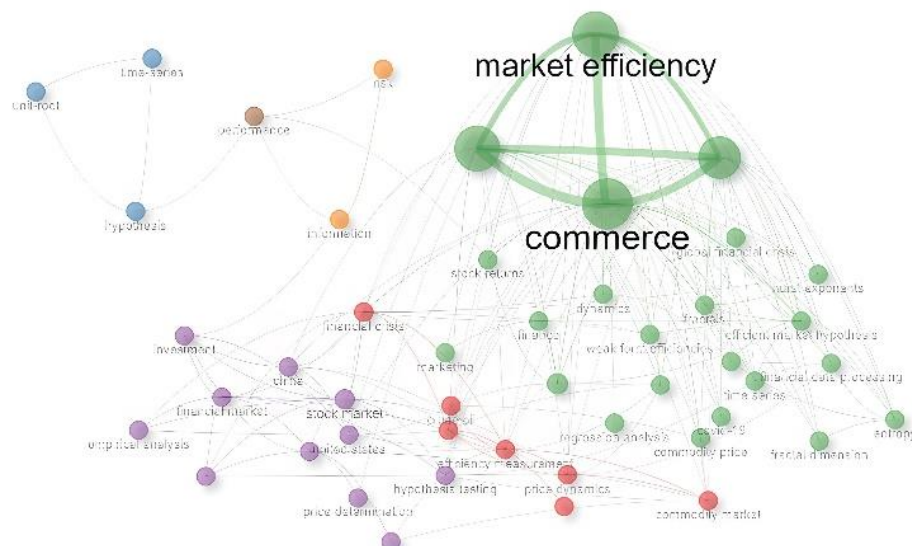
Prominent journals such as The Journal of Finance, Journal of Financial Economics, and Journal of Corporate Finance, along with seminal references such as Jegadeesh et al. (1993), Fama (1998), Edmans (2009), serve as influential sources in research on the Efficient Market.

Additionally, the prevalence of countries such as the USA and the UK, exhibiting significant interest in investigating the Efficient Market Theory, alongside with the most used keywords like "market efficiency", "efficient market hypothesis", "efficiency", "adaptive market hypothesis", "behavioral finance", and "stock market efficiency" in academic research, highlights the predominant trends and focus areas.

In conclusion, the analysis highlights a deficit in research on the Efficient Market, indicating the need for additional investigations to enrich the literature on the subject. These insights provide a robust foundation for researchers and academics interested in the dynamics and current trends of research on the Efficient Market.

### 3.3 Analysis of the base (conceptual, social, and intellectual)

The analysis of the base is a relevant tool for mapping the conceptual, social, and intellectual structure of the Efficient Market. By examining networks of competition, collaboration, and co-citation, it was possible to identify various themes and research areas related to the Efficient Market. Figure 9 shows the analysis in the form of a keyword competition network map, generated from the research data. The main networks identified were the green network, which includes publications focusing on the Efficient Market, the red network, which addresses studies on financial crises, and the third purple network, which discusses the stock market. Additionally, other networks were identified, addressing studies related to performance with an emphasis on time series, hypothesis, risk, and information.



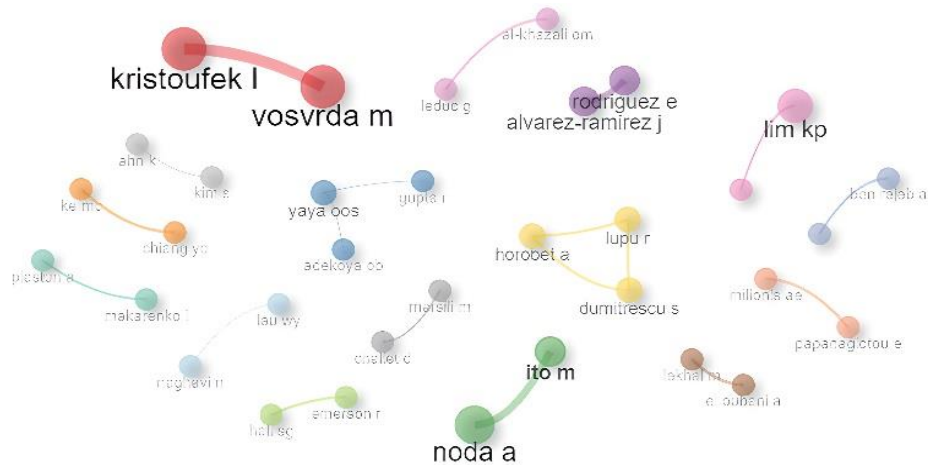
**Figure 8.** Occurrence network on the sample. Source: Bibliometrix.

