BIBLIOMETRIC ANALYSIS OF FOREIGN EXCHANGE RISK

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Abstract

In this study, we have focused our attention on foreign exchange risk as it has gained the attention of many researchers all around the globe. In addition, the increased foreign exchange in the process of globalization significantly impacts the profitability and operations of enterprises (Nor, Masron & Alabdullah, 2020) making it essential to understand the topic in greater depth. Thus, the main purpose of the paper is to understand the contribution that was made regarding this topic. This study thus employed the bibliometric analysis to evaluate the literature on foreign exchange risk. Bibliometric analysis is a statistical approach used to represent developments in a research topic and identify future research directions (Chen & Yang, 2021). The bibliometric analysis was based on 487 documents spanning from 1969 to 2020. The visualization and content analysis results showed that the literature on foreign exchange risk has been growing, and a great deal of it has shown that foreign exchange risk significantly affects the overall performance of both local and multinational corporations. Many papers also concluded that an understanding of foreign exchange risk by investors and businesses can greatly affect their holdings. Based on this study's exploration of current research streams in the field, directions for future research are proposed.

Keywords: Foreign Exchange Risk, Forex, Bibliometrics, Visualization, Performance

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1. INTRODUCTION

The foreign exchange market (forex) refers to the trading of currencies in exchange for one another. This exchange of one currency for another at the prevalent market rates is referred to as a *foreign exchange spot*. Meanwhile, *forward foreign exchange* refers to a contract between two parties to either sell or purchase currencies of a specified

amount sometime in the future (Chun-Hao & Jian-Min, 2012). Forward agreements are broadly utilized by organizations to deal with unfamiliar trade risks.

For organizations, market transactions involving foreign currencies regularly involve hidden reasons such as paying a provider or mitigating risk. With regard to foreign exchange risk, it is ideal for businesses and investors to gain a better understanding of foreign exchange (Baker, Kumar, & Pandey, 2021). The financial risks include changes in the value of currencies with regard to exchange rates (Engel, 2016). Such changes pose risks to investors when they take part in a given business transaction; loss or profit in such transactions depends on changes in the exchange rate. Álvarez-Díez, Alfaro-Cid, and Fernández-Blanco (2016) noted that the risks involved in foreign exchange arise among businesses that deal with exports and imports of supplies and services. It is rare that sellers or buyers located in different countries will use the same currency; therefore, they need to agree on the currency needed to pay for transactions. This mutually accepted currency could be the currency of either party, or it could be the third currency. The transacted money is converted into the chosen currency, which may be higher or lower than the original country's currency, hence leading to a gain or loss in the currency exchange.

Increased foreign exchange in the process of globalization substantially affects the profitability and operations of enterprises, including large, multinational firms, as well as small and medium-sized domestic organizations (Nor, Masron, & Alabdullah, 2020). Studies have shown that foreign exchange risk is highly significant for both investors and business owners, and more recent studies have provided a deeper understanding of how to manage such risks (Kang, Uddin, Troster, & Yoon, 2019).

However, we have noticed that no researchers focused their attention on performing a bibliometric analysis on this topic although a lot of papers have been published regarding it. Thus, we have identified that there is a need to write research that brings all previous contributions in a single document and at the same time pave the way for future research. Thus, our main research objective is to analyze published research on foreign exchange risk and provide an in-depth analysis. The main research questions that will be answered include: What is the general growth trend of the topic? What are the common keywords used in the papers published and their occurrence? What are the top journals publishing on this topic? What countries dominated the research regarding the topic? Which authors have contributed the most to understanding the topic? Which papers were cited the most by researchers around the globe? Finally, what are the main themes researchers focused on when researching this topic? The method that was used to answer the research questions and provide the in-depth analysis was the bibliometric analysis approach. The bibliometric analysis refers to the organized process of showing all papers that have been published in a certain area of science using the connection, quality, number, productivity, citations, and assessing the academic growth of the specified scientific field (Khatib, Abdullah, Hendrawaty, & Elamer, 2021).

This study is considered significant as it provides a clear in-depth analysis for academics interested in the forex risk and highlights the major topics authors have contributed much in. The findings of this paper will contribute to understanding the missing elements in previous papers and what should the next research be focusing on.

Therefore, the next Section 2 will focus on the literature review, Section 3 will define the methodology and parameters used in this research. Section 4 provides tabular and graphical presentations of the analyzed data, followed by interpretations of each infographic. Section 5 discusses the findings, Section 6 presents the future research agenda, and Section 7 concludes with recommendations for future research based on the analyzed papers.

2. LITERATURE REVIEW

In general, according to Ahmed (2015), the majority of international businesses are involved in the exchange of one currency for another to perform different payments. The exchange rate of currencies in fact varies on daily basis resulting in the alteration of the cash outflows needed to conduct different payments accordingly. Similarly, the amount needed of the company's home currency to buy foreign supplies is also vulnerable to change even though suppliers have not modified their prices. Therefore, it is essential for financial managers to understand how to assess the risk of exchange rate variations in order to define and implement different strategies to protect their company from such risk (Ahmed, 2015).

Hence, it is crucial to define what is exchange rate risk. According to Parlak and İlhan (2016), foreign exchange risk demonstrates the alteration in a corporation's cash flow, expenses, and income that are triggered by an unanticipated change in exchange rates. Several causes result in the exchange rate risk. First, the fact of different economic levels and growth of the countries that use different currencies. Second, the level of development of financial markets. Third, country stability concerning political issues. Finally, the prospects of individuals who accelerate action in the financial markets. All these factors including accidental factors contribute to the formulation of foreign exchange risk (Parlak & İlhan, 2016).

