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Exchange-traded funds and the future of passive investments: a bibliometric review and future research agenda

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Abstract

Passive investments such as exchange-traded funds (ETFs) provide an opportunity to invest in indexes, asset classes, and sectors with low maintenance costs and high transparency. Today ETFs dominate the world, with nearly 50% of the investment in the USA coming through ETFs. Numerous studies on specific aspects on ETFs have been done earlier; however, considering the scarcity of thorough summaries in the existing body of literature, this bibliometric and systematic review aims to adopt a methodical approach with the goal of delivering qualitative and quantitative understanding of ETFs, while highlighting general research trends. The authors analyzed 2058 articles associated with ETFs from the Scopus database during the last 50 years, i.e., from 1973 till date. The search was initially conducted using title, keyword, and abstract, yielding 2058 articles, which were narrowed to only include research papers and review papers, resulting in a final count of 958 items. The most important authors, highest cited articles, prominent journals, important themes, and associated countries have been identified using bibliometric research. The numerical and visual representations of the analysis show that ETFs are a widely studied research area, and the enormous rise in publications in 2020, 2021, and 2022 demonstrates that researchers are quite interested in the topic. According to affiliation statistics, most research is focused in the USA together with other developed nations, opening new options for the research on ETFs in relation to developing economies. The current analysis reconciles numerous exchange-traded fund studies associated with volatility, liquidity, risk-return trade-off, and tracking errors and identifies possible research gaps. Some of the emerging topics that evolved in passive investments include the use of machine learning, AI, and the emergence of ETFs associated with ESG and sustainability. This research will help lawmakers, scholars, and regulators understand the core principles of ETFs and identify areas that deserve additional investigation.

Keywords Exchange-traded funds, ETF, Bibliometric analysis, Passive investments, Volatility, Tracking error

JEL Classification G15, G41, O16

Introduction

ETFs have a long history and they started trading in Canada first in the 1980s. They became popular as passive investment instruments after the 2008 financial crisis. Today, they dominate the global investment scenario. There have been numerous studies in this space related to individual characteristics of ETFs, their regional return comparisons, differentiation between ETFs vs mutual funds, etc., but the space still lacks an effort where all the information can be readily referred to and analyzed. The purpose of this research article is (1) to get an all-encompassing resource for exchange-traded funds, (2) to identify deficiencies in knowledge about exchange-traded funds, (3) to generate innovative research ideas

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related to exchange-traded funds for future research. The paper's overview subsection gives a brief synopsis of the history of ETFs since their inception, the development of ETFs as commercial products over a period, the rise of the ETFs post-2008 financial crisis. Through this study, we will address the latest trends associated with the ETFs, important issues and themes related to ETFs, and a conceptual framework of investment via ETFs. The article also discourses the existing gaps and future research trends associated with ETFs.

In the recent past, assets under management (AUM) of ETFs have shown tremendous growth in the Western world and are getting popular in emerging markets as the phenomenon of global financial markets integration is rising [102]. The majority of the passive investments globally are made with the help of index funds or ETFs. They track and replicate the performance of associated reference index, e.g., S&P 500, and Nikkei [66]. Low management fees are an intrinsic benefit of exchange-traded funds (ETFs) versus mutual funds, as they just follow and rebalance their portfolio according to the underlying benchmark index, whereas active funds have higher expenses because of additional costs required to maintain research houses, trading costs during the frequent churning of portfolio, which results in higher expense ratio for active funds [27, 118].

ETFs are available for trading on a real-time basis, whereas mutual fund units price is available only at the end of the day [31]. ETFs have favorable tax treatment in many countries, and they provide relatively superior returns as compared to active mutual fund schemes [122]. Some additional advantages of ETFs include low volatility as compared to equities and the opportunity of diversification [98].

It is crucial to measure the returns from various market indices, and ETFs aim to do the same [133]. The ETF's output matches with the increasing or decreasing pattern of an index. ETFs can be used for the production of sophisticated trading strategies, margins, or shortening purposes [17].

When it comes to capital gains taxes and liquidity costs, exchange-traded funds (ETFs) have a clear edge over index mutual funds, although the investing mechanism in both vehicles is similar. Investors making transactions in the ETF are subject to individual transaction costs and are directly exposed to capital gains when the units are sold, but in index funds, the same is borne by all fund investors at the same time [69].

ETFs are categorized in accordance with the methodology and the underlying assets they hold. Physical ETFs comprise underlying assets in the form of stocks or bonds. Synthetic ETFs aim to return the value of the index using total return from swaps [124]. With the above advantages of ETFs over active mutual funds, ETFs grew over the years and became the dominant part of the overall investment space.

Overview of global ETFs

Index funds and ETFs that are widely acknowledged as passive investments have grown internationally over the years. They recently exceeded active investment markets in the USA (Table 1).

ETFs originated from the idea of a stock collection, like mutual funds or an index portfolio. The Massachusetts Mutual Fund, the first contemporary mutual fund that still exists today, was established in 1924 and went public in 1928 [81].