These results provide a comprehensive view of the various research areas related to the Efficient Market, elucidating the interconnections and interrelations between the topics addressed. This insight can be useful for researchers, academics, and professionals seeking to understand the structure and context within which research on the Efficient Market is embedded.

Figure 9 illustrates a collaboration network map among authors engaged in research on the topic of the Efficient Market. The presence of three clusters in the sample suggests the existence of distinct networks of authors collaborating with each other, in a complex and diversified collaboration structure. The thickness of the lines connecting the authors represents the frequency of

collaboration, indicating the amount of work developed together on the topic. It was observed that the highest incidence of collaboration relationships occurred between the authors Kristoufek, L. and Vosvrda, M., who developed 13 works in collaboration. Next, authors Noda, A., Ito, M., and Wada, T. collaborated on nine works, and Rodriguez, E. and Alvarez-Ramirez, J. collaborated on three works. The

other clusters showed relationships between authors with two to three co-authored works. The identification of authors who collaborated most provides valuable insights into interactions and partnerships in research on the Efficient Market, highlighting key collaborators and the extent of their collaboration.

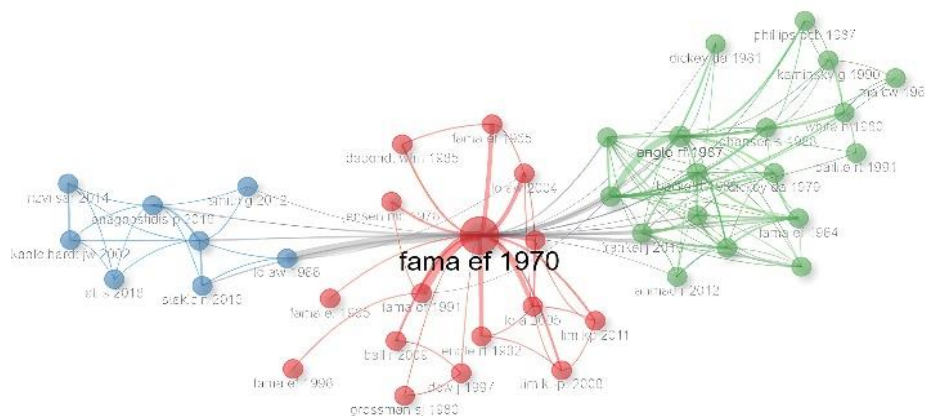


**Figure 9.** Collaboration network between authors. Source: Bibliometrix.

This collaboration network analysis among authors is important for understanding research dynamics, identifying trends and patterns of collaboration, and recognizing the influence and impact of certain groups of authors on academic literature concerning the Efficient Market. This information is relevant to the academic community and professionals interested in the topic, as it aids in understanding the intellectual and social structure of research in this area.

Figure 10 provides a comprehensive view of the co-citation network in the literature on the Efficient Market,

revealing connections between published articles over an extensive period of time. The co-citation network shows the importance and impact of Eugene Fama's contributions as the most cited author in this context, with the articles "Efficient Capital Markets: A Review of Theory and Empirical" and "Session topic: stock market price behavior" in *The Journal of Finance*. Fama, along with other researchers in the field of financial economics, has disseminated the concept of the Efficient Market and consolidated his position as a prominent figure in this field.



**Figure 10.** Co-citation network. Source: Bibliometrix.

Fama's theoretical and empirical contributions on asset pricing have stimulated a series of studies (see Table 3) aimed at testing the efficient market hypothesis in the capital market, to determine if the market does indeed operate efficiently. These studies have led to a significant co-citation network, demonstrating the impact and relevance of the topic in the fields of economics, finance, and econometrics. Additionally, the analysis highlights the

official recognition of Fama's contributions in 2013 when he received the Nobel Prize along with economists Robert Shiller and Lars Peter Hansen. This underscores the importance and influence of Fama's work and his contemporaries in the study of the Efficient Market.

