

THE IMPACT OF INTEREST RATES ON STOCK RETURNS: A SYSTEMATIC LITERATURE REVIEW AND BIBLIOMETRIC ANALYSIS (2021–2025)

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Article History	ABSTRACT
Received: December 21, 2026 Revised & Accepted: January 4, 2026 Available online: July 27, 2026 Keywords: Interest Rates; Stock Returns; Systematic Literature Review; Bibliometric Analysis; PRISMA;	Purpose: This study aims to examine the development of research trends, intellectual structures, and empirical conclusions concerning the impact of interest rates on stock returns, with a particular focus on recent academic contributions amid global economic uncertainty. Method: This research adopts a systematic literature review (SLR) approach using secondary data obtained from peer-reviewed journal articles indexed in the Scopus database and published between 2021 and 2025. The article selection process follows the PRISMA framework, encompassing identification, screening, eligibility, and inclusion stages, which resulted in a final sample of 34 relevant studies from an initial pool of 175 records. Bibliometric analysis and network visualization techniques were applied using VOSviewer to analyze publication trends, geographical distribution, influential institutions and journals, author collaboration networks, and keyword co-occurrence patterns. Finding: The findings reveal a significant increase in scholarly attention to the relationship between interest rates and stock returns in recent years, driven by heightened global economic uncertainty, monetary policy tightening, and post-pandemic market volatility. Empirical evidence consistently indicates that rising interest rates tend to exert a negative effect on stock returns through increased capital costs and declining equity valuations. However, the strength and direction of this relationship vary across economic cycles, sectors, and market conditions. The analysis also shows that while research is predominantly concentrated in developed economies, emerging markets—particularly Indonesia—are increasingly contributing to empirical studies in this field. Novelty: The novelty of this study lies in integrating systematic literature review procedures with comprehensive bibliometric and network analyses, offering a structured and holistic understanding of interest rate–stock return dynamics while identifying key research trends, gaps, and policy-relevant insights for future financial market research.

INTRODUCTION

A systematic literature review (SLR) on the relationship between interest rates and stock returns has become increasingly important, as this approach enables a comprehensive and structured synthesis of empirical evidence and theoretical perspectives concerning the influence of a key macroeconomic variable on stock market performance. A growing body of research indicates that interest rates serve as a critical transmission channel affecting equity valuation, return levels, and market volatility, although the magnitude and direction of these effects vary across countries, market conditions, and phases of the economic cycle (Lone et al., 2024; Marozva, 2020). Through an SLR framework, findings related to investor sentiment and behavioral factors can be systematically integrated, demonstrating that changes in interest rates shape risk perception, market liquidity, and volatility through both rational expectations and psychological biases (Gupta et al., 2023; Vurur,

2020; Xiong & Kok, 2024; Zhou, 2025). Moreover, the literature highlights that interest rate shocks and policy uncertainty frequently generate asymmetric market responses, particularly during periods of economic stress and financial crises, underscoring the need for systematic evidence synthesis to better understand stock market volatility dynamics (de la GONZÁLEZ et al., 2017; Guenich et al., 2022). By consolidating a wide range of methodological approaches—including bibliometric analysis, volatility modeling, behavioral frameworks, and machine-learning-based techniques—SLR plays a vital role in identifying dominant research trends, uncovering research gaps, and deriving policy-relevant insights that can inform more effective monetary policy design and interest-rate-sensitive investment strategies (Bhowmik & Wang, 2020; Choyal & Sharma, 2025; Dipura & Maulana, 2025; Ferreira et al., 2025; Song, 2025).

LITERATURE REVIEW

Interest rates play a central role in financial market dynamics. (Gu et al., 2022) emphasize that interest rates can be understood as the cost of capital usage, which shapes firms' financial expectations and may trigger stock price fluctuations when adjusted by central banks. Similarly, (McMillan, 2022) explains that interest rates are closely linked to money supply and inflation, influencing stock prices through dividend discount valuation mechanisms. From a market risk perspective, (Grochola et al., 2023) argue that interest rate risk represents a dominant factor, exerting an effect approximately five times greater than corporate credit risk within the life insurance industry. In addition, (Nurdina et al., 2024) find that increases in interest rates can intensify market risk, with smaller firms being disproportionately affected. Collectively, these studies demonstrate that interest rates should not be viewed merely as a monetary policy instrument, but rather as a fundamental variable shaping valuation, risk exposure, and overall market behavior.

In modern financial literature, stock returns are commonly defined as the gains received by investors from both stock price movements and dividend payments, arising from complex interactions between firm-specific fundamentals and macroeconomic conditions. (Hermuningsih et al., 2024) state that stock returns are influenced by various macroeconomic factors, including exchange rates, interest rates, and inflation, with profitability serving as an intervening variable. This finding highlights that stock returns do not evolve in isolation but are continuously shaped by changing external conditions. Empirical evidence from the Indonesian energy sector further supports this view. (Rheynaldi et al., 2023) show that return on assets (ROA) has a positive effect on stock returns among energy companies listed on the Indonesia Stock Exchange during the 2017–2021 period, indicating that internal firm performance remains a key determinant of returns, particularly in sectors sensitive to production costs and commodity price fluctuations.