In 1950, Markowitz introduced the Modern Portfolio Theory of optimal portfolio returns with minimal risk [92]. The application of modern portfolio theory in institutional investments was led by Fama and Sharpe through their efficient market theory [114]. In 1973, Burton Malkiel popularized the idea of "buying the market" by using a portfolio rather than relying on individual

Table 1 Evolution of ETF from mutual funds

Year	Event
1924	Evolution of first modern mutual fund (Massachusetts mutual fund)
1950	Modern portfolio theory by Markowitz
1960	Efficient market theory by Fama & Sharpe
1975	Vanguard Index Fund
1987	Crash in US Markets (24% decline in single day) because of automated trading
1993	Launch of first successful ETF in USA (SPY)
1996	Launch of first gold ETF by Barclays
2000	Nasdaq ETF QQQ biggest by asset
2003	Launch of first power beta ETF by Powershares
Post 2003	Launch of commodities, fixed income, inverse, and leveraged ETFs

Source [57]:

stocks through his book "A Random Walk Down Wall Street" [111]. The idea of mimicking the S&P 500 Index by different pension funds, and private portfolios, began by following the advice from the above book.

Vanguard introduced the idea of an index fund managed by John Bogle in 1975 (Bogle, 2014). Present ETFs are the extension of index funds with better tax incentives, readily available on exchanges, and cost-effective. ETFs emerged in the form of program trading in the 1980s, which helped investors purchase shares belonging to an index. One of the root causes of the US market collapse of 1987, when the index plunged by 24 percent on Black Monday, was this intensely programmed trading [48]. After several legal battles and prolonged regulatory support, in 1993, the first ETF known as SPDR was listed in the USA. SPDR was the largest trading ETF fund with assets under management of $280 billion in 2019 [41]. The same fund has an AUM of 490 million dollars today.

Until 1995, most of ETF-related activities were limited to the USA and Canada. Organizations such as Morgan Stanley Capital International and Barclays Global Investors embraced the concept of international ETFs that could be traded even though US stock markets remained closed [96]. Barclays Global Investors introduced first Gold ETF [40], and the introduction of QQQ, a technology shares-based ETF were popular among investors. QQQ alone raised over $18.7 billion, while the overall asset size of the total ETF industry in the previous year was $15.7 billion. It has been found that QQQ ETF stocks with lower weight age have encountered higher liquidity compared to higher-weighted stocks [107]. Powershares introduced smart beta ETFs tracking the smart beta indices in 2003 to outperform the overall markets, and the total asset size of smart beta ETFs has grown to 20% of the total ETF asset size in the USA in 2018 [49].

Following the 2008 financial crisis, many investors wanted to protect their assets from market fluctuations. Hence the minimum ETF volatility [7], fixed income ETF [47], short and leveraged ETF [110] were introduced which were popular among investors.

Figure 1 shows that assets under control for Global ETFs rose from 204 million dollars to approximately 10 trillion dollars by 2021 [100]. 2022 figures are till August 2022. Global ETF assets have grown by over 20 times compared to a 130% growth in mutual fund management assets over the last 15 years [61]. The ETF market started from one ETF in 1993 and developed rapidly. In 2002, there were about 1,000 ETFs, and by December 2021, there were 8522 ETF schemes worldwide [119].

Figure 2 depicts the rise of the largest ETF market in the USA, where passive investments surpassed active investments in August 2019 [50]. This phenomenon has created a significant trend that might be followed by capital markets globally, and emerging markets may not be an exception.

Figure 3 shows the total global fund flows in direct equity investments and ETFs. The trend reveals that the passive market ETFs are attracting new funds, whereas there is negative growth in the case of direct equity funds.

If we refer to Fig. 4, according to PWC projections in 2025, the global AUM under passive investments will be well above active investments [45].

With the above information and projected trends, it is very important to understand the current status and prospects of ETFs in developed and developing economies using bibliometric analysis.

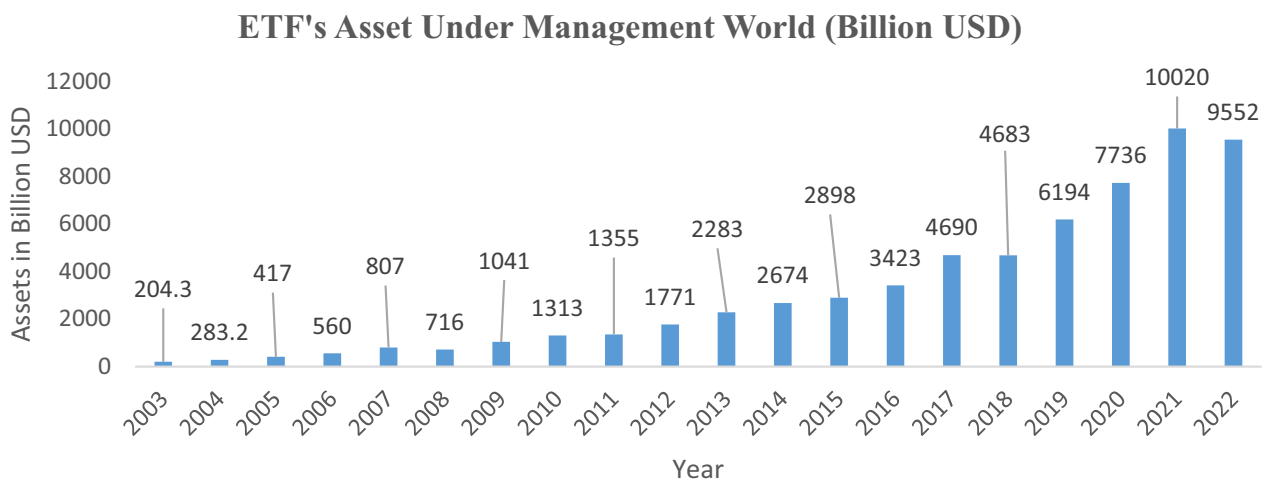

Fig. 1 Growth in global ETF investment from 2003 to 2021 (source—[100])