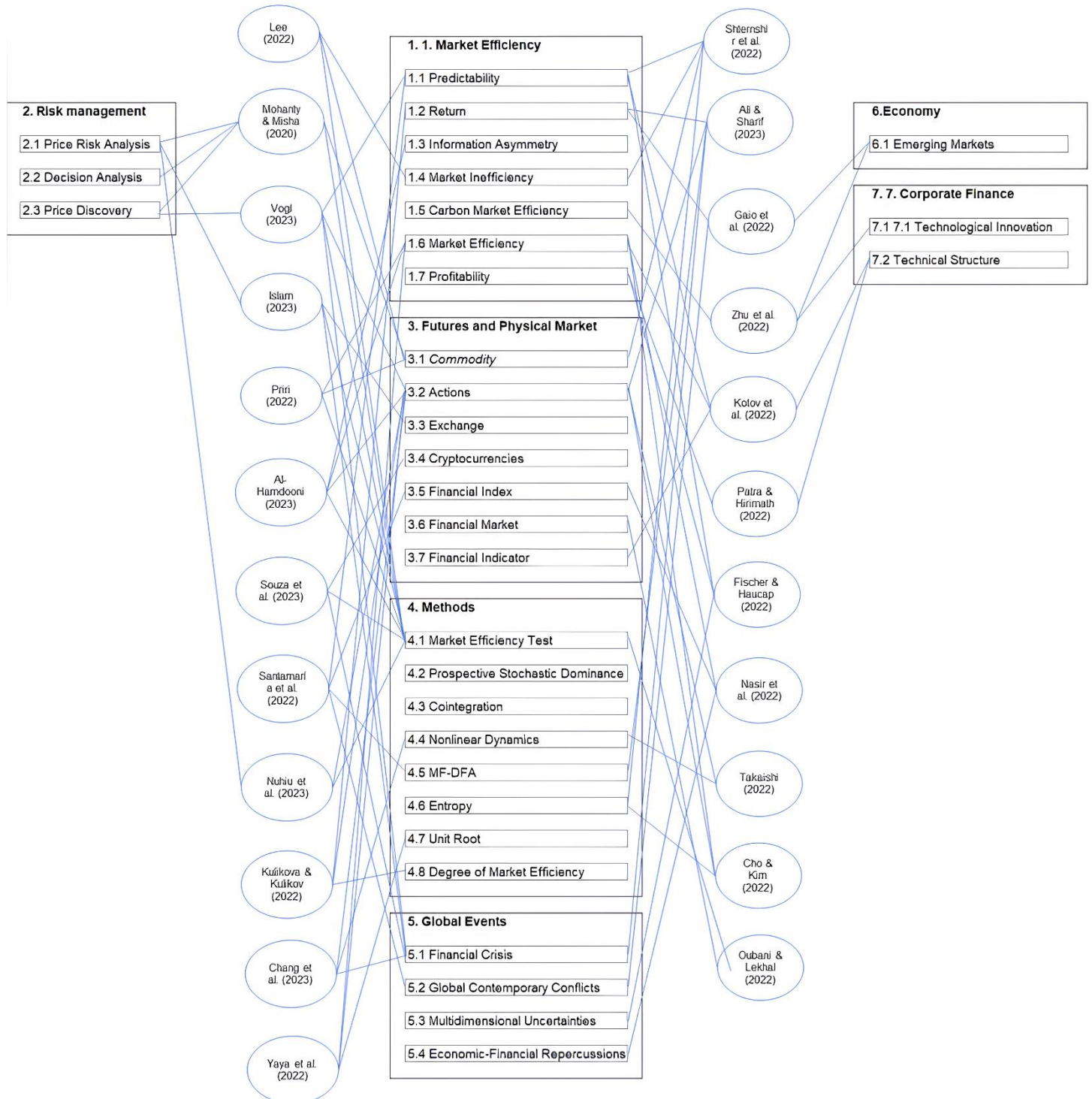
The mentioned researchers, such as Kristoufek, L. and Vosvrda, M., Noda, A., Ito, M. and Wada, T., Rodriguez, E. and Alvarez-Ramirez, J., emerge as key researchers

focusing on the stock market and corporate governance, thereby emphasizing the breadth and influence of Fama's work and his contemporaries in this field of study. Therefore, these results offer a comprehensive view of the impact of Eugene Fama's contributions and other researchers in the field of the Efficient Market, which underscores their relevance in academic scientific production and their influence on studies in financial economics, capital markets, and corporate governance.