At the macroeconomic level, stock returns are also highly vulnerable to external shocks. The same strand of research notes that macroeconomic variables such as oil prices, exchange rates, and interest rates play a significant role in determining stock returns, confirming that capital markets respond directly to both domestic and global economic dynamics. Even during crisis periods, such as the COVID-19 pandemic, firm fundamentals continue to matter. (Hermuningsih et al., 2024) observe that higher profitability enables firms to better withstand macroeconomic shocks, leading to improved stock returns under challenging economic conditions. These findings suggest that firm-level fundamentals can act as a buffer against external pressures and heightened market volatility. Consequently, stock returns may be regarded as a comprehensive indicator reflecting internal firm strength, macroeconomic conditions, and market sensitivity to structural changes and economic cycles.

A substantial body of prior research documents a general pattern in which increases in interest rates tend to reduce stock returns. For example, (Nurdina et al., 2024) explicitly report that interest rates exert a negative and statistically significant effect on stock returns, consistent with the theoretical argument that higher interest rates raise capital costs and suppress equity valuations. (Endri et al., 2021) similarly find that interest rates constitute a powerful macroeconomic determinant of stock returns in the property sector, with the relationship predominantly negative. These findings align with classical financial theory, which posits that rising interest rates weaken corporate performance and dampen investor demand in equity markets.

Nevertheless, several studies indicate that the impact of interest rates on stock returns may vary under specific economic conditions. (Gu et al., 2022) find that while interest rates generally exert a negative influence on stock returns, this relationship may reverse during periods of strong economic expansion. This evidence suggests that the interest rate–stock return nexus is dynamic and shaped by business cycle momentum. (McMillan, 2025) further argues that the correlation between monetary variables and stock returns can shift depending on broader macroeconomic conditions and market structures, implying that interest rate effects are not uniform across time or countries.

Beyond business cycle effects, interactions between interest rates and other macroeconomic variables further complicate this relationship. (Sia et al., 2025) emphasize that stock market dynamics in emerging economies can only be fully understood when interest rates are analyzed alongside inflation and gross domestic product. Likewise, (Grochola et al., 2023) demonstrate that changes in interest rates significantly affect insurance equity prices, with differing impacts between U.S. and European markets due to variations in risk structures. Thus, although most empirical studies support a negative relationship between interest rates and stock returns, the literature consistently underscores that this effect is context-specific, asymmetric, and heterogeneous across sectors and time periods.

METHODOLOGY

This study aims to examine the evolution of research trends concerning the impact of central bank interest rates on stock returns. The analysis relies on secondary data obtained from peer-reviewed articles indexed in the Scopus database over the 2021–2025 period. The literature search was conducted using the keywords interest rate and stock return within article titles, abstracts, and author-provided keywords.

To ensure transparency and replicability, the study follows the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) framework. The PRISMA protocol consists of four sequential stages—identification, screening, eligibility assessment, and inclusion—each guided by predefined inclusion and exclusion criteria. These criteria were applied to ensure that only relevant and high-quality studies were retained for the final analysis.

Table 1
Inclusion and Exclusion Criteria for Article Selection

Criteria	Eligible for inclusion in the sample
Specific Keywords	Exclude specific keywords “Interest Rate” and “Stock Return”
Subject Area	Exclude subject area: Social sciences, Mathematics, Computer Science, Energy, Decision Sciences, Computer Science, Psychology, Art and Humanities
Document Type	Exclude document type : review, letter,
Publication Stage	Exclude Publication Stage: Article in Press
Open Acces	Exclude Open Acces: Gold, Green, Hybrid Gold, Bronze

The selection criteria were defined as follows. Articles were excluded if they belonged to subject areas outside the scope of the study, namely social sciences, mathematics, computer science, energy, decision sciences, psychology, and arts and humanities. Document types classified as reviews or letters were also excluded. In addition, articles categorized as “Article in Press” were removed to ensure publication completeness. With respect to access type, studies published under Gold, Green, Hybrid Gold, or Bronze open-access categories were excluded from the sample.

The database search was conducted on 1 December 2025 using the Scopus database and covered publications from 2021 to 2025. The initial search using the keywords interest rate and stock return across multiple academic disciplines yielded a total of 175 documents. Following the screening process based on subject areas, 154 articles remained. Further exclusions based on document type

reduced the sample to 149 articles, while the removal of articles classified as “Article in Press” resulted in 148 records. Subsequent filtering based on open-access categories narrowed the dataset to 63 articles.

Of these 63 articles, 15 could not be retrieved in full-text form, leaving 48 studies available for detailed assessment. After evaluating their relevance to the research objectives, 14 additional articles were excluded. Consequently, a total of 34 articles were retained and systematically reviewed in the final analysis.