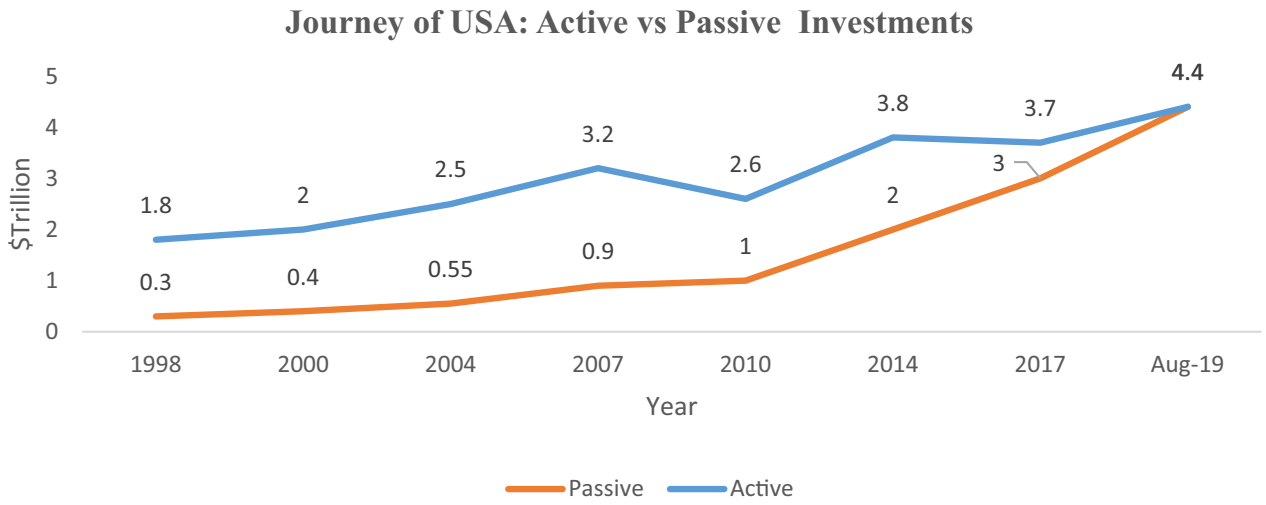

Fig. 2 Journey of USA Active MFs vs Passive ETF Equity Funds [77]

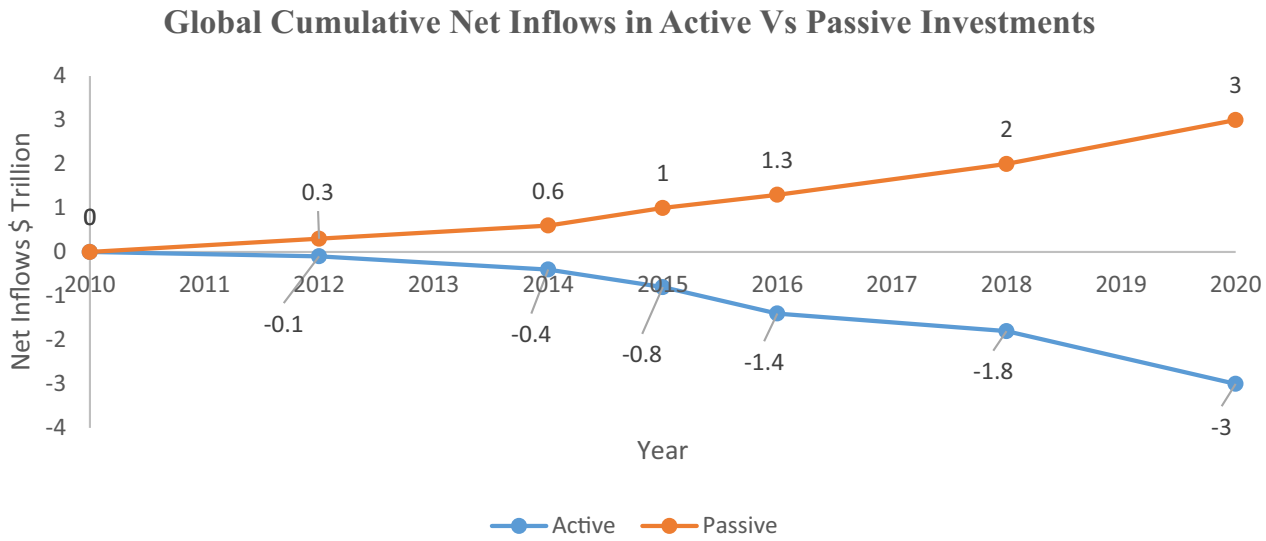

Fig. 3 Cumulative positive fund flows for global passive investments [132]

