Uncovering the Dynamics of Exchange traded fund (ETFs): Bibliometric Perspective

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Abstract: *Exchange-traded funds (ETFs) represent a noteworthy advancement in the world's financial markets, providing investors a flexible and effective way to participate in diverse asset classes. North America holds most of the worldwide ETF assets, with the US being the largest market. Europe, the second-largest market, is next, having experienced remarkable development in nations like France, Germany, and the UK. This study employs bibliometric analysis to look at current exchange-traded funds (ETFs) trends. This study evaluates the data set of 595 articles extracted from the Scopus database to provide previously unexplored quantitative and qualitative information. The author narrowed the number of publications to just the title, abstract, and keyword from 3403 ETF-related papers. Consequently, a total of 595 articles were counted. This research integrates co-citation, co-occurrence, and citation analysis using Vos Viewer, Biblio shiny using R studio for visualizing data and MS Excel for frequency analysis. The study presented numerically and graphically demonstrates how extensively researched ETFs are, with a significant volume of publications starting in 2020. Statistically, most research in this field is concentrated in the United States, followed by the United Kingdom, which explores new options for other countries. The data highlights Significant patterns, active organizations, and top countries in the sector, which show a steady rise in ETF development since 1998. The University of Notre Dame is a significant player in US ETF research. It is advised that more research be done on the effects of COVID-19, Bitcoin, and ESG factors on ETFs to improve knowledge of sustainable investing strategies in dynamic markets. The beneficial implications highlight the necessity of investigating the relationships among arbitrage mechanisms, tracking inaccuracy, and pricing efficiency in Exchange-traded funds (ETFs), offering insightful information to investors and managers regarding managing risks and performance, which will help scholars, policymakers, and regulators to understand the importance of ETFs.*

Keywords: *Bibliometric Analysis, ETFs, Exchange-traded fund, Vos Viewer*

Introduction

Exchange-traded funds (ETFs) are an excellent instance of a passive investing type. ETFs are collections of assets that are primarily based on an index. It tries to replicate the return of the index it is tracking. Unlike conventional mutual fund schemes, exchange-traded funds (ETFs) are only offered for purchase and sale through stock exchanges (Kaur, 2024). According to the Investment Company Institute (ICI) reports that as of January 2022, global ETF assets surpassed \$6.5 trillion, demonstrating these products' growing popularity among investors seeking diverse and reasonably priced investment options. Over time, the amount of research on exchange-trend Over time, the amount of research on exchange-traded funds has increased dramatically. Numerous research on exchange-traded funds (ETFs) that are socially conscious, green, and gold have been conducted from a variety of perspectives. The most popular product to be introduced to exchanges in recent years is the exchange-traded fund (ETF). Newer products, like leveraged, inverse, and synthetic ETFs, are more sophisticated and include extra risk factors than the initial ETFs, which are straightforward to understand. The regulators' attention has been drawn to this because of the added dangers, complexity, and decreased transparency (Aggarwal & Schofield, 2013). ETFs can be bought on margin, and short sold and can also use options to manage the risk exposure (Moran, 2001). Further, any kind of order i.e. limit, stop market-if-touched, etc. can also be applied in the case of ETFs (Richards, 2002). The ETFs are similar to mutual funds in the sense that ETFs offer a considerable level of risk diversification (Shakeel , 2023)at a lower cost i.e. the investors can diversify their investments across a wide range of asset class which ranges from national or global stock indices to sector indices including infrastructure or technology or real estate, to bond indices covering government or corporate portfolios, and commodities including gold, etc. (Dennison, 2018). Thus, ETF offers dual benefits to the investors i.e. access to the stock market and diversification of investment. The other major attractions of ETFs are their lower expenses, easy market access, trading flexibility, liquidity, tax efficiency, and greater transparency. The Mirae Asset Mutual Fund poll found that almost 60% of the 2,109 participants, spread across 15 locations, felt they had a solid understanding of exchange-traded funds (ETFs) and that returns and liquidity were the main factors affecting their purchases (Money, 2023). The Bharat Bond Exchange Traded Fund (ETF), which was the first target maturity fund, matured in April 2023 with returns that were marginally less than the benchmark index (Nifty Bharat Bond Index) and the yield-to-maturity (YTM) during the launch period. By March 31, 2023, the underlying index had grown by 6.61 percent annually, while the ETF had produced 6.54 percent annualized gains (Kumar, 2023). The country's financial markets are regulated by the Security and Exchange Board of India (SEBI), which plans to simplify mutual fund rules to reduce compliance for exchange-traded and index funds, examples of passive investment funds. The action aims to promote growth, save expenses, and increase investor transparency. The criteria for sponsoring a mutual fund have also been updated by SEBI, enabling private equity funds to apply without having a track record of profitability (The Economic Times, 2023).

How does the ETF mechanism work

According to AMFI, ETFs can be bought straight from the Fund or through the exchange. The Fund only issues new units or redeems existing ones in predetermined lot sizes in return for an underlying portfolio basket (a "creation unit"). The investor is given the units when the Fund receives the underlying portfolio basket and a cash component. This is a feature of ETFs only: the issuance or redemption of units in kind. As an alternative, investors may choose the "Cash Subscription" method, whereby they can buy the underlying portfolio in each unit size by paying the Fund directly. Understanding the mechanisms behind ETF creation and redemption is essential. To fulfil the growing market demand or to introduce a new product, the ETF fund management will work with an authorized participant (AP) to issue more shares. In exchange, the market maker will get a creation unit, or block of equal-value shares of the ETF, from the fund manager. The market maker is paid a set amount for the underlying securities in ETF shares. This amount is based on the net asset value (NAV) of the ETF, not on the price at which it is traded. The market maker makes money by selling the ETF shares, and the ETF fund manager gets the stocks needed to track the index. It works the opposite way when you redeem a thing. Market makers can take ETF shares off the market by buying them to make a creation unit and returning them to the ETF provider. (Omar & Muhamat, 2021). An AP is a market maker, typically a financial institution, that will purchase shares of the ETF. One essential aspect of an ETF's operation is its creation and redemption process. To meet demand, APs can add or remove ETF shares from the market, which can help provide efficiencies and tighter tracking that is not usually found in regular mutual funds. This procedure can yield many of the potential advantages of an ETF. APs are essential to guarantee that the ETF is reasonably priced and per its NAV. APs also help the tracking inside the ETF become more accurate by covering the costs of buying and selling the assets that the ETF holds. Because of this process, exchange-traded funds (ETFs) have become one of the most popular ways to invest money. Schwab (2023)