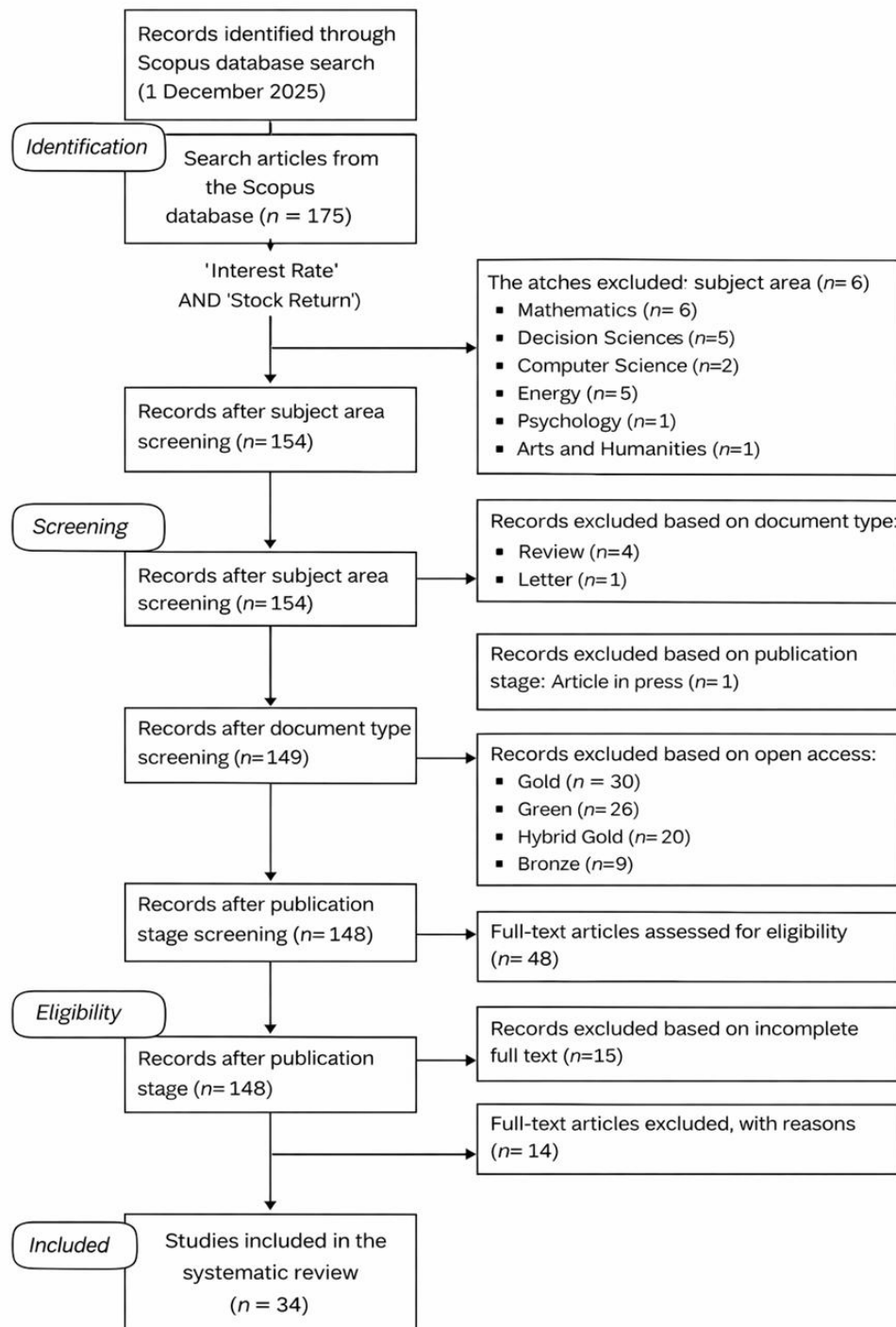


Figure 1
Source: Researcher, (2025)

RESULTS AND DISCUSSION

Results

Publication Timeline

Of the 34 articles included in the review, the distribution of publications across the 2021–2025 period indicates a clear upward trend in scholarly output. Specifically, six articles were published in 2021, followed by an equal number in 2022. Publication activity slightly declined in 2023, with five articles recorded, before increasing markedly in subsequent years. The highest number of publications occurred in 2024, with nine articles, while eight articles were published in 2025. This pattern suggests a growing academic interest in the topic in recent years, likely driven by heightened global economic uncertainty and increased attention to monetary policy dynamics and their implications for stock market performance.