Ahmed (2015) focused on political stability and stated that it plays a major role when dealing with foreign exchange risk. Countries like Japan and the United States that have long-standing, steady governments are expected to experience comparatively stable currency values. Conversely, countries that encounter political instability for instance regular adjustments in government leadership, strikes, rebellions, and civil wars could suffer larger fluctuations in the value of their currency. Somalia's currency for example drops abruptly when a new political faction attempts to take power. Ahmed (2015) further added that the sudden political, social, economic, and environmental issues that influence foreign countries are an ever-present risk in foreign currency trading.

On the other hand, Su (2018) further identified the three main types of exchange rate risk confronted by multinational enterprises (MNEs). The transaction, operating, and translation risks are defined as the three main types of exchange rate risk. Transaction risk calculates the fluctuations in the value of outstanding financial liabilities acquired preceding a shift in exchange rates but not due to be resolved until after the exchange rates change. It focuses mainly on the adjustments in cash flows that result from predetermined obligations. Nevertheless, operating risk that is also called "economic risk, competitive risk, or strategic risk", evolves from unforeseen exchange rate changes causing a change in a firm future operating cash flow, which leads to the alteration in the present value of a company. Finally, the translation risk, which is also referred to as accounting risk, demonstrates the possible accounting-derived changes in owners' equity and consolidated income for the necessity to formulate consolidated financial statements by interpreting foreign currency designated financial statements of foreign subsidiaries into a particular currency (Su, 2018).

Several approaches were introduced to manage the foreign exchange risk. According to Sudacevschi (2017), hedging is an approach for a corporation to reduce or exclude foreign exchange risk. This process involves the use of derivatives that include forward contracts, currency futures, options, and currency swaps. First, forward contracts provide the opportunity for the user to sell or purchase foreign currency amounts at a future time thus the agreement takes place at the time and the exchange rate mentioned in the contract, regardless of any fluctuations. Second, futures contracts are advance orders to buy or sell a currency. A dealer anticipates obtaining cash flows designated in a foreign currency on a specified future date can lock in the present exchange rate by participating in an offsetting currency futures position. Third, options offer corporations the right, but not the obligation, to buy or sell a particular quantity of a currency at a pre-assigned exchange rate for a given time period. However, taking such a benefit will require the payment of a premium. Finally, currency swaps are a financial instrument that permits the purchaser to trade one set of each flow for another, paying periodic payments based upon some financial price and on the other hand obtaining periodic payments based upon some other financial price.

3. RESEARCH METHODOLOGY

Foreign exchange risk is a financial risk that may arise in international financial transactions, and it plays a significant role in open economies (Li & Shen, 2021). Currency fluctuation can result in foreign exchange risk; various studies have investigated the relationship between such risk and other variables, or the effects on different parties or on forecasting (Hui, 2021). The bibliometric analysis in the present study made use of the Scopus database as well as the software applications NVivo and VOSviewer. In this way, the authors, countries, and institutions prominently involved in foreign exchange risk research were identified. The amount of data extracted in this research reflects the significance of this topic in the field and highlights a general increase over the years in its importance.

Bibliometric analysis is a statistical method used to map trends in a research topic and identify future research directions. It maps out essential themes to present substantial information and research fronts (Chen & Yang, 2021). Such analysis offers insights into trends in terms of citations, publication activity, emerging themes, aggregate contributions to a given topic, and collaboration among authors (Baker et al., 2021). It also helps to identify research gaps and the potential effects of research problems in a given scientific domain. This approach can help expand information and map essential connections between authors, institutions, publications, and themes. Under bibliometric citation analysis, cartography analysis, citation network analysis, co-citation analysis, and citation analysis are performed to interpret extracted data. Traditional content analysis is also performed to study the content of published research (Koondhar, Shahbaz, Memon, Ozturk, & Kong, 2021).

NVivo and VOSviewer were used for analysis. VOSviewer was used to map and study the essential themes related to the topic. Graphical mapping was used to visualize connections within the topic. The Scopus database, which provides access to published research papers (de Oliveira, da Silva, Juliani, Barbosa, & Nunhes, 2019), was used to identify high-quality journals publishing quality papers on the study topic. These papers were regarded as the most relevant and reliable in the field. Such papers can also help to identify gaps in the research and propose future research directions (Wang, Cheng, & Liao, 2021).

A total of 16 keywords were used to identify research on the study topic. All article titles were audited, and irrelevant articles were filtered, generating 487 results for the period 1969–2020. Examples of keywords include "foreign exchange" and "risk", or "forex" and "risk", or "foreign exchange" and "volatility", or "forex" and "volatility", or "foreign exchange" and "fluctuations", or "forex" and "fluctuations". Keywords can be said to concisely represent an article and provide ideas about its content. The titles of retrieved articles were reviewed. The selected papers were limited to research articles, review papers, and papers published in English (Nobanee, 2020).

An alternative method for conducting an in-depth analysis regarding our topic could be a systematic review. This approach is defined as a systematic, specific, complete, and reproducible technique for detecting, assessing, and integrating the existing body of published papers by researchers, scholars, and practitioners (Okoli & Schabram, 2010). However, we have decided to take the bibliometric approach as it provides more visual and graphical illustrations of the results and at the same time gives us significant insights and understanding regarding the topic.