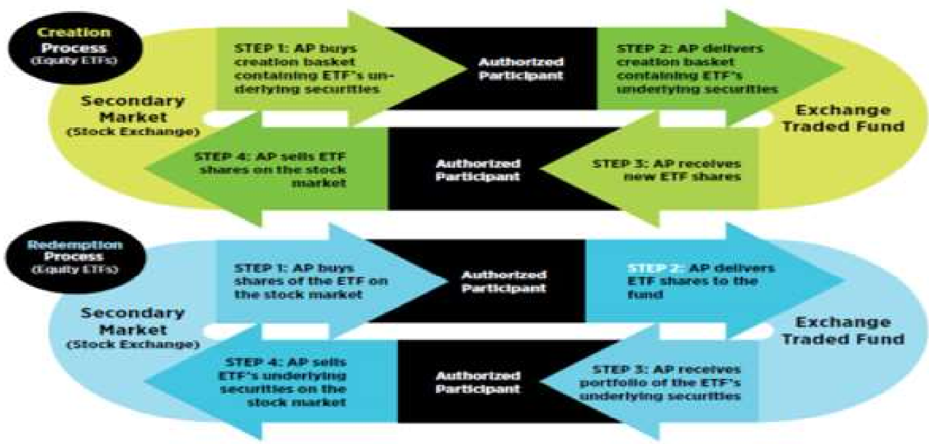

Figure 1: creation and redemption process of etfs

Source: etf.com

Global Exchange-traded fund

Table 1: The transformation of the global ETF market since 2013

	2013	2023
Global ETF AUM (USD bn)	$2,376.1	$11,464.3
Number of ETFs globally	4,032	9,804
Number of ETF issuers globally	233	582

Source: Lipper data

The information presented shows how the global ETF market has grown and changed significantly between 2013 and 2023.

Under Management Assets (AUM): In worldwide exchange-traded funds (ETFs), the aggregate value of assets under management climbed significantly from $2,376.1 billion in 2013 to $11,464.3 billion in 2023. This indicates a significant inflow of cash into ETFs as investors increasingly choose them as their preferred investment vehicles, marking a nearly five-fold increase over the past ten years.

The quantity of ETFs During this time, there were more than twice as many ETFs accessible worldwide, going from 4,032 in 2013 to 9,804 in 2023. The rise of ETFs is indicative of a growing market for diversified investment options that can accommodate different investing strategies, sectors, and geographical areas.

Number of ETF Issuers: In a similar vein, there were roughly three times as many ETF issuers worldwide in 2023—up from 233 in 2013. This growth indicates increased innovation and competition in the ETF sector as new players fight for market share and long-standing issuers broaden their product lines.

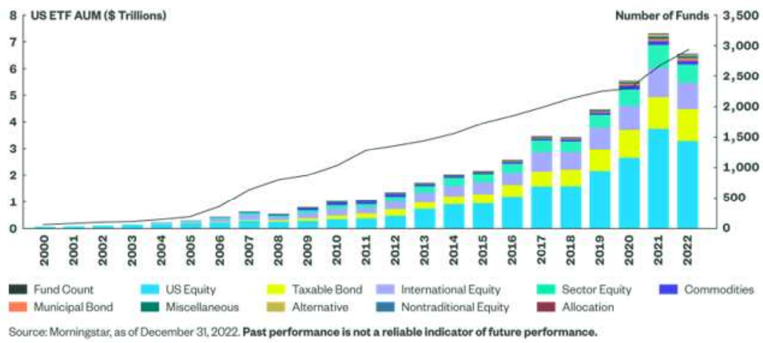

Figure 2: growth of asset in the global etfs industry

Source: morning star

Figure 3: global size market of exchange traded funds

Source: Nasdaq

As per Nasdaq, In the US, ETFs make up 12.6% of stock assets; in Europe, they make up 7.5%, and in Asia-Pacific, 3.9%. In fixed income, where ETFs make up 2.5% of assets in the US, 1.6% in Europe, and 0.3% in Asia-Pacific, market share is lower.

Factors influencing the growth of Exchange traded fund

Exchange-traded funds (ETFs) have grown globally, including in India. The rise of algorithmic and HFT has increased ETF market efficiency and liquidity. (David & Franzoni, 2017) algorithmic and high-frequency trading improves price efficiency but can potentially increase market volatility. Electronic trading platforms have made ETFs more accessible to individual investors. (Marszk & Lechman, 2019) found, these platforms enable low-cost trading and investor engagement, making ETFs popular among individual investors in India. Blockchain technology also improves ETF transparency and accuracy. (Hougan & Lawant, 2021) examine how blockchain could improve ETF trading, but it is still new. AI improvements in ETF selection and performance analysis also change the ETF landscape. Artificial intelligence allows smart beta and actively managed ETFs to meet investor needs. (Patwardhan & Joshi, 2016) AI-driven data analysis helps create more complex and targeted ETF products that attract more investors. Understanding how technology changes have changed the ETF landscape helps interpret bibliometric data. Exchange-traded funds (ETFs) have grown due to regulatory issues such as approval processes, fee structures and tax regulations First, regulatory limits and approval processes, primarily by the SEC, shape ETF creation and diversity. note that SEC approval affects ETF product expansion and type since it assures that new ETFs meet investor protection and market stability rules. ETF growth is also driven by regulatory fee structures' competitive pressure on expense ratios. Fee regulations and low expense ratios distinguish ETFs from mutual funds, attracting cost-sensitive investors. (Khorana & Servae, 2008) focus on mutual funds, but their global tax policy insights reveal that ETFs have similar tax advantages, making them tax-efficient investments in many jurisdictions. In markets like the U.S., flexible tax regulations allow investors to develop diversified portfolios without paying significant taxes, making ETFs popular. (Bae & Kim , 2020) Passively managed ETFs are attractive to low-cost, diversified investors due to regulations. My bibliometric study suggests that most ETF studies are from the U.S., which traded ETFs initially. Because of this, ETFs have risen swiftly and continue to advance in that market. Globalization has also helped ETFs grow. ETFs have expanded into international markets to expose foreign investors to diversified global assets as economic integration increases cross-border investment flows. (Espagne & Oman, 2023) emphasize that globalization has increased ETF liquidity and accessibility, accelerating global expansion. Economic uncertainty has increased demand for ETFs during financial crises or geopolitical tensions due to their quick diversification. ETFs give investors instant access to a portfolio of assets, which helps hedge against market volatility. (Sakarya , 2020) describe how market participants favor ETFs for hedging, especially during volatility. ETFs' *lower fees* attract cost-conscious investors, especially during economic instability when diversity is essential. ETFs are popular because investors can get broad market exposure cheaply. (Ray, 2024).