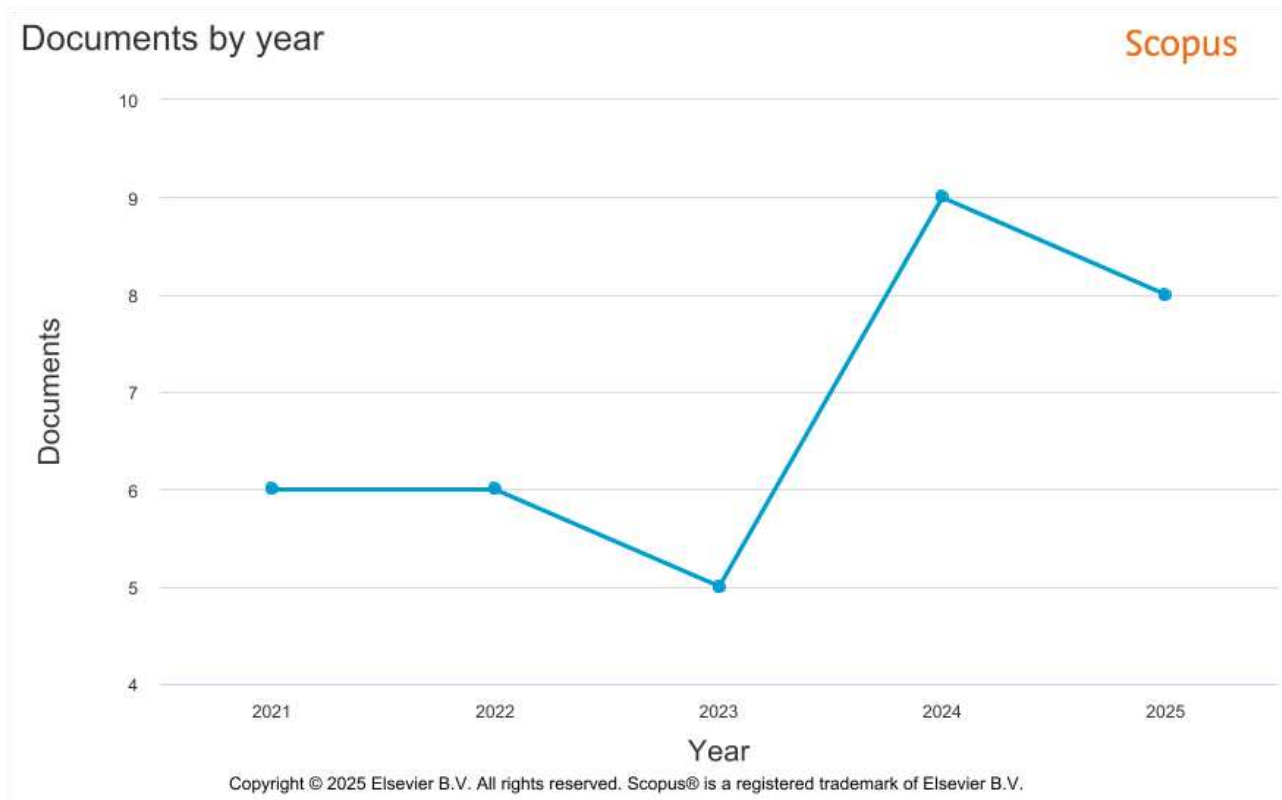


Figure 2

Source: Scopus, (2025)

Geographical Distribution

The geographical distribution of the reviewed studies reveals a relatively broad spread of research contributions, with clear dominance by a limited number of countries. As illustrated in Figure 3, the United States ranks first in terms of publication output, contributing six documents, thereby reaffirming its role as a primary hub of knowledge production in this research field. Indonesia occupies the second position with five publications, highlighting the substantial contribution of an emerging economy to the literature. The United Kingdom follows in third place with four documents, while Germany contributes three publications. Other countries, including India, Malaysia, Saudi Arabia, and South Africa, each account for two documents, whereas Australia and Canada record the lowest output with one publication each. This pattern suggests that although research activity is largely concentrated in developed economies, participation from Asian and African countries is notably prominent, reflecting growing scholarly interest from emerging regions in the topic under investigation.

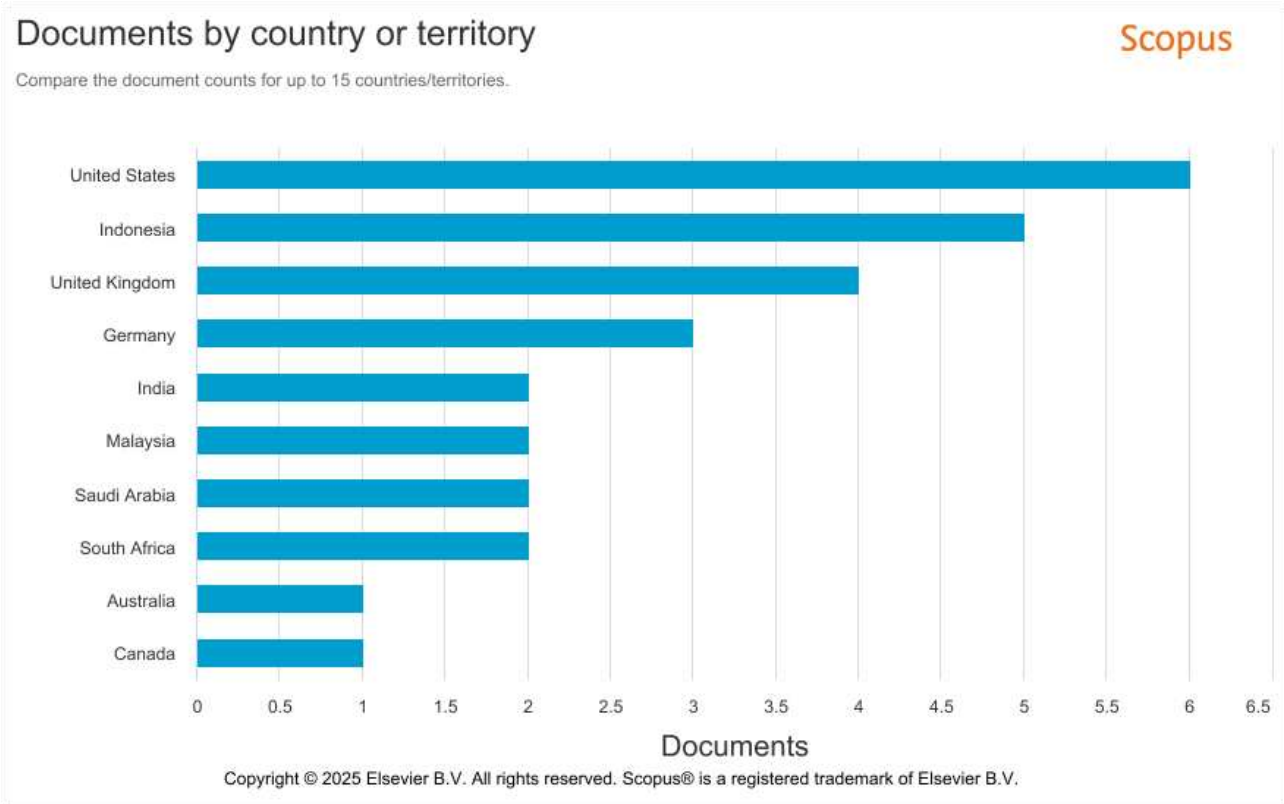


Figure 3
Source: Scopus, (2025)