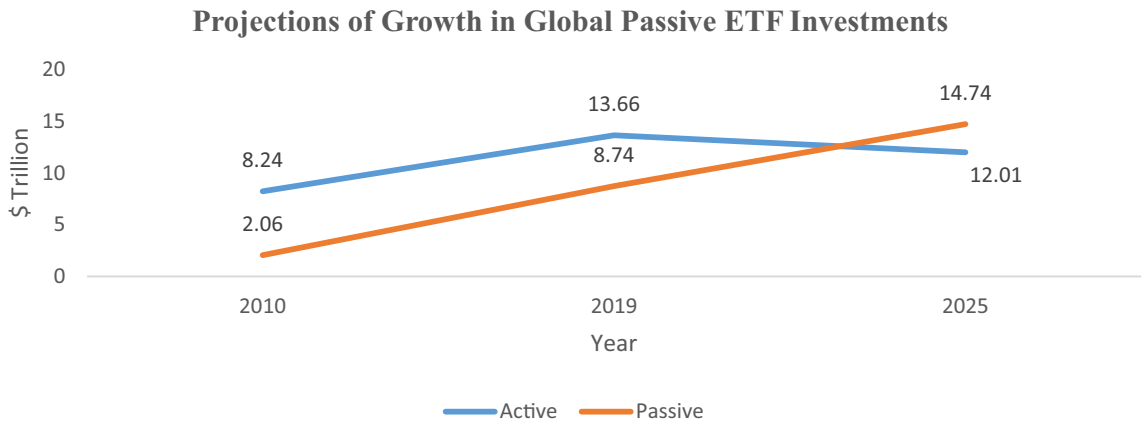

Fig. 4 Projections of growth in global passive ETF investments [45]

Objectives of the study

The primary goal of this study is to review the current state of the research on exchange-traded funds. The queries that come next help to determine the scope of this investigation.:

RQ1: In terms of authors, associated institutions, affiliated nations, affiliated journals, affiliated fields, affiliated research types, and affiliated economies, what are the present trends in exchange-traded funds publication?

RQ2: What are the most important topics and associated themes in this area?

RQ3: What is the conceptual framework of research on exchange-traded funds, how has it changed over time, and what recent advancements have occurred in this field of study?

RQ4: What exactly are gaps in knowledge associated with exchange-traded funds and potential future research areas?

The remainder of the document has been developed as outlined below: Sect. Research methodology is associated with research methodology, Sect. Method of analysis delineates the findings associated with the trends in publications associated with ETFs, Sect. Results deals with citation network, Sect. Citation network analysis details keyword analysis, Sect. Keyword analysis includes co-citation analysis, while Sect. Co-citation analysis covers the conceptual framework of ETF investments, Sect. Conceptual framework of ETF investments details conclusion and discussion, Sect. Results and conclusion contains future trends, Sect. 12 concludes the study with limitations.

Research methodology

Identification of suitable terms for search

The study comprises papers between the last 50 years, ranging from 1973 to the present, connected to the Scopus database. Scopus is a citation and abstract database from Elsevier, which was introduced in 2004. Scopus covers 11,768 publishers, 34,346 peer-reviewed journals, and 36,377 articles as of December 2022 in wide-ranging areas, including management, social sciences, life sciences, engineering, health sciences, etc. According to Jo [65], the scope of the Scopus database is substantially greater than that of the Web-of-Science database, which only contains 12,000 titles and ISI-indexed journals, but it is challenging to locate peer-reviewed journal articles published before 1996 using Scopus. Additionally, authors used free tools like R and Gephi for bibliometric analysis.

Preliminary search results

When searching the Scopus database, authors chose "exchange-traded funds" as their primary keyword in the "keywords, abstract, and title" field. In the initial search, authors found a total of 2056 articles. These were refined with document types “article” and “review.” Authors then sorted the output “by relevance” and focused their studies mostly on articles related to finance, economics, energy, and social sciences. After this filtration process, the authors had 958 articles, which were used for bibliometric analysis in the research paper. The stepwise analysis procedure is shown in Fig. 5.