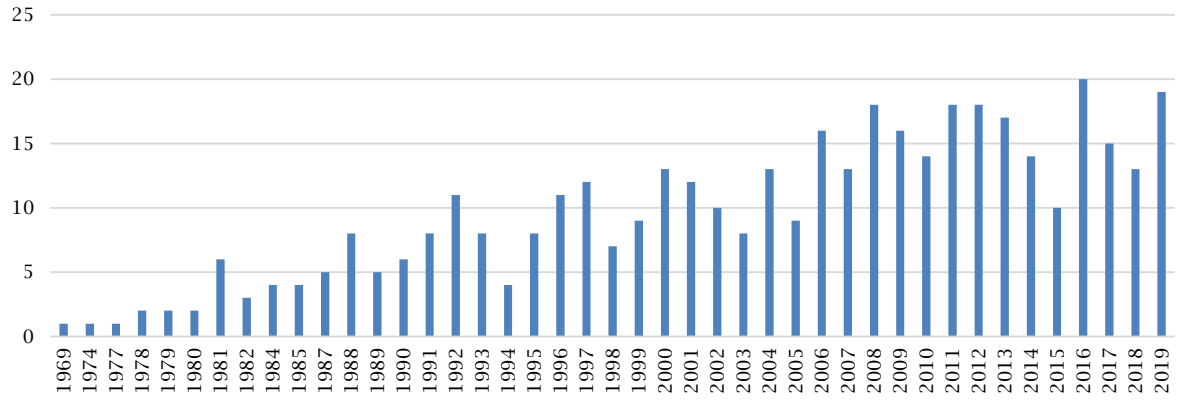
4. BIBLIOMETRIC ANALYSIS RESULTS

The figures presented in this section provide a comprehensive overview of the top authors, papers, and countries related to research on foreign exchange risk.

4.1. Publications growth in years

Figure 1 depicts the growth trend of articles on foreign exchange risk from 1969 to 2019. While only one relevant article was published in 1977, 2016 and 2019 saw the highest number of papers. There is a clear increase over the years in the number of published articles on this topic. In particular, Figure 1 shows a marked increase in the research since 2000. In the selected papers, researchers have mainly investigated different ways to mitigate the risks companies face in international financial transactions.

Figure 1. Total number of published papers on foreign exchange risk (publications per year)



4.2. Keywords co-occurrence analysis

The word cloud in Figure 2, derived from bibliometric keyword data, represents a frequency chart. It depicts the keywords appearing most frequently in papers on foreign exchange risk. This representation facilitates categorizing the content to better understand the relationships between words and identified concepts. These qualitative data represent relevant research domains in the studied topic for the period 1969–2020 (Nobanee, Alhajjar, Abushairah, & Al Harbi, 2021).

Figure 2. Keyword frequency in the literature on foreign exchange risk, 1969–2020 (created using NVivo)

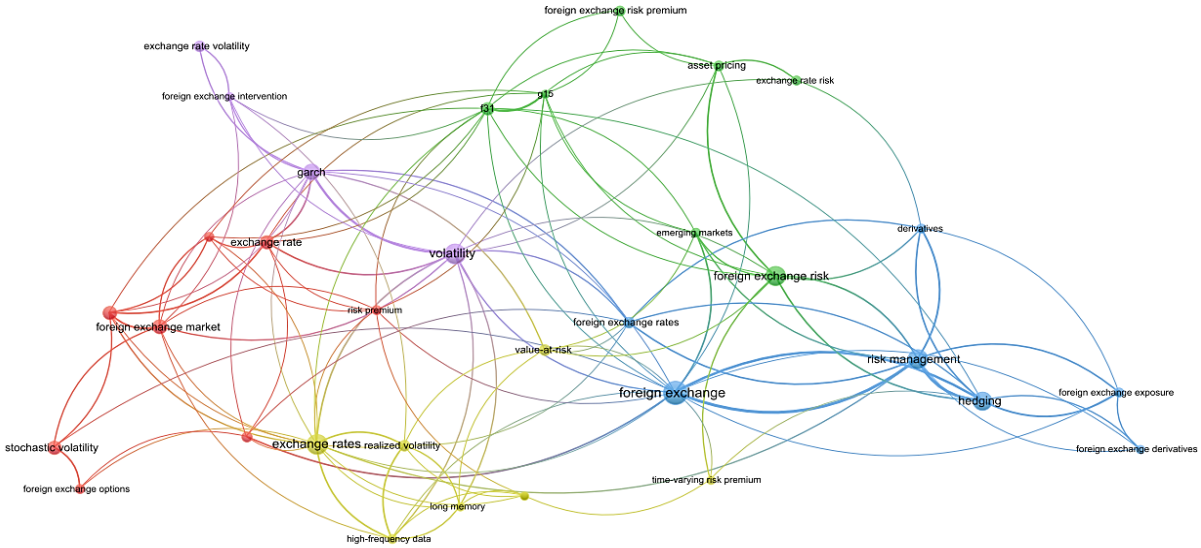
Table 1 presents the most frequently used keywords, their occurrence, and their ranking in research papers on foreign exchange risk. These 16 keywords reflect the main themes in this research domain; they can act as a filter to better understand common emerging trends in this research topic over the years.

Table 1. Keywords and their occurrences

Rank	*Keyword*	*Occurrences*	*Rank*	*Keyword*	*Occurrences*
1	Exchange rate	44	9	Foreign exchange market	13
2	Foreign exchange	40	10	Volatility spillover	12
3	Risk management	26	11	Stochastic volatility	12
4	Exchange rates	26	12	Financial market	12
5	Volatility	25	13	Stock market	11
6	Foreign exchange risk	22	14	Risk assessment	10
7	Hedging	20	15	F31	10
8	GARCH	16	16	Foreign exchange rates	9

Figure 3 presents the keyword network. These keywords represent the most relevant forex-related content in the selected articles. These keywords also facilitate finding the right articles when using search engines. The figure indicates that foreign exchange, foreign exchange risk, risk management, and volatility are the most-used keywords in the field.