Review of Literature

This study has been conducted to provide a comprehensive analysis of the research carried out in the field of exchange-traded funds (ETFs). ETF literature covers performance analysis, price efficiency, volatility, liquidity, and ESG-focused ETFs. (Chang, Krueger, & Witte, 2015) analyze U.S. fixed-income ETFs and CEFs over the past five and ten years, concentrating on operational features, risks, and performance indicators in the same Morningstar categories. (Chen, Chen, and Frijns 2017) find that the index exposure of New Zealand ETFs differs significantly. Regression analysis, cointegration, and multivariate regression are used to evaluate these ETFs' tracking performance. (Qadan & Yagil, 2012) found that ETF tracking was more excellent in 2008 than 2007, especially in real estate, banking, and finance. Integration tests and error correction models show that trade volume did not affect tracking error and that ETF returns and local market performance are linked over time. (Akhigbe, Balasubramanian, & Newman, 2020) examine ETF disclosure decisions, which differ from mutual funds, including fund performance, investment style, expense ratio, and fund family size. (Charupat and Miu, 2013) study price efficiency, performance, tracking capability, and ETF effects on underlying assets. They expect research on ETFs to increase as they gain popularity worldwide, not only in North America and Europe. They feature new exchange-traded notes, actively managed, leveraged, and inverse ETFs. (Sabbaghi, 2011) finds green ETFs make sustainable investing accessible. His examination of 15 green ETFs shows volatility persistence and weak-form market efficiency. Socially responsible ETFs are another alternative for investors seeking social impact without sacrificing earnings. (Lobato, Javier, & Romero, 2021) analyze systemic risk, capitalization, trading frequency, and tracking inaccuracy to determine how return intervals affect ETFs. Price discovery, volatility, and pricing efficiency are examined in ETF literature using various methods. A vector error correction model (VECM) showed price discovery in GCC ETFs. (Almudhaf F. , 2019) In addition, an improved Generalized Autoregressive Conditional Heteroskedasticity (GARCH) framework shows that ETF market prices affect net asset value (NAV) volatility, demonstrating ETFs' effectiveness in price discovery. Others use quantile cointegration models on the 1994–2020 S&P 500 Index and Chicago Board Options Exchange Volatility Index (VIX) data to link ETFs' rising prominence to market volatility and more excellent stock prices. (Jiang & Guo, 2010) The paper investigate the influence of international and domestic ETFs investing in Indian equities on return volatility and pricing efficiency, panel regression methods with stock and time-fixed effects and robust standard errors were used. (Tripathi V. S., 2023). Previous research has not examined ETF-financial market interactions, regulatory environments' effects on ETF growth and innovation, or how investor preferences drive the development of new ETF products, including ESG and thematic ETFs. This study examines many ETF research themes and trends to fill these gaps. It analyses knowledge structure and emerging patterns with the help of threefold plotting, thematic evolution, and thematic clusters, which was not mentioned in previous review papers. It also examines collaboration networks between countries, institutions, and authors. The study provides a complete information landscape to help scholars comprehend ETF development and trend. In conclusion, this review provides learners and prospective researchers with an overview of the latest advancements in the subject.

Objective

The purpose of this research is to use bibliometric methods to better understand patterns in exchange-traded funds. The following questions for research serve as a guide for this review

RQ1. How many articles are published in this discipline each year, and what is the publication trend?

RQ2. Who are some of this field's most active writers, governments, and organizations?

RQ3. Which publications, journals, and papers receive the highest citation counts in the field?

RQ4. Which search terms, documents, and source kinds are the most vital in this field?

RQ5. What are the prominent themes prevailing in this area of Research?

Research method and study design

The study analyzes exchange-traded funds (ETFs) from 1998 to 2023, utilizing 595 Scopus articles to find new quantitative and qualitative insights. This period saw tremendous ETF growth, market impacts, and regulatory reforms. Using article titles, abstracts, and keywords, the author found relevant terms, including "exchange-traded fund," "ETFs," and "ETF." The analysis Include co-citation references, keyword co-occurrences, threefold plotting, thematic evolution and thematic clustering. using Vos Viewer, Biblio shiny using R studio for visualizing data and MS Excel for frequency analysis.

Table 2: Data retrieval process

Stage	Filtering criteria	Reject	Accept
1	The initial search term "exchange-traded funds" OR "ETFS" OR " ETF"	-	3403
2	Period - 1998-2023	392	3011
3	Subject - " Business, Management, Accounting", "Economics, Econometrics & Finance", "social sciences, and "Arts and humanities "	1606	1405
4	Document type- Articles		810
5	Language - English only		595

Descriptive Analysis

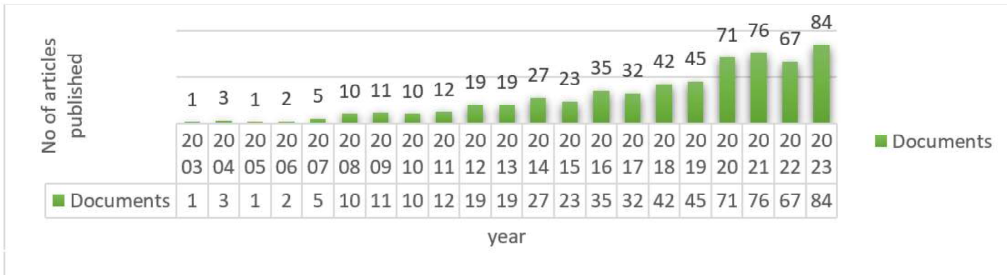

Figure 5: publication trend in exchange-traded funds

Source: Author

The publication trend is presented in Fig.5 wherein the total number of articles is mapped against their respective year of publication. The most prolific years are 2023 (84 articles), 2021 (76 articles), 2020 (71 articles), and 2022 (67 articles), with a decline in 2022. Expect this upward tendency to continue in 2018 and then decline in 2022. Note- This figure presents the distribution of the shortlisted articles based on the year of publication.