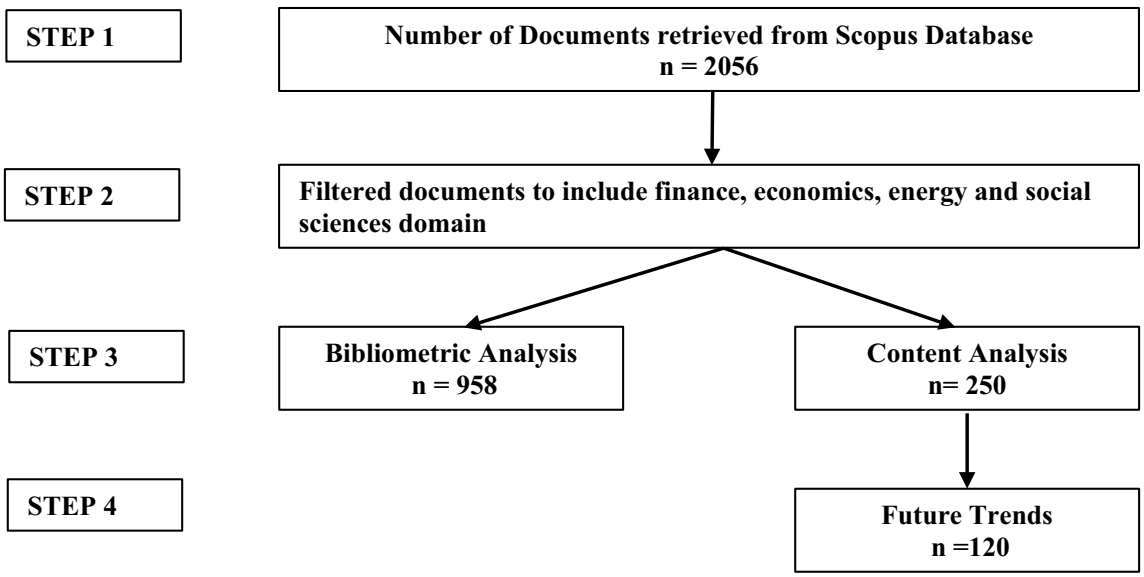

Fig. 5 Stepwise analysis procedure

Method of analysis

There are several kinds of systematic review studies, including—structured reviews that concentrate on commonly used techniques, ideas, and frameworks [108], reviews based on theory [131], based on the framework [101], bibliometric review [41], meta-analysis [109], hybrid narration [37], model/framework-based review [22], etc. Bibliometric is a widely used method for tracing the knowledge architecture of a study topic [88]. To summarize the literature, prevent bias, and identify any potential research gaps, systematic literature reviews are utilized [73, 123].

The two bibliometric techniques that are most frequently employed are citation and co-citation analysis which are used for demonstrating commonalities between citing and cited publications [138]. This study uses techniques like citation network analysis and publication trends [93, 120]. Content analysis, clustering, and keyword analysis can be done by using co-citation analysis [135].

To present a comprehensive analysis and fill up a gap in the existing literature on ETFs, the authors conducted a bibliometric study followed by content analysis [103]. Besides acknowledging the current research trends in ETFs through this study, the authors also glimpse potential future research directions. The analysis approach is displayed in Fig. 6.

Results

Descriptive statistics

Table 2 shows the details regarding the number of articles extracted from the Scopus database. A total of 923 articles and 35 review papers were reviewed, summing up the total reviewed documents to 958. These articles were sourced from a total of 358 different sources. The focus of the study was on the finance and economics domain to make sure that authors cover a comprehensive overview of ETFs.

Table 2 Descriptive statistics (created by authors from analysis)

Description	Results
Documents	958
Sources (Journals, Books, etc.)	358
Average citations per doc	9.926
Keywords plus (ID)	1023
Authors	1690
Author's keywords (DE)	2248
Time span	1973: 2023
Authors	1690
Authors of single-authored docs	157
Single-authored docs	199
Author appearances	2251
Document types	
Article	923
Review	35

Source: Created by authors

A total of 1023 unique keywords were found during the analysis, and the authors used a total of 2248 keywords. Extended keywords connected to the text by the Scopus database are called Keyword Plus (ID). The literature review covers 50 years from 1973 till date, with an average citation per document equal to 9.926. Total of 157 single authors contributed to 199 single-authored documents. There are 1690 authors involved, and they wrote 2251 articles in collaboration and the number of documents per author is 0.563.

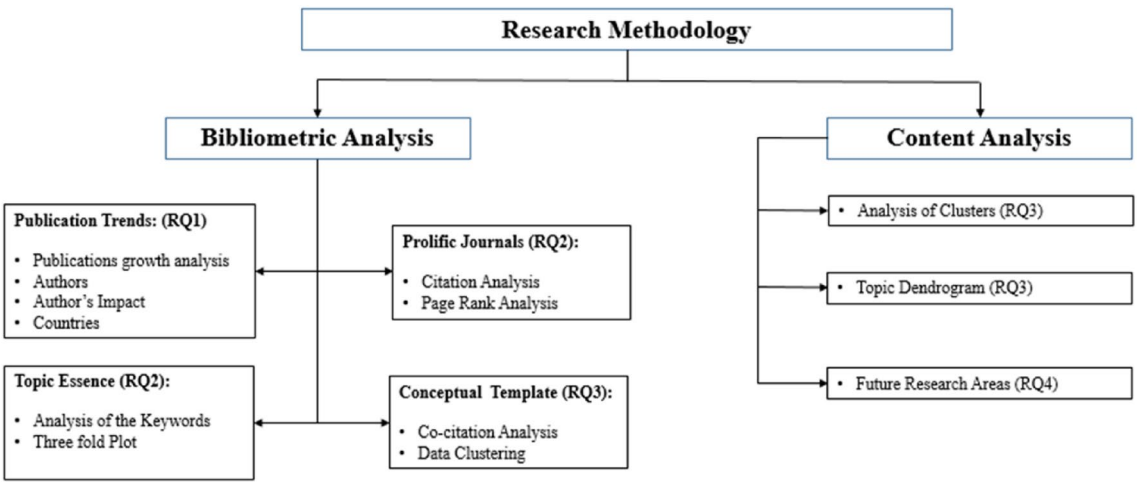

Fig. 6 Analysis approach

Annual publications and growth analysis

ETFs are popular financial instruments, with global assets under management recently hitting $9.37 trillion in August 2022 [29]. There has been substantial research published on the topic over the years, and some of the important contributions include the introduction to ETFs [106], the world's largest ETF Spider fund [43], analysis of herding behavior in sectoral ETF [51], comparison of mutual funds vs ETFs [3], active vs passive fund management [36], commodity ETFs [76], volatility and ETFs [16], etc. In the last few years, there has been a huge contribution to the body of knowledge associated with ETFs with the publication of hundreds of articles in the last 3 years, which indicates the depth, prospects, and the subject's potential.

Figure 7 shows the count of research papers published on ETFs yearly from 1973 to 2023. The current analysis includes 951 publications published in finance and economics. Over the previous 50 years, the number of publications has climbed at a stable annual rate of 2.22%.