Figure 3. Keyword network (created using VOSviewer)



4.3. Leading journals

Figure 4 provides a graphical visualization of the journal citation network, depicting the development of research on foreign exchange risk. VOSviewer was used for network visualization. This citation network analysis also represents the quality of the articles published in journals. Furthermore, this citation network aids our understanding of the development of this topic in the scientific field. In other words, it shows that concepts emerging from the research have been continuously cited over the years. Network relationships traced between journals in the form of clusters are based on the identification of the growing literature on foreign exchange risk.

Figure 4. Citation network linking journals (created using VOSviewer)

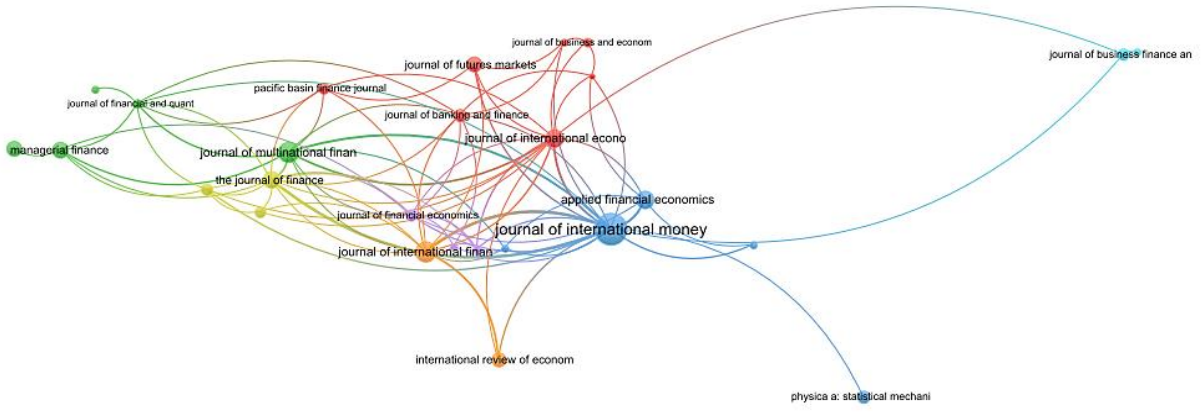


Table 2 presents the 12 most-cited journals publishing papers on foreign exchange risk along with the number of documents and citations for each journal. The *Journal of International Money and Finance* tops the list with 1468citations and 34 documents, followed by *The Journal of Finance* with 1133 citations and 10 documents. *Applied Economics Letters* ranks twelfth with 41 citations and 6 documents.

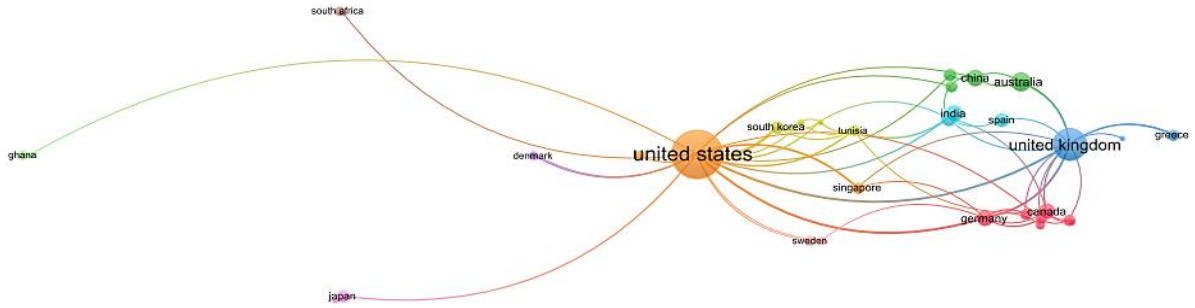
Table 2. Sources, documents, and citations

Rank	*Source*	*Documents*	*Citations*
1	Journal of International Money and Finance	34	1468
2	The Journal of Finance	10	1133
3	Journal of International Economics	11	887
4	Journal of Multinational Financial Management	14	254
5	Journal of Futures Markets	8	155
6	International Review of Economics and Finance	7	133
7	Journal of International Financial Markets, Institutions and Money	15	127
8	Applied Financial Economics	11	71
9	Managerial Finance	9	53
10	Journal of Risk Finance	8	50
11	Applied Economics	7	43
12	Applied Economics Letters	6	41

4.4. Leading countries

Figure 5 visualizes the citation network linking authors' countries of origin. The US has the highest number of widely cited authors on the topic of foreign exchange risk. The UK is the second while Australia, China, India, and Singapore, among others, have also made significant contributions.

Figure 5. Citation network linking authors' countries of origin (created using VOSviewer)



4.5. Prominent authors

Figure 6 shows the citation network linking authors' institutional affiliations. It also shows the affiliations used by small and medium-sized organizations. This figure reveals that exchange risk plays a significant role for most investors and business owners.

Figure 6. Citation network linking authors' institutional affiliations (created using VOSviewer)