Publications by Leading Authors, Institutions, and Countries

Table 3: Top ten influential authors, institutions, and countries of Exchange-traded funds

TC	Authors	TP	TC	Institutions	TP	TC	Countries	TP
304	Bouri, Elie	6	135	University of Notre Dame	1	2643	United States	204
212	Saeed, Tareq	2	135	University of Texas at Austin	1	711	United Kingdom	59
169	Alsalami, Hamed	1	135	comsats university Islamabad, Pakistan	2	669	China	56
167	Peterson, Mark A.	2	103	King Abdulaziz University, Saudi Arabia	1	441	Australia	39
167	Gleason, Kimberly C.	1	103	university of Virginia, Charlottesville	1	310	Lebanon	7
135	Mathur, Ike	1	103	Emory University, United States	1	416	Taiwan	31
135	Cremers, Martijn	1	98	University College Dublin, Ireland	1	247	Japan	17
135	Ferreira, Miguel A.	1	101	university of connecticut united states	1	269	Spain	16
135	Matos, Pedro	1	101	European University Institute, Italy	1	271	Ireland	15
135	starks, laura	1	101	Stanford university, united states	1	273	Canada	25

The top writers, institutions, and countries are listed in Table 3 based on the quantity of citations. The most important and influential writers in the exchange-traded fund industry are Elie Bourie, Tareqe Saeed, and Hamed Alsalami, who have a combined total of 135 citations. Ike Mathur, Kimberly C. Gleason, and Mark A. Peterson comes next, each with 103 total citations. whereas the leading Author Elie boure includes six publications and explores into important themes such as the problems between equity and commodity exchange-traded funds (ETFs) during COVID-19 and the connections between blockchain ETFs, cryptocurrencies, and the

Nasdaq markets through the use of multifractal and asymmetric cross-correlation methods, The university of Notre Dame has 2643 citations. Notre Dame's finance department has made a name for itself in the ETF (Exchange Traded Fund) research by focus on liquidity, market processes, and regulatory insights. For instance, their research has investigated the effects of exchange traded funds (ETFs) on the price of underlying assets and the liquidity of those assets, particularly in times of market stress (e.g., Poterba & Shoven, 2002). Studies from Notre Dame have examined how ETFs impact the liquidity of underlying assets, the role of arbitrage in maintaining price parity. (Zhi Da, 2017) respectively, It is one the most influential universities. Comsats University Islamabad, Pakistan, is the most active university in terms of publications, with 2 publications. Out of all countries, the United States has produced the most scientific work in exchange-traded funds, with 204 papers and the highest number of citations (2643).

Top Journals for exchange-traded Funds

Table 4: Most ten influential journals on the exchange-traded fund

TC	Journals	TP
515	energy economics	19
414	journal of banking and finance	16
322	journal of empirical finance	7
288	International review of financial analysis	21
288	journal of financial economics	7
216	resources policy	5
169	journal of asset management	17
149	journal of financial markets	9
146	finance research letters	11
135	financial review	11

This list shows the ten exchange-traded fund publications with the most citations. The publications that put out the most papers are the International Review of Financial Analysis, with 21 papers, and Energy Economics, with 19 papers. One difference between finance-classified journals and non-finance journals is shown in Table 4. This indicates that finance-classified journals print more exchange-traded funds. There are 515 mentions for Energy Economics and 414 for the Journal of Banking and Finance.

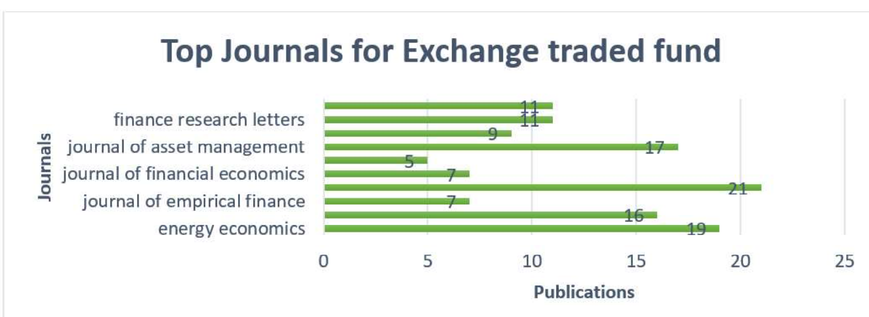

Figure 6: top ten journals for exchange-traded funds

Source - Author

Top articles on Exchange-traded funds

Table 5: Top ten most influential articles on exchange-traded funds

Citations	ARTICLE	TITLE OF ARTICLE
60	Charupat (2011)	"The pricing and performance of leveraged exchange-traded funds"
61	Hegde (2004)	"The market liquidity of DIAMONDS, Q's, and their underlying stocks"
62	Takahashi (2021)	"When the Japanese stock market meets COVID-19: Impact of ownership, China and US exposure, and ESG channels"
62	pavlova (2022)	"ESG ETFs and the COVID-19 stock market crash of 2020: Did clean funds fare better?"
62	Feuerriegel (2018)	"Long-term stock index forecasting based on text mining of regulatory disclosures"
63	wang (2022)	"Does reinvesting payouts in plain vanilla exchange-traded funds enhance household portfolio performance?"
63	López (2020)	"All that glitters is not gold. The rise of gaming in the COVID-19"
72	Folger (2022)	"ESG ratings and financial performance of exchange-traded funds"
78	Corbet (2021)	"Bitcoin-energy markets interrelationships - New evidence"
79	Agapova (2011)	"Conventional mutual index funds versus exchange-traded funds"