In 1973, there was only one publication, and in 2022, there are 127 publications associated with ETFs. The amount of literature published in 2022 (127) shows that the subject has enough depth and the capacity to support additional research, even though despite the fact that the quantity of the research papers published has increased continuously. The figure represents a consistently increasing pattern of article publications over a period with no sluggishness, indicating the overgrowing interest of researchers in ETFs.

Authors with the highest influence

Table 3 displays data of 15 most pertinent and prominent writers who have made notable contributions to the field of ETFs. These authors have helped in testing already established theories by using empirical tests and contributing toward the new theoretical developments occurring in ETFs, which created a platform for further research on the topic. The information in the

Table 3 Most influential authors

Authors	Research articles	Authors	Research articles fractionalized
Tse, Yiuman	16	Rompotis, Gerasimos	9.5
Xu, Liao	11	Ivanov, Stoyu	8.67
Ivanov, Stoyu	10	Tse, Yiuman	6.67
Rompotis, Gerasimos	10	Marszk, Adam	4.33
Zhao, Yang	9	Xu, Liao	4.08
Marszk, Adam	8	Kaur, Harleen	4
Chang, Chia-Lui	7	Madhavan, Ananth	3.75
Lechman, Ewa	7	Broman, Markus	3.5
Lee Chien Ching	7	Lin, Jung-Chu	3.5
Yavas, Burhan	7	Gastineau, Gary	3.33
Bouri, Elie	6	Lechman, Ewa	3.33
Chen, Mei-Ping	6	Madan, Dilip	3.33
Madhavan, Ananth	6	Charteris, Ailie	3.08
Madura, Jeff	6	Chen, Jo-Hui	3
Miu, Peter	6	Lachance, Marie-Eve	3

Fig. 7 Number of publications per year

table is presented in decreasing order, with the author with the greatest contribution mentioned first. Tse Yiuman. has published the most research articles since 1973, with 16 independent publications and 6.67 articles co-authored by others. Xu Liao. is second highest contributor with a score of 15.08 (11 articles as individual authors and 4.08 articles in collaboration with others). The table appropriately credits the efforts of the other writers.

Author's impact

Productivity indices can be used to gauge the impact of the authors on ETFs. Table 4 lists the top 15 author's contributions in this area. The author's impact is evaluated by using the three citation impact and productivity measures, viz. h index, g index, and m index. The Hirsch or H index counts the total number of citations linked with each publication and the number of publications. To support the lesser cited articles, the G index examines the total publications with the highest citations to the lowest citations, whereas the M index includes a version associated with h index which describes an author's h index (number of articles published) each year from his or her first publication.

Based on the authors' h index values, Tse Yiuman. has the most influence, followed by Ivanov, Stoyu., and Rompotis, Gerasimos. In case of total number of citations, too, the above sequence of authors is maintained, with Tse Yiuman. being the most cited author followed by Ivanov Stoyu and Rompotis Gerasimos.

Countries represented by corresponding authors

Table 5 contains information about the country associations between the corresponding author and their co-authors. Multi-country publications by multiple authors are denoted by the acronym MCP, while single-country publications are denoted by the term SCP. The MCP ratio is the percentage of all published articles that are multi-county articles. The details below help understand each country's contribution in terms of research on the topic as well as author's collaboration with co-authors residing in different countries. According to the table, the USA contributed the most to ETF research with a total publication of 228 articles, out of which 197 articles have been published in the USA alone, and only 31 articles representing 13.6% articles are multi-county articles. Because the MCP ratio in the USA is less, it indicates smaller multi-country cooperation, whereas, in the case of China and the UK, the same is 32.9% and 36.59%, indicating higher multi-country collaboration. China, the UK, and India are among the leading nations contributing to the research topic, but their volume of combined publications is still less than the USA alone. This shows much higher research interest and research concentration on ETFs in the USA.

Most prolific journals

Table 6 describes the list of top 15 journals in Economics and Finance that have immensely contributed to the publication of research papers associated with ETFs. In order to learn about the most popular issues in the field both now and in the past, researchers typically

Table 4 Impact of authors by using productivity indices

Authors	h index	g index	m index	TC
Tse Yiuman	10	16	0.5	276
Ivanov Stoyu	5	10	0.416667	103
Rompotis Gerasimos	5	9	0.333333	85
Xu Liao	4	6	0.666667	47
Liu Qingfu	3	3	0.375	24
Yin Xiangkang	3	5	0.5	30
Chen Jilong	2	2	0.142857	14
Kadapakkam Palani Rajan	2	2	0.2	20
Krause Timothi	2	2	0.2	50
Martinez Valeria	2	2	0.125	57
Zhao Jing	2	2	0.5	8
Zhao Yang	2	2	0.666667	5
Bandyopadhyay Pia	1	2	0.058824	56
Cheng Louis	1	1	0.066667	10
Dash Soumya Ranjan	1	1	0.1	12

TC total citations

Table 5 Countries represented by corresponding authors

Country	Articles	SCP	MCP	MCP_Ratio
USA	228	197	31	0.136
China	88	59	29	0.3295
UK	41	26	15	0.3659
India	34	31	3	0.0882
Greece	22	20	2	0.0909
Germany	21	20	1	0.0476
Australia	20	13	7	0.35
Canada	18	12	6	0.3333
Korea	15	10	5	0.3333
France	13	9	4	0.3077
South Africa	13	12	1	0.0769
Spain	13	7	6	0.4615
Poland	11	9	2	0.1818
Ireland	10	8	2	0.2
Italy	10	4	6	0.6