### 3.4 Future study agenda

To identify future research opportunities on the Efficient Market, this study delimited 52 articles published

between 2022 and 2023 so far in the Web of Science (WoS) and Scopus databases. The selection of these articles is justified by the belief that possible future research proposals have not been investigated yet. Out of the 52 selected articles, 5 were not available and 24 did not present proposals for future studies. Based on the methodology applied by Filser et al. (2017), the remaining 23 articles were read and then a mapping of future research on the topic was developed. Figure 11 presents the map of future research, identifying the main gaps in the scientific literature on efficient markets, classified into 7 topics: Market Efficiency, Risk Management, Future and Physical Market, Methods, Global Events, Economy, and Corporate Finance..



**Figure 11.** Map of future research  
Source: Prepared by the authors.

From these topics, the main research trends centered on market efficiency were identified:

1. Analyzing market efficiency in the time variable in the future and physical markets, through the application of statistical tests and econometric methods.
2. Evaluating market efficiency and risk management in financial market prices, applying econometric methods.
3. Investigating financial assets to examine predictability, return, profitability, and informational asymmetry of price series with an emphasis on periods of global contemporary conflicts.
4. Developing market efficiency measures.

In the first study trend, the application of statistical tests and econometric methods in future research to examine market efficiency in periods of macroeconomic events stands out. In the reading of the articles, the following statistical tests and econometric methods were identified: Market Efficiency test, Prospective Stochastic Dominance (PSD), Cointegration, Johnson Unit Root, Nonlinear Dynamics, Multifractal Detrended Fluctuation Analysis (MF-DFA), Autoregressive Methods (AR) in the time variable, Structural Breaks, Kalman Filter (KF), Shannon Entropy, Market Efficiency Degree, and Hurst Exponent Dynamics. Authors such as Kulikova and Kulikov (2022), Shternshis et al. (2022), Cho and Kim (2022), Nasir et al. (2022), Yaya et al. (2022), and Vogl (2023) recommend studies to analyze market efficiency in the time variable and investor perception in periods of repercussions, economic uncertainties, and financial events that encompass global events. Additionally, authors such as Zhu, Long, and Gong (2022) emphasize the importance of studies on carbon market efficiency and technological innovation in the company, while Souza and Carvalho (2023) indicate a gap in the literature on abrupt asset displacement and its implications for the future market.

The second trend in market efficiency study includes issues related to risk management both in the future and physical markets, addressing price risk analysis, investor decision-making, and price discovery mechanism in the financial market, with an emphasis on global events.

Authors such as Mohanty and Mishra (2020), Vogl (2023) highlight the importance of studies on price risk management in agricultural commodities, asset predictability, momentum trading, unbiased forward rate as a predictor of spot rate, and financial asset price measure in turbulent periods in the global economy.

The third trend in market efficiency study addresses e-commerce, predictability, return, profitability, and informational asymmetry of price series in the future and physical market. Authors such as Gaio et al. (2022), Takaishi (2022), Santamaría et al. (2022), and Ali, Raza, and Khan (2023) propose further studies using multifractal and fractal methods in emerging economies, while authors like Patra and Hiremath (2022) and Kotov et al. (2022)

suggest new research with technical structure analysis in corporate finance.

The fourth trend in market efficiency research focuses on methodological expansion to estimate market inefficiency. Authors such as Lee (2022), Phiri (2022), and Chang et al. (2023) express the need for a measure to estimate the optimal duration of the time interval to detect the level of market efficiency (inefficiency) in periods of financial and non-financial crises. These identified fourth trend of future research are intriguing and require complex and innovative methods. Although some statistical tests and econometric models suggested by the authors are not innovative, unique combinations of the test and model can yield good research and relevant insights into the financial market.

The theme is relevant in economic literature and finance, with research trends for both the academic field and in practice. The presented future research agendas emphasize the need for deepening and strengthening the literature regarding price dynamics in the future and physical market in periods encompassing recent macroeconomic events. This result demonstrates to the academic community that there is significant interest in research on Market Efficiency, with a series of identified trends for future studies. The analysis of articles published between 2022 and 2023 revealed gaps in the scientific literature on the topic, and the identification of specific trends suggests promising areas for further investigation.