Notes: TC – Total Citation, TP – Total publication

With 79 citations, Agapova (2011) and Corbet (2021) are the most significant and influential articles in Scopus. The most referenced publications on exchange-traded funds are shown in Table: 5. Agapova (2011) is the most influential one as their study investigates the connection between exchange-traded funds (ETFs) and traditional index mutual funds, aiming to understand why they coexist despite their different structures. By comparing fund flows into both types of funds for various indexes, the analysis reveals that while they can be substitutes, they are not identical. The research suggests that differences in customer preferences create distinct market niches for each type of fund, explaining their coexistence. A closer examination of the most cited publication on ESG ratings and ESG ETFs reveals a growing interest in emerging topics such as the performance of plain vanilla exchange-traded funds (ETFs) in household portfolios, pricing performance, and ETF liquidity (Wang, 2022; Pavlova, 2022).

Top Co-citation of References by Articles on Exchange-traded Fund

Table 6: Co-citation References of Exchange-traded funds

AUTHORS	TITLE	TC
DelcoureN., Zhong M	"On the premiums of iShare "	18
Daz, Shive s	"Exchange-traded funds and asset return correlations"	16
Petajisto	"Inefficiencies in the Pricing of Exchange-Traded Funds"	18
ben - David I, Franzoni	"Do ETFs Increase Volatility?"	17
buetowg.w, Henderson	"An Empirical Analysis of Exchange-Traded Funds"	8
tse y, Martinez	"Price discovery and informational efficiency of international iShares funds"	13
chu p,k,k	"Study on the tracking errors and their determinants: evidence from Hong Kong exchange-traded funds"	7
Hilliard j	"Premiums and discounts in ETFs: An analysis of the arbitrage mechanism in domestic and international funds"	8
Kayli m.m	"Pricing Efficiency of Exchange Traded Funds in Turkey: Evidence from the Dow Jones Istanbul 20"	10
Amihud y	"Illiquidity and stock returns: cross-section and time-series"	13

Table 6 lists the top-referenced articles among the ten most cited publications. This section examines the most frequently cited works within the corpus of exchange-traded funds literature. Notably, the works by Delcoure N., Zhong M., and Daz, Shives have received eighteen and sixteen citations respectively.

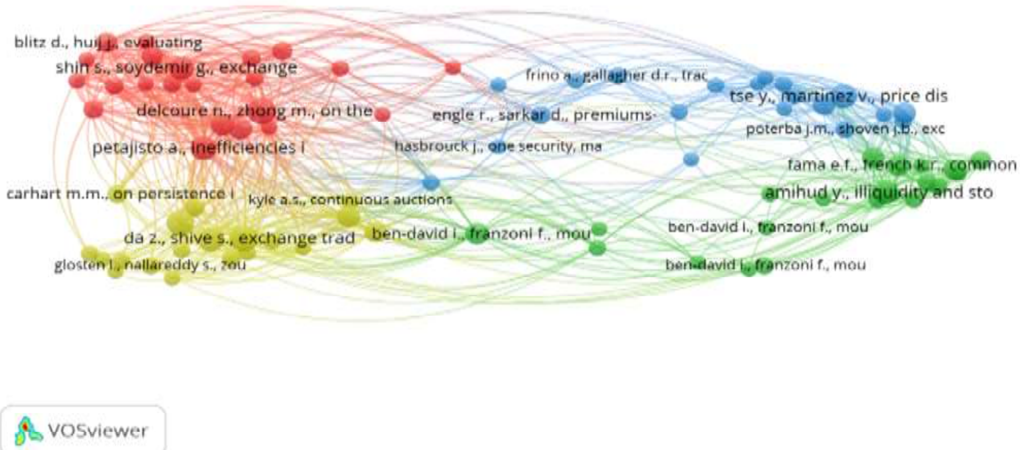

Figure 7: co-citation references of exchange-traded funds

Co-occurrences of Authors Keywords

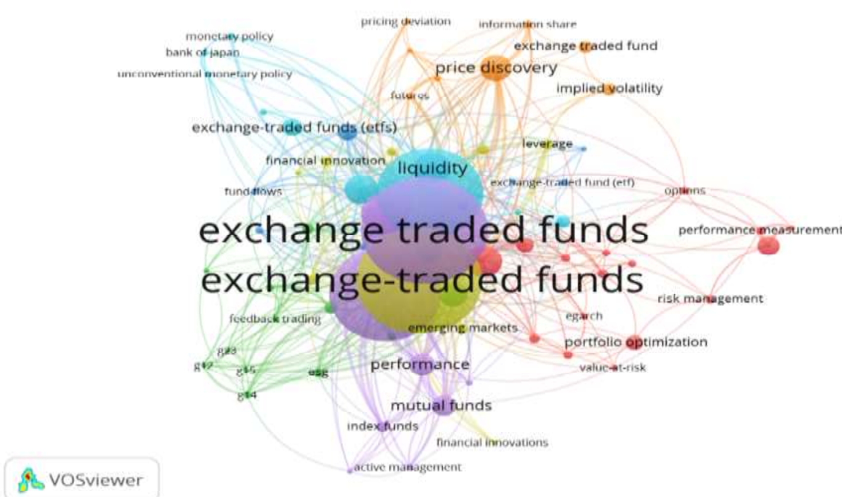

Figure 8: co-occurrences of authors keywords

An author-keyword co-occurrence network shows how often certain writers and keywords end up together in academic literature. Large bibliometric data sets can be visualized and examined using Vos Viewer for concurrence analysis. As shown in Fig 5.6, the network visualization shows that exchange-traded funds have the highest correlation with other keywords, followed by liquidity, implied volatility, and price deviation, financial innovation, fund flows, performance, index funds.