SCP single-country publication, *MCP* multiple country publication

Table 6 Most prolific journals

Source	TC	NP	ABDC category	h index	SJR rank
Journal of Portfolio Management	421	28	A	7	0.77
International Review of Financial Analysis	280	24	A	10	1.83
Journal of Futures Markets	219	24	A	8	0.99
Journal of Banking and Finance	408	21	A*	10	1.47
Journal of Asset Management	154	17	B	7	0.47
Journal of Empirical Finance	410	15	A	9	1.21
Applied Economics	66	15	A	5	0.56
North American Journal of Economics and Finance	113	13	B	6	0.71
Energy Economics	270	11	A*	8	2.55
Financial Review	126	11	A	7	0.69
Research in International Business and Finance	129	9	B	7	1.04
Applied Financial Economics	112	9	B	5	1.26
Journal of Financial Economics	308	8	A*	6	10.42
Review of Finance	91	6	A*	6	3.8

TC = Total Citations (from the Scopus database), NP = Number of Publications, ABDC category is associated with 2019 categories published by the Australian Business Deans Association, SJR rank is obtained from Scimago (2022) Journal and Country Rank.

review a number of articles published in the most prominent journals related to their chosen research area.

The peer-reviewed journals are arranged according to the quantity of publications, with the Journal of Portfolio Management having the largest number of published papers on the subject of ETFs in the last 15 years, closely followed by International review of Financial Markets and Journal of Futures Markets.

Most influential countries

When it comes to financial products, it has been noted that the product's origin region has undergone the most initial research, with research on the product's operational efficiencies coming next. Subsequently, emerging markets contribute to the product's related research field since the financial product is accessible in both developed and emerging economies. Table 7 describes the number of articles published, total citations, and an average article citations associated with each country. With 701 research publications overall, 4172 citations, with a median publication citation value of 18.72, the USA topped the ranking, followed by emerging market China with 297 publications, 545 citations, and 6.19 average article citations. With the most published articles as well as maximum publication citations, the USA leads the world in contributions to the ETF industry, indicating better quality of research. Other countries like China, the UK, and Canada have also contributed substantially to the research, but they are no way near as compared to the USA.

Table 7 Scientific production countrywise

Country	Frequency	TC	Average article citations
USA	701	4172	18.22
China	296	545	6.19
UK	139	499	11.88
Canada	116	195	10.83
Spain	75	182	14
Australia	63	155	7.75
Germany	62	151	7.19
Ireland	44	135	13.5
Netherlands	42	126	18
Korea	41	121	8.07
Greece	34	116	5.27
Switzerland	34	108	15.43
Poland	34	102	9.27
France	33	78	6
Italy	32	67	6.09

TC Total citations

Citation network analysis

Citations indicate the overall strength of the research article, journal, and the authors in the respective research area. Articles with novel research ideas contributing to the existing body of knowledge always attract high citations.

Table 8 lists the top 15 most cited research papers in ETFs. The articles are ranked in descending order, with the highest cited article at the top, followed by other

Table 8 Maximum cited articles

Article Name	Journal	References	DOI	Total Citations	TC per Year
Realized GARCH: a joint model for returns and realized measures of volatility	Journal of Applied Econometrics	[53]	10.1002/jae.1234	316	28.73
Intraday Price Formation in U.S. Equity Index Markets	The Journal of Finance	[54]	10.1046/j.1540–6261.2003.00609.x	250	12.5
Do Hedge Funds Hedge?	The Journal of Portfolio Management	[11]	10.3905/jpm.2001.319819	205	9.32
Risk and Return on Real Estate: Evidence from Equity REITs	Real Estate Economics	[28]	10.1111/1540–6229.00531	191	5.79
Testing the Masters Hypothesis in commodity futures markets	Energy Economics	[62]	10.1016/j.eneco.2011.10.008	164	14.91
Statistical arbitrage in the US equities market	Quantitative Finance	[12]	10.1080/14697680903124632	152	11.69
Analysis of intraday herding behavior among the sector ETFs	Journal of Empirical Finance	[51]	10.1016/j.jempfin.2003.06.003	148	7.79
Do ETFs Increase Volatility?	The Journal of Finance	[16]	10.1111/jofi.12727	117	23.4
Indexing and active fund management: International evidence	Journal of Financial Economics	[36]	10.1016/j.jfineco.2016.02.008	117	16.71
Spiders: Where Are the Bugs?	The Journal of Business	[43]	10.1086/339891	110	5.24
Predicting the exchange-traded fund DIA with a combination of genetic algorithms and neural networks	Expert Systems with Applications	[129]	10.1016/j.eswa.2004.05.018	99	5.21
An adaptive portfolio trading system: A risk-return portfolio optimization using recurrent reinforcement learning with expected maximum drawdown	Expert Systems with Applications	[5]	10.1016/j.eswa.2017.06.023	97	16.17
Testing the predictive ability of technical analysis using a new stepwise test without data snooping bias	Journal of Empirical Finance	[59]	10.1016/j.jempfin.2010.01.001	97	7.46
Island Goes Dark: Transparency, Fragmentation, and Regulation	The Review of Financial Studies	[56]	10.1093/rfs/hhi013	94	5.22
Premiums-Discounts and Exchange-Traded Funds	The Journal of Derivatives	[44]	10.3905/jod.2006.635418	88	5.18

articles as per the total citations. The top cited research article is "Realized GARCH: a joint model for returns and realized measures of volatility" authored by [53]) with 316 citations. In this article, the authors have introduced a newly realized GARCH model combining returns and volatility associated with ETFs. benchmarked against the Dow Jones Index. The second research article is "Intraday Price Formation in U.S. Equity Index Markets," authored by [54] with 250 citations. The writers of these widely referenced papers are well-known ETF experts.