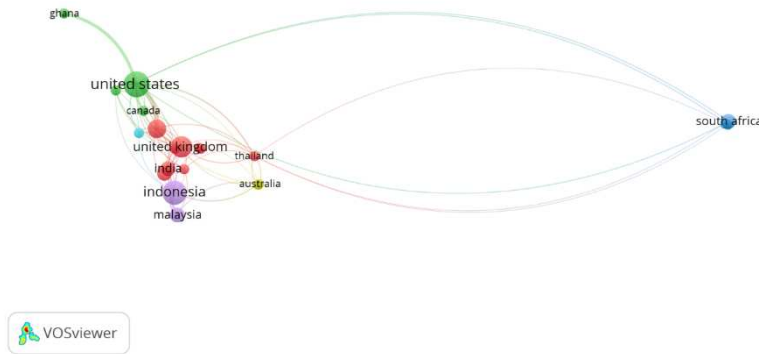


Figure 4
Source: Vosviewer, (2025)

Figure 4 further demonstrates the dominance of the United States within the international publication collaboration network. The country exhibits a relatively high number of documents, the highest citation count (62), and the largest total link strength (181), underscoring its central role in cross-national scientific connectivity. This dominance is clearly visualized in the network map, where the United States functions as the main node linking countries across Asia, Europe, and Africa. Although Indonesia contributes fewer publications than the United States, it occupies a strategically important position with relatively strong collaborative ties, particularly with the United Kingdom, Malaysia, and India, indicating the presence of intensive regional and historical research partnerships. The United Kingdom emerges as the second most influential actor, characterized by high citation counts and cross-cluster connections, and serves as a bridge between developed and developing

countries. Meanwhile, countries such as South Africa appear in more peripheral positions but maintain strong ties with central nodes, reflecting focused yet meaningful collaborative relationships. Overall, the integration of quantitative indicators and network visualization suggests that global scientific collaboration in this field remains centered on developed countries, while simultaneously providing opportunities for emerging economies—including Indonesia—to engage actively in the global knowledge network through strategic partnerships.

Bibliographic Coupling of Institutions

Figure 5 illustrates that Universitas Mercu Buana, Jakarta occupies a central position as a key connector among institutions that share common scholarly references, indicating its significant role within the analyzed academic network. On one side of the network, a relatively dense cluster of institutions emerges, including the Department of Business Mainz, the Faculty of Economics and Business, the Department of Accounting, the Center for Sustainable Innovation, and the Centre for Econometrics & Applied Research. This clustering reflects a high degree of similarity in the literature cited and a strong convergence of research interests, particularly in the fields of economics, business, accounting, sustainability, and econometrics.

On the other side, the Faculty of Economics and Administration is directly linked to Universitas Mercu Buana but remains relatively detached from the main cluster, suggesting a more specialized and selective overlap in referenced sources. Overall, this visualization demonstrates that bibliographic coupling not only captures inter-institutional relationships based on shared citations, but also reveals the underlying knowledge structure and the strategic positioning of institutions within the research landscape. In this context, Universitas Mercu Buana appears to have the potential to function as a bridge for research collaboration across institutions and national boundaries.

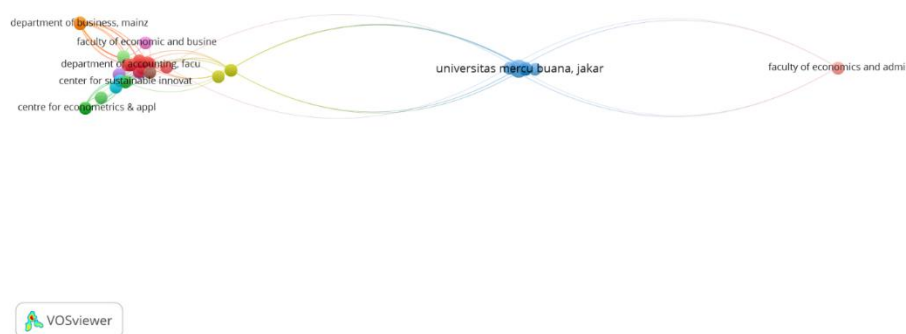


Figure 5

Source: Vosviewer, (2025)

Bibliographic Coupling of Journals

Figure 6 indicates that the *Journal of Risk and Financial Management* occupies the core position within the main cluster, as reflected by its highest total link strength (30) and the largest node size, suggesting that it is the most interconnected and influential journal within the literature network on this topic. Other journals, including *Finance Research Letters*, *European Financial Management*, and *Economic Research–Ekonomika*, also form interconnected subclusters, although the strength of their linkages is comparatively weaker. Taken together, the visualizations suggest that the publication ecosystem in this research area is structured around a small number of core journals that function as primary reference hubs, while other journals operate as peripheral nodes that broaden thematic coverage yet remain connected through shared citation patterns.