Threefold plot

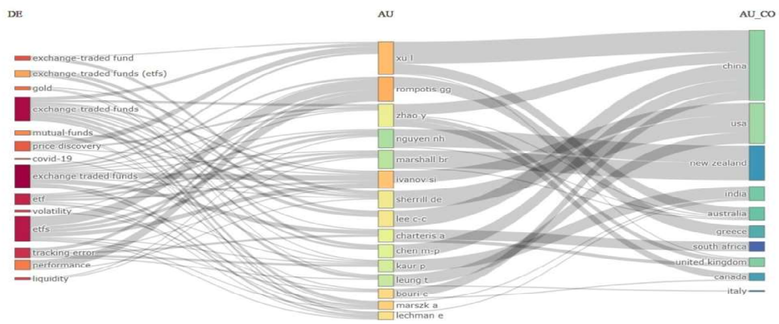

Figure 9: Threefold plot of keywords, authors and countries

The following information is presented in a three-field plot diagram to illustrate the interconnection between keywords, Authors and countries. The grey connection indicate that these items are interconnected. The keywords are located on the left and are linked to the appropriate topic. The countries are located on the right. The chart indicates that Rompotis G, Pavlova, Kaur, and Zhao are the authors who contribute the most keywords like exchange traded funds, etfs, mutual funds, volatility, performance, covid -19, price discovery, tracking error. The second component is the keywords most frequently used in the paper, followed by the third component, the country of origin such as China, USA, India, Australia, Greece etc.

Thematic Evolution and maps

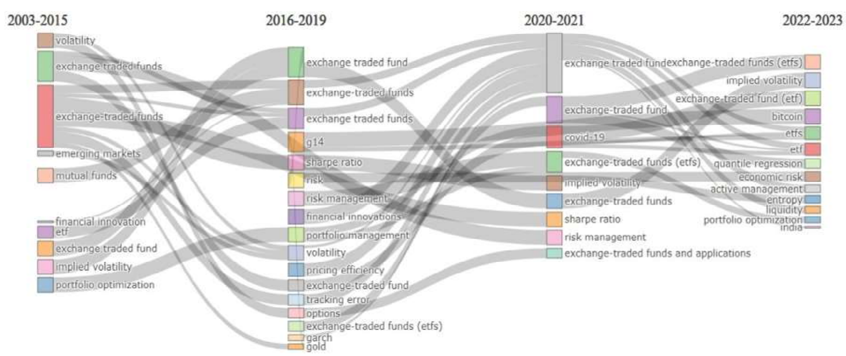

Figure 10: thematic evolution and maps

The study has been divided into periods to show how things have changed. The number of articles released and the results of the topic trend show how the years are distributed. The period parameter is divided into four segments. 2003-2015, 2016-2019, 2020-2021, and 2022-2023. Clusters of keywords represent the year between 2003 and 2015 in each period. The most frequently used keywords are ETFs" "exchange-traded funds", "emerging markets". And mutual funds. In the coming year, the authors primarily employed keywords such as "portfolio management" "volatility" and "price efficiency" for 2016-2019. Several emerging topics have gained prominence, particularly about volatility, risk management, and the growing interest in active management strategies as a result of the advancement of exchange-traded funds (ETFs). The term "implied volatility" has become increasingly prevalent, underscoring the growing emphasis on volatility forecasting and its influence on the pricing and performance of exchange-traded funds (ETFs). Risk management has also transformed, with contemporary exchange-traded funds (ETFs) providing customized solutions to mitigate market risks through inventive strategies, including leveraged and inverse ETFs. The utilization of quartile regression in the analysis of ETF performance has acquired momentum in recent years, enabling a more sophisticated comprehension of the behaviour of various ETF categories in response to changing market conditions. Additionally, the upcoming of actively managed exchange-traded funds signifies a transition from pure passive investment strategies to those incorporating both active and passive components to achieve superior performance in volatile or uncertain markets. These emerging themes underscore the extent to which ETFs are adjusting to the evolving financial market landscape, offering investors more sophisticated instruments to mitigate risk and accumulate returns over a variety of time frames.

Thematic clusters on exchange-traded funds through Co – occurrence

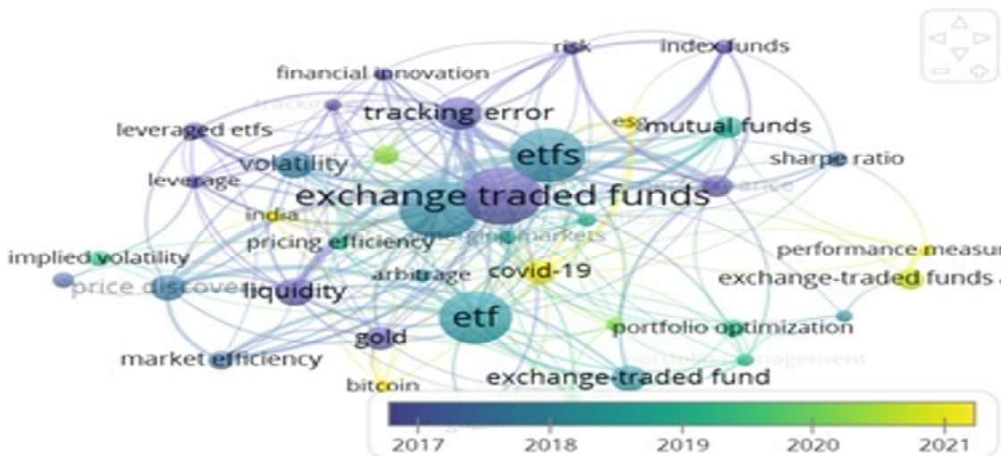

Figure 11: Thematic clusters on exchange-traded funds through Co – occurrence

Several emerging themes were identified through keyword co-occurrence analysis. These include *Pricing* Efficiency, Tracking Error & Arbitrage (Shin, 2010; Soydemir, 2018; Marshall et al., 2019) the efficacy of ETFs in replicating the performance of underlying assets, the determinants influencing tracking precision, and the possibilities for arbitrage opportunities., Leveraged Volatility and Liquidity (Bae & Kim, 2018; Leung et al., 2017; Datar et al., 2020), appealing to specific investors for their potential for enhanced returns, may also elevate market risk and affect liquidity trends within the markets they monitor ESG ETFs and COVID-19 alongside cryptocurrency themes like rising prominence of ESG (Environmental et al.) investments has resulted in ETF offerings that conform to socially responsible investment standards. The COVID-19 epidemic has heightened interest in these assets as investors pursue resilient and responsible investing options. Incorporating cryptocurrency concepts, such as Bitcoin, into ETF frameworks introduces a novel domain for ETF research, (Pavlova, 2020; Almudhaf, 2016). Additional themes such as Performance Measurement and Risk Measurement (Sharifzadeh, 2022) also emerged as trending topics within ETF studies. focus on evaluating the performance of ETFs across various sectors and markets while accounting for risk-adjusted metrics. Studies within this theme are crucial for helping investors understand how ETFs perform relative to other assets and how different types of risks—market, sectoral, and idiosyncratic—affect ETF returns.