The identified trends include the analysis of market efficiency in periods of macroeconomic events, risk management in the future and physical markets, e-commerce, predictability, return, profitability, and informational asymmetry of price series, and methodological expansion to estimate market inefficiency. Each of these trends presents interesting and challenging research opportunities that can significantly contribute to understanding how financial markets work.

Furthermore, the mention of specific authors and their recommendations for future studies provides a solid foundation for the development of new research. The relevance of the theme in economic literature and finance, along with the need for deepening and strengthening the literature, highlights the importance and urgency of addressing these issues in future academic and practical research.

## 5 CONCLUSIONS

The study sought to map the scientific production related to the Efficient Market, conducting a quantitative analysis of the evolution of the literature on the subject. To do this, 478 articles addressing market efficiency in the financial context were examined from 1977 to 2023, based on metadata extracted from the Web of Science (WoS) and Scopus databases.

The results revealed an annual growth rate of 12.28% in the theme, with a peak in scientific production from 2006



onwards. Authors such as Fama (1970; 1998), French (1992), Jensen (1978), Shiller (1981), Hansen (1982), Malkie (1989), Moy and Lee (1991), Jegadeesh et al. (1993), Schwert (1983; 2003), Ball (2005), and Edmans (2009), among others, were identified as significant drivers of this growth. Additionally, journals such as *The Journal of Finance*, *Journal of Financial Economics*, *Journal of Corporate Finance*, *Journal of Financial and Quantitative Analysis*, and *Journal of Banking and Finance* were highlighted as the main publication outlets on the subject.

The analyses also pointed to a predominance of journal affiliations in the regions of the Americas, Europe, and Asia, mainly in departments of statistics, economics, business, and management. Relevant references, such as the articles by Jegadeesh (1993) and Fama (1998), were significantly cited, while the main topics addressed included market efficiency, efficient market hypothesis, efficiency, adaptive market hypothesis, behavioral finance, and stock market efficiency.

Furthermore, the co-citation of the intellectual base highlighted Eugene Fama as the main author in both databases, consolidating his influence in financial literature. These findings contribute theoretically to the field of financial economics, offering valuable insights to scholars and readers interested in finance theory.

As future research trends, the analysis of market efficiency in the future and physical market, assessment of market efficiency and risk management in financial market prices, investigation of predictability and profitability in periods of global conflicts, and the development of market efficiency measures were identified. These trends are intriguing and require complex and innovative methods. These pieces of evidence are relevant as they present possible directions for future research in the field of market efficiency and risk management in the financial market.

The identified future research trends highlight the importance of analyzing market efficiency in different contexts, such as in the future and physical markets, and suggest investigating predictability and profitability in periods of global conflicts. Additionally, it emphasizes the need to develop more complex and innovative market efficiency measures to address these issues. These trends indicate promising and challenging research areas for academics interested in the field. However, it is important to note that the research sample was limited to the Web of Science and Scopus databases, suggesting the need for future bibliometric reviews focused on Brazilian journals and the use of other databases.

The results of this analysis offer a significant contribution to the field of finance, providing valuable insights and guiding possible areas of future research. The identification of key journals and influential authors, along with the analysis of predominant themes and emerging trends, helps map the current landscape of financial literature and highlights areas of greatest interest and relevance. Furthermore, the emphasis on market efficiency, risk management, and other key issues provides a solid

foundation for future investigations and theoretical developments in the field of financial economics. The identified trends, such as the analysis of market efficiency in different contexts and the investigation of predictability in periods of global instability, point to promising areas that can interest both academics and professionals in the financial sector. In summary, these results contribute to expanding knowledge and understanding of market efficiency and risk management, encouraging the search for innovative and complex approaches to further advance this field of study.

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**CONTEXTUS**

CONTEMPORARY JOURNAL OF ECONOMICS AND  
MANAGEMENT.

**ISSN 1678-2089**

**ISSNe 2178-9258**

1. Economics, Administration and Accounting - Journal
2. Federal University of Ceará. Faculty of Economics,  
Administration, Actuaries and Accounting

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