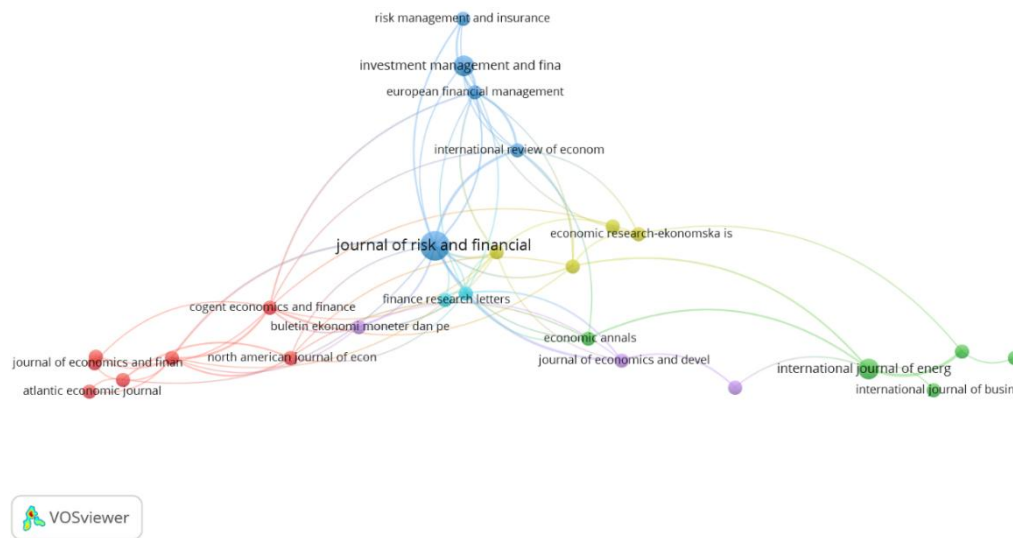


Figure 6

Source: Vosviewer, (2025)

Bibliographic Coupling of Publications

Figure 7 illustrates that Drake p.p. (2022) emerges as the most dominant publication, recording the highest number of citations (53) and occupying a central position within the network. However, its relatively low total link strength (3) suggests that its influence is primarily citation-driven rather than based on close bibliographic similarity with other studies. In contrast, publications such as Schrank j. (2024) and Wisniewski t.p. (2021) exhibit high total link strength values (14 and 12, respectively) despite receiving fewer citations, indicating their important role as conceptual connectors within the core literature cluster. Gu g. (2022), with 15 citations and a total link strength of 6, appears to function as an intermediary linking the core cluster to more peripheral studies, including Rheynaldi p.k. (2023), which demonstrates a balanced profile in terms of citation count and bibliographic connectivity (8 citations; TLS 8). Other publications, such as Gordo n. (2024), Kuo y.-s. (2022), and Grochola n. (2023), further reinforce the cluster structure through relatively strong link strength values despite moderate citation levels, reflecting consistent use of shared references in the development of the literature. Overall, the integration of network visualization and bibliometric indicators underscores that the structure of the research field is shaped not only by highly cited works, but also by publications with strong bibliographic linkages that serve as conceptual foundations and binding elements in the evolution of this research domain.

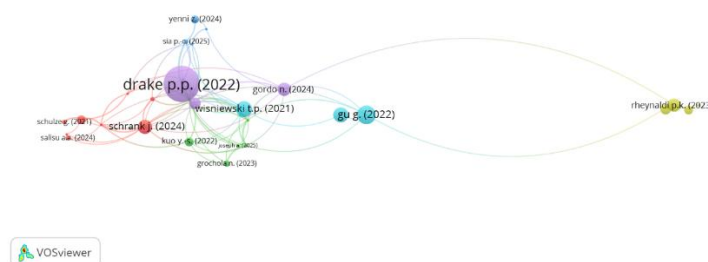


Figure 7

Source: Vosviewer, (2025)

Bibliographic Coupling of Authors

Figure 8 shows that Endri e. occupies the most central and dominant position within the author network, as evidenced by the highest number of documents (2), the greatest citation count (13), and an exceptionally large total link strength (449). These indicators underscore Endri e.'s role as a key connector and a pivotal actor in the structure of the analyzed literature. The network visualization further reveals that Endri e. functions as a bridge between relatively dense clusters of authors—such as McMillan d.g., Eliza, Satrianto a., Foos d., and Esparcia c.—and more peripheral contributors, including Hermuningsih s., thereby reflecting cross-cluster bibliographic linkages.

Other authors, including Adib n., Atmini s., Nurdina n., and Nurholis n., also display high total link strength values (313) despite having relatively modest citation counts. This pattern indicates strong similarity in referenced sources and suggests considerable potential for conceptual contribution within the network. Overall, the combined use of quantitative indicators and network visualization demonstrates that the intellectual structure of the field is shaped not solely by citation frequency, but also by the strength of bibliographic connections among authors, with Endri e. playing a strategic role as a central node in the development and integration of the literature within this research domain.