Table 7: Thematic clusters on exchange-traded funds through Co – occurrence

Theme	Authors	Title	TC
Pricing Efficiency, tracking error & arbitrage	Shin S.; Soydemir G. Marshall B.R et al Shanmugham	"Exchange-traded funds, persistence in tracking errors, and information dissemination" "ETF arbitrage: Intraday evidence" "Pricing efficiency of nifty BeES in bullish"	57 54 15
Leveraged volatility and liquidity	Bae K.; Kim D. Leung T et al Datar V et al	"Liquidity risk and exchange-traded fund returns, variances, and tracking errors." "Implied Volatility of Leveraged ETF Options" "Liquidity commonality and spillover in the US and Japanese markets: An intraday anal"	14 36 13
Performance measurement and Risk measurement	Sharifzadeh M Andrii K et al Alam N.	"Analytical performance comparison of exchange-traded funds with index funds" "Complex risk analysis of investing in agriculture ETFs" "Comparative performance analysis of conventional and Islamic exchange-traded funds"	13 9 9
ETFs and Index Funds	Chen H et al Haga R et al	"Investing in the healthcare sector: mutual funds or ETF" "Understanding bull and bear ETFs"	4 4
ESG ETF and covid 19 bitcoin	Pavlova I Almudhaf F. Rompotis G.G.	"ESG ETFs and the COVID-19 stock market crash of 2020: Did clean funds fare better?" "Pricing efficiency of Bitcoin Trusts" "The ESG ETFs in the UK"	62 22 9

Cluster 1- The first cluster consists of 39 items that primarily report Pricing Efficiency, tracking error & arbitrage, The top cited articles in this cluster are Shin S, Soydemir(2010), Marshall B.R, et al (2013), Shanmugham (2012) with 57,54,15 citations respectively. Price discrepancies that lead to the establishment and elimination of arbitrage opportunities are induced by the buying and selling of ETFs during regular trading hours. The conditions here is optimal for an arbitrage (Marshall a & Nguyen, 2013) Numerous studies have demonstrated the relationship between arbitrage and exchange-traded funds (ETFs) performance. (Shearer & Byrd, 2019) the existence of an ETF and arbitrage agents amplifies the total volatility of underlying symbols, and when one symbol has a small flash crash, One paper indicates that liquidity is a crucial determinant of the effectiveness of ETF arbitrage. Liquidity is a crucial factor influencing the effectiveness of ETF arbitrage, and this correlation is both more robust and enduring. (Rappoport & Tuzun, 2018) in the same way price efficiency and tracking error also impact the performance of Exchange traded fund. (Thirumalai ,2003) Investigated the pricing efficiency of passive and active ETFs, both with and without an arbitrage mechanism, trading on the Deutsche Börse, and discovered a more significant standard deviation of price deviations from NAV for active ETFs, alongside positive and statistically significant mean price deviations for passive ETFs. (Dorocáková, 2017). closely duplicate the returns and risk of the underlying index, with tracking error being a key performance indicator for these passively managed funds. research indicates that the primary determinant of copy deviation is fund size and the consolidation of the fund's stocks. Furthermore, performance disparities between exchange-traded funds and their benchmarks often exhibit seasonal patterns with the presence of tracking error These are the most cited publications that are still timely today and cover topics such as pricing efficiency, tracking inaccuracy, and arbitrage.

Cluster 2- It consists of 9 items on Leveraged volatility and liquidity, The top cited articles in this cluster are Bae K.; Kim D., Leung T., et al, and Datar V et al with 14,36, and 13 citations respectively A summary of papers cited discussing these issues is provided below. (Bae & Kim , 2020) examined the effects of exchange-traded fund (ETF) liquidity on tracking errors, returns, and volatility in the US ETF market. They noticed that substantial tracking errors were present in ETFs with low liquidity. The returns and liquidity of illiquid exchange-traded funds were more vulnerable to fluctuations in the liquidity of the ETFs market, the underlying index returns, or both. As a result, there was a favorable liquidity premium seen in US ETF markets. (Leung & Sircar, 2015) Looked into how to interpret implied volatility from options written on leveraged exchange-traded funds (LETFs) and focused on how options on LETFs with different leverage ratios relate to each other. In a multiscale unpredictable volatility scheme, they use asymptotic methods to get a good idea of both the LETF option value and the potential volatility. (Shakeel , 2023) investigate the intraday volatility spillover between the exchange rate, gold, and crude oil. Gold was the best at providing return spillover to the exchange rate and crude oil. On the other hand, crude oil was found to be the best at receiving spillover from other system factors.

Cluster 3- It consists of 9 items on Performance measurement and Risk measurement, The top cited articles are Sharifzadeh M, Andrii K, et al, and Alam N with 13, 9, and 9 citations respectively. correspondingly Below is an outline of the papers cited that discuss these topics. Comparing ETFs to index mutual funds, the data reveals that tracking inaccuracy is greater for ETFs. Index funds have underperformed and outperformed, while exchange-traded funds (ETFs) have consistently outperformed their underlying index, according to an examination of their active returns (returns minus the returns of the underlying index). (Andrii, 2020) This research aims to provide an in-depth risk analysis of agricultural exchange-traded funds (ETFs). When implementing the general portfolio method, it is important to consider the unique qualities of agricultural investments, as well as direct financial investments made into agricultural exchange-traded funds (ETFs). The authors divided agricultural exchange-traded funds (ETFs) into six classes, each of which represents a distinct ETF type, to accomplish the work's goals. There were 26 agricultural ETFs in the unique sample. To measure investment risk, five distinct conceptual frameworks were applied in a comprehensive risk analysis. Specifically, methods that measure variability and apply the Value-at-Risk notion are used. (Alam, 2013). This study used 85 ETFs from UK iShares to compare the results of Islamic and conventional ETFs. ETFs can beat the market benchmark index as well as traditional ETFs.