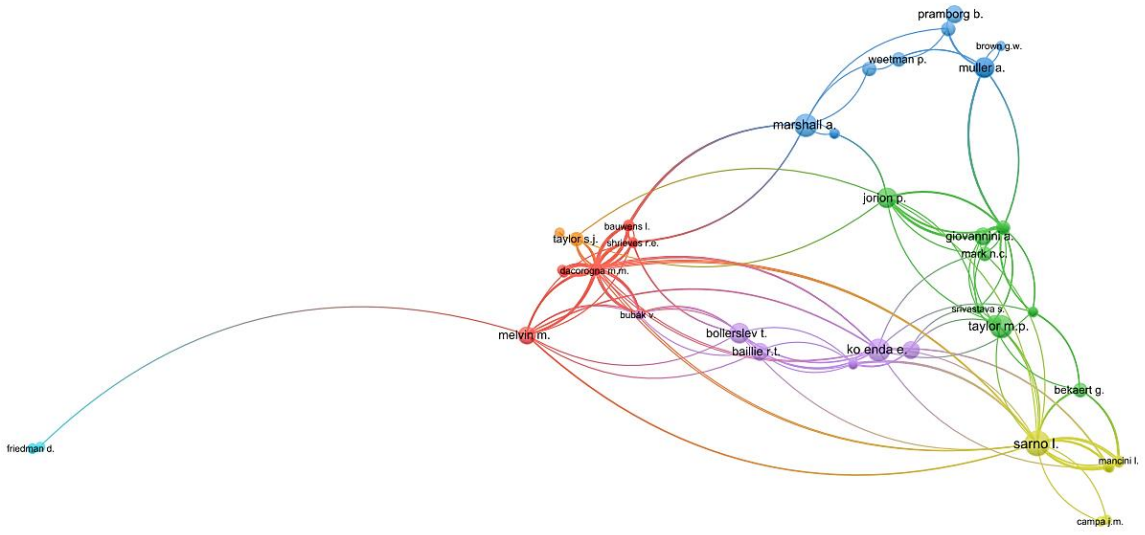


Figure 6 shows the citation network of authors on this research topic. Each node in a cluster, represented in a form of a circle, denotes a citation relationship of authors for their respective scientific contribution. This figure further helps in comprehending the number of citations secured by a research study of an author from other references. Red cluster depicts the most linked network of authors with other clusters. Moreover, the connection within the same cluster depicts a stronger citation network amongst authors.

Table 3 presents the 10 most-cited authors. Bollerslev had the most citations (578) while Baillie was the second (437 citations).

Table 3. Authors with the most citations

Rank	*Author*	*Citations*
1	Bollerslev (1990, 1991, 1994, 1994)	578
2	Baillie (1990, 1991, 1994)	437
3	Dumas (1995)	386
4	Solnik (1995)	386
5	Engle (1993)	152
6	Jorion (1989, 1995)	122
7	Diebold (1999)	112
8	Hodrick (1984, 1993)	101
9	Bekaert (1993, 1996)	73
10	Engel (1992, 1999)	67

4.6. Top documents

Table 4 ranks forex-related paper citations since 1995. Dumas and Solnik (1995) has the most citations (386) while Mark (1985) has the fewest (105 citations).