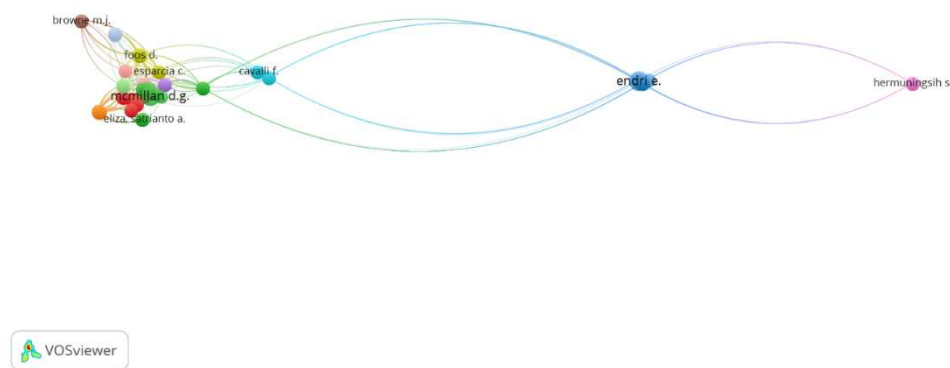


Figure 8
Source: Vosviewer, (2025)

Network Visualization of Authors' Keyword Co-Occurrence

Figure 9 illustrates that *stock returns* and *interest rate(s)* constitute the most dominant and central themes within the research landscape, as indicated by their relatively high frequency of occurrence (eight and five occurrences, respectively) and strong total link strength, reflecting intensive conceptual connections with other variables. The network map shows that *interest rate*, *exchange rate*, and *monetary policy* form a tightly interconnected core macroeconomic cluster, while *inflation* serves as a bridging variable linking the macroeconomic cluster with the financial market cluster.

In contrast, *stock returns* occupy a central position within the financial cluster and are strongly associated with *predictability*, *interest rates*, and methodological approaches such as *quantile regression*, highlighting the research focus on the ability of macroeconomic variables to explain and forecast stock market performance. The presence of *COVID-19* as a connecting node reflects the global crisis context that has intensified interactions between macroeconomic variables and stock returns, while the appearance of *Indonesia* indicates a specific empirical setting in which these relationships have been examined.

Overall, this structure suggests that the literature has evolved around the integration of macroeconomic factors, monetary policy, and empirical methodologies to explain the dynamics and predictability of stock returns, particularly in the context of external shocks and emerging market environments.

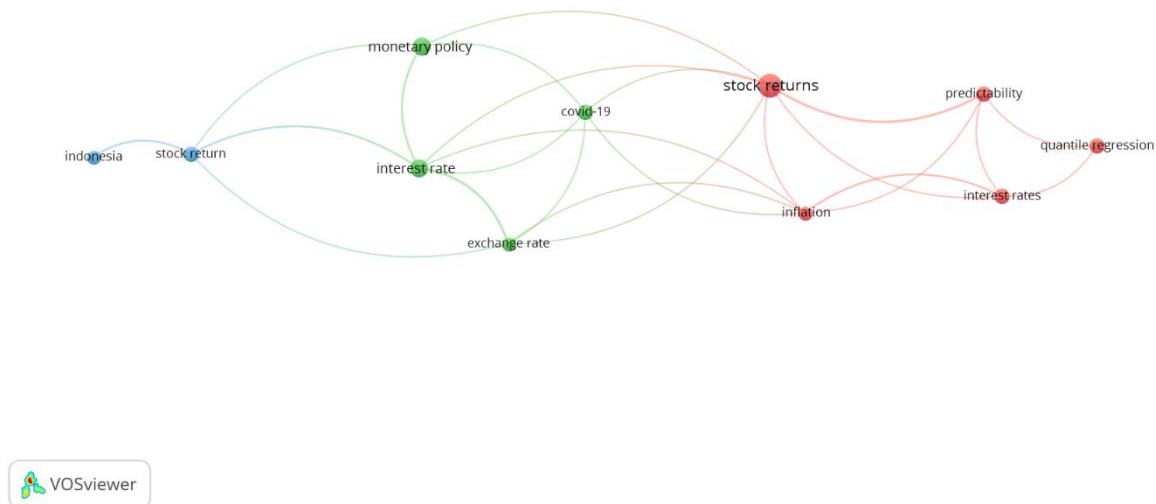


Figure 9

Source: Vosviewer, (2025)

Discussion

This study offers a comprehensive synthesis of the relationship between interest rates and stock returns by employing a systematic literature review (SLR) enriched with bibliometric analysis and scientific network mapping. The findings indicate a marked increase in academic attention to this topic during the 2021–2025 period, coinciding with heightened global economic uncertainty, tighter monetary policy stances, and the prolonged effects of the COVID-19 pandemic. The growing volume of publications in the later years of the observation period underscores that interest rates continue to be regarded as a key macroeconomic variable in explaining contemporary stock market dynamics.

From an intellectual structure perspective, the bibliometric analysis reveals a research landscape that is centralized yet highly interconnected. Developed economies—most notably the United States and the United Kingdom—serve as primary hubs within the global collaboration network, while emerging economies such as Indonesia and Nigeria demonstrate increasingly prominent empirical contributions. This pattern reflects a two-way flow of knowledge, in which theoretical and methodological frameworks are largely developed in advanced economies, while empirical validation is expanded through the relatively more volatile market environments of developing countries. Such interaction enhances the external validity of the findings and strengthens the generalizability of the interest rate–stock return relationship across diverse economic contexts.

At the institutional and journal levels, the results indicate that knowledge production is concentrated among a limited number of core institutions and journals with high total link strength. These journals function not only as dissemination channels but also as conceptual integrators that bring together diverse methodological approaches. This observation is consistent with the view that “the structure of scientific literature is not determined solely by citation counts, but also by the strength of bibliographic connectivity that forms the conceptual foundation of a research field” (Endri et al., 2021).

Thematic and keyword analyses confirm that *interest rate* and *stock returns* constitute the conceptual core of the literature, with strong linkages to other macroeconomic variables such as inflation, exchange rates, and monetary policy. This finding reinforces the argument by Gu et al. (2021) that interest rates represent the cost of capital, shaping corporate financial expectations and potentially triggering stock price fluctuations when adjusted by central banks. Consequently, changes in interest rates influence not only equity valuation in a mechanical sense, but also investor expectations and risk perceptions.