Cluster 4- It consists of 6 items on ETFs and Index Funds. The top cited articles are Chen H et al, Haga R et al with 4 and 4 citations respectively, Belowis an outline of the papers cited that discuss these topics. (Chen & Estes, 2018) The authors examine whether investment vehicles are better at diversifying holdings within the healthcare industry and how much investors can profit from transferring a portion of their S&P 500 index fund holdings into an ETF or a value-weighted healthcare fund portfolio. (Haga, 2012) This study examines leveraged exchange-traded funds (ETFs), paying particular attention to a few of the first Norwegian ETFs. The funds offer investors two and a half times the daily returns on the OBX index through futures markets. We discovered that fund returns diverge from the providers' expectations when risk-free interest rates are favourable. Furthermore, we discovered that fluctuations may negatively impact investors' profits. Thirdly, we found that the funds needed to provide the returns depicted. Ultimately, we realized that the bets entered into the futures markets were too tiny to produce the results shown.

Cluster 5 consists of 5 items on Esg etf and covid 19 bitcoin. The top cited articles are Pavlova I, Almudhaf F., and Rompotis G.G., with 62 and 29,9 citations, respectively. (Ivelina, 2022) This study evaluates the ESG risk-adjusted returns of pre and post-COVID-19. It is found that, before the COVID-19 market crisis, lower-rated sustainable exchange-traded funds (ETFs). (Almudhaf, 2018) investigates the Bitcoin Investment Trust's pricing effectiveness. Upon examining the discrepancy between prices and net values of assets, they discovered an average hefty and consistent premium of 44%. This data draws attention to the price inefficiencies of the now available trusts and forces providers to produce better products, like exchange-traded funds, as substitutes for bitcoins. (Rompotis, 2022) This study looks at the performance of 49 so-called

ESG exchange-traded funds in the UK. These funds incorporate social, governance, and environmental factors into their investment strategy. The Capital Assets Pricing Model, the Fama and French Five-Factor Model, and the Sharpe and Treynor ratios are some of the most well-known ways to figure out raw and risk-adjusted returns. These are the most cited publications that are still timely today and cover topics such as ESG ETfs and covid 19 bitcoin.

Conclusion

The study's main goal is to draw attention to the significant contributions that academics have made to the progress of ETFs, since 1998. This study sheds light on significant trends, active organizations, and top nations in the field of (ETFs) over the past three decades. Among American academic institutions, the University of Notre Dame stands out for its contributions to research on exchange-traded funds (ETFs). The study's analysis of keyword co-occurrences has provided valuable insights into the dominant themes and research topics within the ETF domain, in addition to institutional contributions. The research offers a roadmap for future investigations by identifying these recurring themes, including market dynamics, regulatory frameworks, investor behaviour, and the integration of ETFs into broader investment strategies. The clusters and patterns identified through keyword analysis enable researchers to investigate further critical issues, including the interactions between ETFs and financial markets, the influence of regulatory environments on ETF growth and innovation, and the influence of investor preferences on developing new ETF products. This comprehensive approach underscores the multifaceted character of ETFs and creates additional opportunities for academic inquiry, particularly in emerging fields such as ESG investing, thematic ETFs, and integrating ETFs into dynamic, global portfolios, Furthermore, the examination of keyword co-occurrences has yielded significant insights into the dominant themes and subjects in this area. Researchers can explore further into topics including market dynamics, regulatory frameworks, investor behave or, and the incorporation of exchange-traded funds (ETFs) into more comprehensive investing strategies by utilizing the clusters and themes that have been identified.

Limitations & Future Research Direction

The study has certain shortcomings that point out areas for future research direction The current study uses the Scopus database to retrieve publications published between 1998 and 2023 Furthermore, the keywords we utilized were restricted to "exchange-traded funds" OR "ETFS" OR "ETTF," but more keywords should be included in future research. Notwithstanding its limitations, the data from this study adds to the body of information by showing trends in exchange-traded funds.

The study mentioned above shows that the majority of work about ETFs is conducted in developed nations like the USA, UK, and China; nevertheless, these nations face challenges with liquidity, volatility, and other concerns that are evident in the study's results and that we have yet to investigate as possible topics for future research. Future studies should examine the interaction among arbitrage mechanisms, tracking inaccuracy, and pricing efficiency between index funds and exchange-traded funds (ETFs). Examining how well they manage risk and performance can provide valuable insights into portfolio management strategies, particularly in market turbulence. Another critical area for investigation is the addition of ESG. Understanding the characteristics of Risk and Return ESG-focused ETFs is crucial as socially responsible investing becomes increasingly prevalent. Research could investigate the performance of these funds in comparison to traditional ETFs particularly in the context of regulatory changes and changes in investor conduct toward sustainable investment practices. Furthermore, the ETF landscape is subject to new variables due to the global health crisis induced by COVID-19 and the growing prominence of digital currencies such as Bitcoin. Future research could investigate the impact of the pandemic. on the performance, liquidity, and pricing of exchange-traded funds (ETFs), with a particular emphasis on sector-specific or thematic ETFs such as technology or healthcare. In addition, the emergence of Bitcoin and other cryptocurrencies necessitates an examination of the impact of virtual currencies on ETF dynamics, whether through direct investment in Bitcoin ETFs or as part of broader market volatility. Understanding these emerging trends would give valuable insights into the evolution and adaptation of ETFs to a swiftly changing financial ecosystem.

In conclusion, future research should concentrate on topics such as arbitrage mechanisms, error tracking, pricing efficiency, risk management strategies during market turbulence, the impact of ESG concerns, and the influence of significant global events such as the rise of cryptocurrencies and COVID-19. These regions present thrilling prospects for expanding our comprehension of (ETFs) and their significance in contemporary portfolio management and sustainable investing strategies.

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