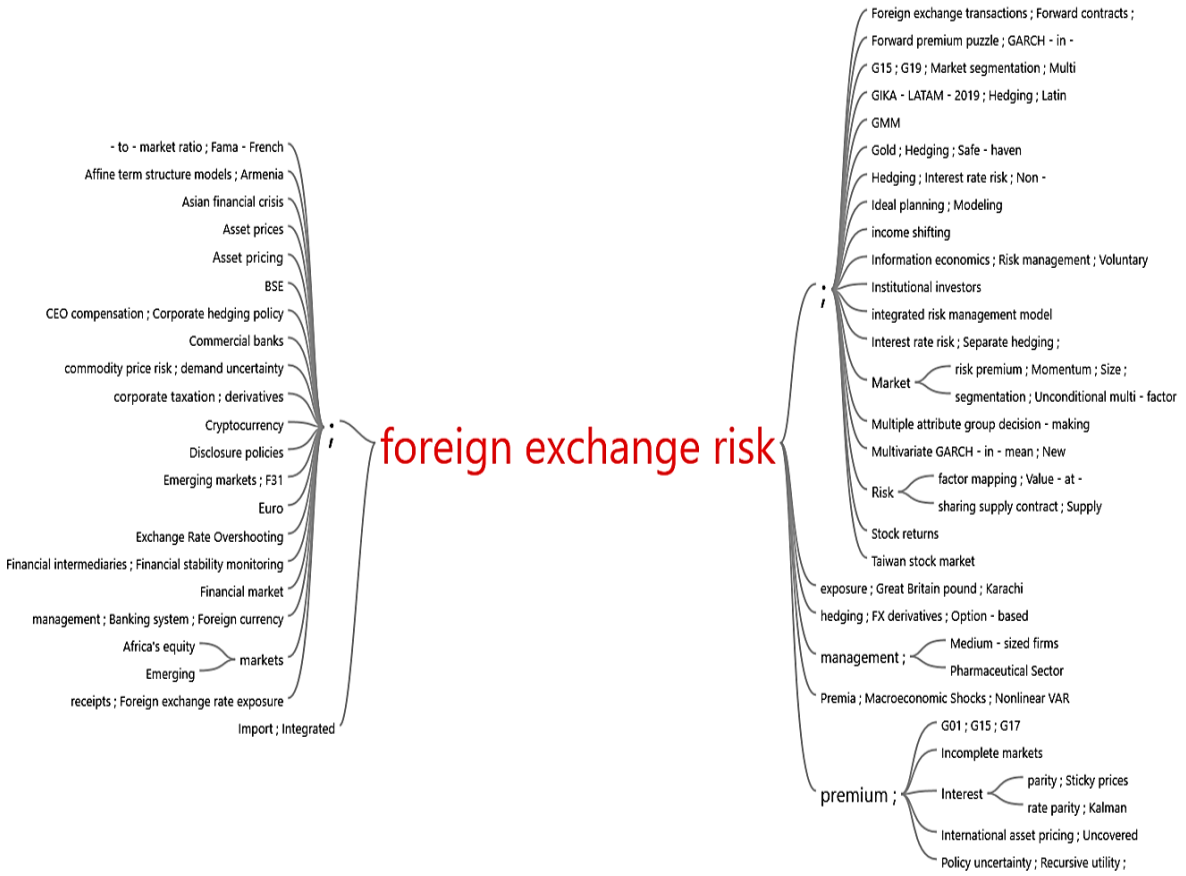
Table 4. Ranking of cited articles

Rank	*Document*	*Citations*
1	Dumas and Solnik (1995)	386
2	Dacorogna, Müller, Nagler, Olsen, and Pictet (1993)	316
3	Jorion (1995)	310
4	Domowitz and Hakkio (1985)	263
5	Menkhoff, Sarno, Schmeling, and Schrimpf (2012)	255
6	Baillie and Bollerslev (1991)	252
7	Zhou (1996)	244
8	Hodrick and Srivastava (1984)	202
9	Baillie and Bollerslev (1990)	174
10	Diebold, Hahn, and Tay (1999)	160
11	Taylor and Xu (1997)	151
12	Bollerslev and Melvin (1994)	141
13	Westerfield (1977)	140
14	Bekaert and Hodrick (1993)	122
15	Bonser-Neal and Tanner (1996)	119
16	Gençay, Selçuk, and Whitcher (2001)	115
17	Brown (2001)	114
18	Giovannini and Jorion (1989)	111
19	Mancini, Ranaldo, and Wrampelmeyer (2013)	107
20	Bubák, Kočenda, and Žikeš (2011)	106
21	Bauwens, Omrane, and Giot (2005)	105
22	Mark (1985)	105

5. DISCUSSION: SIGNIFICANT FACTORS IN THE LITERATURE

VOSviewer was used to identify journal distribution in the networks. This helped to further identify authors with substantial contributions to the topic, their nationalities, sources, and organizational affiliations. Ranking authors according to national origin and institutional affiliation was also considered and presented in network form. The ranking of authors was based on the number of citations in the last 50 years; this was found to be effective in terms of identifying future research directions in the field. Keyword network visualization was also performed using VOSviewer. The main purpose of keyword analysis is to identify various areas and research directions in foreign exchange risk research. Important keywords included exchange rate, foreign exchange, and risk management. The 487 articles examined here were published in well-regarded journals and have a high number of citations. These articles also help to identify research gaps with regard to foreign exchange risk, which can be addressed in future studies.

Figure 7. Co-citation mapping: Classification of research streams along with syntheses



The citation and content analysis presented in this paper help to identify research streams. The word tree presented in Figure 7 presents four clusters of themes: volatility, hedging, asset valuation, and exposure.

6. FUTURE RESEARCH AGENDA

This study examined the literature on foreign exchange risk from 1969 to 2020 to identify gaps in the research. Changing trends that may lead to different types of future risks should be considered in future research. There is a growing need for alternatives to currency hedging for new currencies introduced by the emerging markets in which microfinance companies operate. Studies have further suggested that there needs to be a risk management structure introduced by firms to demonstrate the assessment procedure for currency risk, as well as the management strategies implemented to deal with currency risk. There is also a need for the continuous monitoring of this management structure. The purpose of such a management structure should be to identify, assess, manage, and monitor foreign exchange risk (Nzioka & Maseki, 2017). Table 5 below summarizes 16 key research papers in terms of their objectives, findings, and recommendations for future work.

The papers in Table 5 are categorized into four themes: volatility, hedging, exposure, and asset valuation. Many studies have shown that an increase in currency volatility tends to have a significant effect on business profitability and operations. Havi (2019) suggested that two important factors — high growth in industrial output and drops in real exchange rate volatility — negatively affect import growth. Hedging helps protect traders against events that may trigger volatility in financial currency markets; it especially tends to provide benefits during periods of crisis (Kočenda & Moravcová, 2019). Central bank interventions in the foreign exchange market have become common in emerging markets (Sikarwar, 2020). Exposure concerns the risk any business willingly undertakes during financial transactions conducted in foreign currencies. Foreign exchange exposure reflects changes in the domestic currency value of operating income, liabilities, or assets based on unpredictable fluctuations in exchange rates (Daniel, Mohan, Daniel, & Mathew, 2019). Investors evaluate exchange-rate fluctuations to determine their asset returns, which further helps them to assess the currency exposure of their investments (Nobanee, 2021).

Table 5. Future research agenda (Part 1)