Empirically, most of the reviewed studies support the view that increases in interest rates tend to exert a negative effect on stock returns. Nurdina et al. (2024) explicitly report that interest rate increases have a negative and statistically significant impact on stock returns, in line with capital cost theory and discounted cash flow models. Similar evidence is provided by Endri et al. (2021), who identify interest rates as a powerful macroeconomic factor with a predominantly negative effect on returns in the property sector. Nevertheless, the SLR also highlights that this relationship is not uniform across contexts.

Several studies emphasize the dynamic and asymmetric nature of the interest rate–stock return nexus. Gu et al. (2022) find that although interest rates generally exert a negative influence on stock returns, the relationship may reverse during periods of strong economic expansion. This suggests that business cycle conditions and monetary policy regimes play a critical role in determining both the direction and magnitude of interest rate effects. McMillan (2025) further argues that the correlation between monetary variables and stock returns can shift depending on macroeconomic conditions and market structures, implying that the relationship cannot be interpreted in static terms.

In crisis contexts, particularly during the COVID-19 pandemic, stock market sensitivity to interest rate changes appears to intensify. Hermuningsih et al. (2024) note that higher profitability enables firms to better absorb macroeconomic shocks, leading to improved stock returns under adverse economic conditions. This finding indicates that firm-level fundamentals can serve as a buffer against external pressures, even though interest rates remain an important determinant of return dynamics.

Overall, the results of this study provide important theoretical and practical contributions. From a theoretical standpoint, the findings confirm that the relationship between interest rates and stock returns is complex, asymmetric, and highly context-dependent, thereby requiring integrative and flexible analytical approaches. From a policy perspective, the evidence suggests that central bank interest rate decisions have direct implications for stock market stability and performance, particularly in emerging economies that are more vulnerable to macroeconomic shocks.

CONCLUSION AND RECOMMENDATIONS

Conclusion

Based on a systematic literature review of 34 scholarly articles published between 2021 and 2025, this study concludes that interest rates constitute a central macroeconomic determinant of stock returns in capital markets. The majority of the reviewed studies indicate that rising interest rates tend to reduce stock returns, primarily through higher capital costs, declining equity valuations, and shifts in investor preferences toward fixed-income instruments. This conclusion aligns with the findings of (Nurdina et al., 2024), who emphasize that increases in interest rates have a negative and significant impact on stock returns.

At the same time, the review demonstrates that the relationship between interest rates and stock returns is neither linear nor universal. Several studies show that the impact of interest rates varies depending on business cycle conditions, monetary policy regimes, and sectoral and country-specific characteristics. As noted by (Gu et al., 2022), interest rates generally exert a negative effect on stock returns, but this relationship may reverse during peak phases of economic expansion, highlighting its dynamic and asymmetric nature.

Moreover, bibliometric evidence reveals that the literature is dominated by research networks centered in developed economies, while empirical contributions from emerging markets—particularly Indonesia—are becoming increasingly significant. This enriches the academic discourse

by incorporating evidence from markets that are more volatile and sensitive to monetary policy changes. During crisis periods, especially the COVID-19 pandemic, stock returns appear to become more responsive to interest rate movements, although firm fundamentals continue to play a stabilizing role. (Hermuningsih et al., 2024) emphasize that higher profitability helps firms withstand macroeconomic shocks and supports improved stock returns under challenging conditions.

In sum, this study confirms that the interest rate–stock return relationship is complex, context-specific, and shaped by interactions among multiple macroeconomic factors and market characteristics. Understanding this relationship therefore requires comprehensive analytical frameworks rather than reliance on simple linear assumptions.

Recommendations

Based on these conclusions, several recommendations can be proposed.

First, for policymakers, particularly central banks, the findings suggest that interest rate adjustments affect not only monetary stability but also capital market performance. Accordingly, interest rate policy formulation should take into account its broader implications for stock returns and overall financial market stability, especially in emerging economies that are more exposed to macroeconomic shocks.

Second, for investors and market participants, the results indicate that interest rate changes should not be interpreted in isolation. Instead, they should be evaluated in conjunction with macroeconomic conditions, business cycle phases, and sector-specific characteristics. This approach is particularly important given (McMillan, 2025) observation that the relationship between monetary variables and stock returns varies across market structures and economic environments.

Third, for future researchers, further studies are encouraged to adopt more dynamic methodological approaches, such as quantile regression, regime-switching models, or volatility analysis, to better capture the asymmetric and non-linear nature of the interest rate–stock return relationship. In addition, cross-country and cross-sector analyses using high-frequency data should be expanded to deepen understanding of monetary policy transmission mechanisms in increasingly integrated global financial markets.

Accordingly, the findings of this study are expected to serve as both an academic reference and a practical guide for policymakers, investors, and researchers seeking to understand and respond to the evolving dynamics between interest rates and stock returns.

DECLARATION OF ARTIFICIAL INTELLIGENCE USAGE

“During the preparation of this manuscript, I used chatgpt for grammar refinement, text translation. All AI-generated outputs have been independently reviewed, edited, and verified by the author, and the author hold full responsibility for the content of the final manuscript.”

CONFLICT OF INTEREST

I declare that there are no conflicts of interest regarding the research, authorship, or publication of this article.

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