Streams	*Authors and year*	*Objectives*	*Findings/results*	*Research questions/recommendations*
Volatility	Berger, Chaboud, and Hjalmarsson (2009)	Employs multifractal detrended fluctuation analysis to analyze the efficiencies of exchange markets for the euro and the British pound for the period 2005–2019.	Provides evidence for each currency and the effect on foreign exchange market efficiencies. Market sensitivity plays a critical role in causing fluctuations over time in a volatile forex market.	How does quantifying volatility in the forex market affect currencies and the world economy? Using quantifying fluctuations can be effective for analyzing market risk. Other markets and studying whether the pattern of variation in market sensitivity is specific to certain assets or markets, or if there is a common component, should provide additional evidence on the factors driving the variation in market sensitivity and volatility
	Kearney, Cummins, and Murphy (2018)	Investigates the presence of time-differing hazards in currencies.	Provides evidence for time-differing hazard premiums in all arrangements.	How can signal extraction help in predicting risk? Using models that fuse features can upgrade the procedures used in prior investigations. Using functional time series can help in predicting volatility variations in the future.
	Morales-Zumaquero and Sosvilla-Rivero (2018)	Notes that the hazard premium is a significant factor in the swapping scale; under hazard impartiality theory, residential and unfamiliar resources are immaculate substitutes, and the forward swapping scale approaches the normal conversion standard.	Demonstrates the significance of the Consensus Economics information used to quantify the ex-bet hazard premium; also concludes that the latter gives adequately depicts the balance estimation of the hazard premium determined by the augmentation of the normal utility of genuine riches held by residential and unfamiliar operators.	What are the effects of indirect fluctuations between the foreign exchange and the stock market? To analyze the exchange rate, companies should focus on the instability of unfamiliar trade and the securities exchanges.
	Viola, Klotzle, Pinto, and da Silveira Barbedo (2019)	Breaks down intercessions driven by the Bank of Brazil for exchanging the publicity from 2003 to 2014. Examine the mediations carried out by Brazilian Central Bank, from 2003 till 2014, in the Brazilian forex market.	Results were different when utilizing everyday intercessions versus the net collected situation as logical factors. Volatility tends to increase if interventions conducted by the central bank exist for too long in the foreign exchange market.	How do foreign exchange interventions in Brazil affect volatility? Examining the effect of government intercessions in unfamiliar trade is a suitable process for the quantiles of unpredictability circulation. Interventions, transparency, and signaling can be collaborated to reduce the effects of exchange rate fluctuations.
Hedging	Álvarez-Díez et al. (2016)	Proposes a multi cash cross-supporting technique that limits trade chances.	Found that the ideal hedge strategy that limits VaR(value at risk) is not quite the same as the base CVaR (conditional value at risk) fence method.	How can hedge foreign exchange risk be reduced through the use of multicurrency diversification? VaR and CVaR are suitable for estimating money chance exhibitions. Cross-hedging activity paired with multicurrency can help in reducing the forex risk.
	Mensi, Hammoudeh, Rehman, Al-Maadid, and Kang (2020)	Examines the portfolio of board and hazard overflow among four significant valuable metals and 20 significant US trade markets. Study effects of risks and portfolio management between twenty significant US trade markets and four essential metals named silver, gold, platinum, and palladium.	Provides evidence for frail normal restrictive equi-correlations in the thinking about business sectors after some time, barring the unstable 2008–2010 period. Portfolio diversification is essential for high yields for investors. This could include clubbing of equities together, currencies combined with bonds and stocks, or bonds combined with stocks that prove to be better options for investors.	How are dynamic spillovers associated with portfolio risk management? Chance assessment examination shows solid proof of hazard decreases, and drawback chance decreases after the consideration of valuable metals. Governments and central banks can introduce more effective policies to limit the spread of forex market risks in the currency markets during high inflation periods and political and economic instability.

Table 5. Future research agenda (Part 2)

Streams	*Authors and year*	*Objectives*	*Findings/results*	*Research questions/recommendations*
Hedging	Sirpal (2009)	Examines different strategies for installment and foreign-trade hazard among the executives of firms associated with either fare or import exchange, or both, in Brunei. Examine methods firms, with export or import business or both, use for managing their forex risk and making payments, in Brunei Darussalam.	Results come fundamentally from the different exchange organizations associated with an unfamiliar exchange in Brunei. Companies use bilateral and multilateral netting methods often if they import less in contrast to firms who are actively involved in importing activities. Firm size has no correlation with forex risk management methods. However, this excludes currency options, money market hedging activity, netting, and forward contracts in foreign trade financial contracts.	What are the payment methods associated with foreign exchange risk? Firms should use multilateral processes when regularly importing goods. Currency options, currency swaps, futures contracts, forward contracts, and market hedging are some of the hedging methods that need to be marketed to reduce forex risk.
	Mundaca (2000)	Normal future differences in the conversion scale within its money band and the normal realignment rate are evaluated utilizing a regime-switching model.	Information generally contains few real-example dispersions and might not be delegated enough to catch discrete changes in the conversion scale brought about by the nonzero abstract likelihood of realignment.	How can the effects of interventions be realigned based on probabilities? It was difficult for Norges Bank to intercede by purchasing unfamiliar cash without further devaluing the krone. The central currency band can be maintained by intervention policies as it would indicate its importance in the financial market.
Exposure	Muller and Verschoor (2007)	Examines the broad money changes experienced during the 1997 Asian financial crisis. Examines the relationship between stock returns of Asian firms and variations in forex rates.	As opposed to US firms' liquidity, firms in East Asia do not support more. Asian international profitable firms, offering low dividend payout ratios, tend to have more exposure to uncertainty in exchange rates in contrast to firms with lower profits. Firms with higher dividend returns are less affected by exchange rate fluctuations as compared to firms offering lowering dividend returns.	What is the exposure risk associated with Asian foreign exchange? Asian firms with irrelevant presentation effects are amassed uniquely in a few ventures. Firms need to limit their hedging activities if they have decreased quick ratios coupled with resource constraints.
	Bartram and Karolyi (2006)	Highlights changes in stock return instability, advertising hazard, and unfamiliar conversion scales that occurred around the time of the dispatch of the euro in 1999. Identify if fluctuations in market risk, forex risk exposure, and volatility in stock returns occurred when euro was launched in 1999.	Euro's acquaintance drove with a net outright lessening in the unfamiliar conversion scale presentation of nonfinancial firms; however, these progressions are measurably, financially small. Introducing euro currency resulted in decreased forex rate exposure for commercial enterprises. There was an increase in volatility of stock returns and decreased market risk exposure for commercial enterprises during the euro launch in European countries and other countries as well.	How can the effects of foreign exchange risk exposure be mitigated? Market risk should be managed using appropriate business strategies in Europe. Developed markets in Asia and emerging markets in Africa, Asia, Europe, and Latin America must be studied to comprehend the effects of forex exposure. Macroeconomic variables and effects of capital markets must be examined to understand the fluctuations in the volatility of stock returns, forex rate exposures, and market exposures.

Table 5. Future research agenda (Part 3)

Streams	*Authors and year*	*Objectives*	*Findings/results*	*Research questions/recommendations*
Exposure	Zhou and Wang (2013)	Evaluates the effect of subsidiaries' utilization of large UK nonmonetary firms in their unfamiliar trade chance administration actions and tests the esteem importance of Financial Reporting Standard 13. Evaluates the effect of subsidiaries' utilization of large UK nonmonetary firms in their forex management activities and find out the significance of Financial Reporting Standard 13.	Findings bolster the esteem pertinence of Financial Reporting Standard 13 that numerical revelation of subordinates' use. Derivatives are used by commercial enterprises in the UK to hedge against unpredictable exchange rate fluctuations. This proves to be an effective way to reduce the exposure of these enterprises against different levels of risk.	How can foreign exchange risk with derivatives be managed in the UK? With the help of a swapping scale, the UK nonmonetary subsidiaries can be effectively diminished. New frameworks must be introduced to bridge the gap between exposures of enterprises to forex risk and a surge in the usage of hedging activities related to derivatives.
	Loudon (1993)	Considers how unfamiliar trade introduction and the valuation effects of conversion-scale chance are the two most significant components in the field of global money-related administration. Finds out if returns on equity react to changes in exchange rates and if currency risk is taken into account in global managerial financial decisions.	The worth included by the corporate administration of unfamiliar trade introduction is identified with the size of the hidden presentation and with the greatness of the conversion scale chance premium. Returns on equity show distinctive exchange rates in Australian industries and risk associated with the exchange rate is not denominated in Australian equity returns. Corporate hedging with respect to foreign exchange exposure does not improve value.	How are foreign exchange exposure and the pricing of currency risks related? Appraisal of the graphic legitimacy of these elective clarifications requires access to past information. Additional factors such as inflation or deflation must be assessed to estimate currency risk premia.
Asset valuation	Apergis, Artikis, and Sorros (2011)	Examines whether unfamiliar trade hazard is a resource-evaluating factor. Examine the link between foreign exchange risks and stock returns.	Unfamiliar trade hazard was estimated for the period 2000–2008. Market risk premium and stock return statistically reveal a significant positive relationship with each other. The magnitude of variations in foreign exchange is higher for small companies and value stocks.	How is foreign exchange risk an asset pricing factor? To further estimate unfamiliar trade risk, the method used here should be applied to data from other eurozone nations. Integration of the stock market in European countries must be studied to investigate forex pricing.
	Krapl and Giaccotto (2015)	Makes two commitments to the writing on foreign trade hazard. Uses a conditional asset pricing method to comprehend the term framework of cost of capital.	Normal FX hazard premium was found to be 2.29% for incomes with momentary development, but it decreased with developmental increments.	How are term structure and foreign exchange related? Most ventures showed a mound-like shape; markdown rates typically increase with income development, arriving at the top for incomes expected somewhere in the range of five to ten years, steadily decaying afterward for longer-term developments. The term of cost of equity and term structures of foreign exchange risk premium in different periods can be studied for future research.
	Kiani (2013)	Highlights the risks associated with the currencies of Brazil and other countries against the US dollar. Studies the existence of risk premia daily in several currencies against the US dollar.	Demonstrates the time-differing hazard premium in all arrangements. There is statistical evidence of risk premia in different time periods in the studied currencies.	How can signal extraction help predict foreign exchange rates? To grasp the connection between swapping scale markets and the economy, it is important to focus on strategies that are proper in a given conversion-scale system.
	Kočenda and Poghosyan (2009)	Examines unfamiliar trade hazard and its macroeconomic determinants among new EU members.	This shows that both genuine and ostensible components assume significant roles in clarifying the changeability of the unfamiliar trade hazard premium.	What are the macroeconomic sources of risk in foreign exchange risk? The common rotation is due to the abundance of familiar trade showcases, and the variables are displayed utilizing a multivariate GARCH-in-mean determination. Central banks in the European Union must work towards introducing more stabilization policies to converge with main EU countries to further stabilize the domestic currency.

7. CONCLUSION

This study found that research on foreign exchange risk has significantly increased over the last 25 years and has involved authors from many different countries. With increased integration among researchers, collaborative networks have been established to help fill gaps in the literature. Furthermore, common elements were found among the distinctive keywords of various articles in the field. Such clusters facilitate locating overlapping contexts among different research approaches. These different approaches highlight different assumptions and conclusions with regard to managing risks to maintain exchange rates in financial markets. The broad research themes are shown in Table 5 — such as trade hazard, hedging, and stock instability — help us to better understand the related risks in terms of different dynamics. Most studies concluded that firms have proactively taken measures to minimize the effects of such risks. Table 5 also presents a comprehensive picture of different theoretical frameworks, of data being extracted from a wide variety of sources, and of diverse methods being used to provide insightful conclusions. This paper will help future researchers to indicate what has been published regarding the topic, what is the overall trend regarding the topic, what are the main keywords researchers used, top documents cited regarding this topic thus be able to refer to as it consists of important information regarding the topic and now what exactly is missing and needs improvement. The papers discussed here have helped to identify important research gaps, highlighting directions for future studies, especially with regard to empirically investigating ways to mitigate foreign exchange risk. Such future work can help people to be better equipped to deal with challenges related to international financial transactions. Our research on the other hand has some limitations like any other research paper. First, the selection of papers is dependent extensively only on the Scopus database since it's the dominant database software of peer-reviewed articles, conference proceedings, and book chapters. Second, the keyword selection plays a critical role in the research yielded thus changing the keywords could have shown distinct results Finally, the cluster analysis presented in Section 6 and Table 5, focused on converting future research suggestions into research questions (Nobanee et al., 2021).

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