Keyword analysis

A study topic can be divided into several subfields, and each subfield can subsequently be examined from diverse perspectives using a variety of perspectives and approaches**.** The literature generates various relevant keywords that highlight the importance of the field investigation. Thus, it is possible to understand both the breadth and depth of the study field by utilizing keyword analysis.

Most frequently used words

Referring to Fig. 8's word cloud, readers are able to see that "exchange-traded fund" "etfs" and other similar terms are the most frequently occurring terms throughout the investigation. They stand for exchange-traded fund's reliability and domination during the past twenty-five years. Additional well-known terms are "volatility," "liquidity," "tracking error," and "price discovery" and those are all connected to the exchange-traded fund's operating features. In the advanced nations, a great deal of investigation has been conducted in these fields. When the ETFs were new in the markets, the liquidity was very low, and hence, there was a lot of volatility, and price discovery in

Fig. 8 Word cloud

ETFs was a challenge. As the ETFs are normally benchmarked to certain index, lack of liquidity and difficulty in price discovery resulted in higher tracking errors. All these topics associated with ETFs have been extensively researched. As time progressed, the ETFs moved to emerging markets and ETFs is a popular area of research in these countries.

Factorial analysis

The hierarchical clustering relationships between the objects can be explained by using a dendrogram. Figure 9 represents the dendrogram for "exchange-traded funds." It is categorized into 4 distinct cluster patterns.

The first cluster represents a commodity-based ETF scheme, which represents keywords associated with commodity ETFs and their analysis. The second cluster represents keywords associated with energy markets, but they represent futuristic time series analysis by using the granger causality method and other forecasting methods. Instead of only focusing on ETFs, it also represents index funds, which are part of the passive investment family.

The third cluster is the largest keyword cluster representing ETF management. It covers various topics related to ETF operations, such as volatility, liquidity, efficiency, cost-effectiveness, benchmarking of the ETFs against different indices, portfolio management, and risk management associated with ETFs. The fourth and the last cluster represents keywords associated with current and future trends in ETF, including the Covid-19 situation and its impact on ETF investments, exchange rate, and spillover effects on various economies. It also focuses on the emerging markets theme, where a lot of contribution to the existing body of knowledge has taken place in the last few years.

Co-occurrence networks for keywords

Keywords are normally available in the research articles after the abstract, and they provide important topics or concepts associated with the research article. Normally,

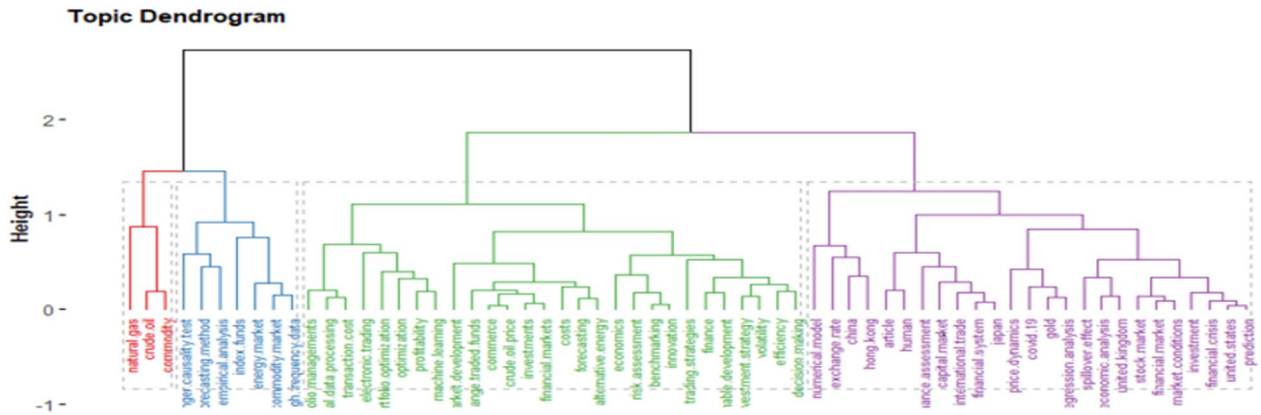

Fig. 9 Factorial analysis

six to eight keywords are mentioned in each research article. Some important keywords always get repeated over a period in different research articles. We call this type of event as keyword co-occurrence. It provides much more analytical meaning for the researchers.

Keyword co-occurrence helps in identifying the most important research sub-areas associated with any specific domain, and they also describe the closeness of one research sub-area with another. Thus, it helps to understand the prominent co-occurred keywords associated with any specific area of interest. Figure 10 describes the keyword co-occurrence associated with ETFs.

Threefold plot

The threefold plot (Fig. 11) helps us to understand the relationship between researcher (AU), researcher keywords (DE), and source of the publication (SO) associated with ETFs. This information is useful to identify the most prominent authors associated in the research area, essential subtopics that may be found by using the author's keywords, and they can be approached for

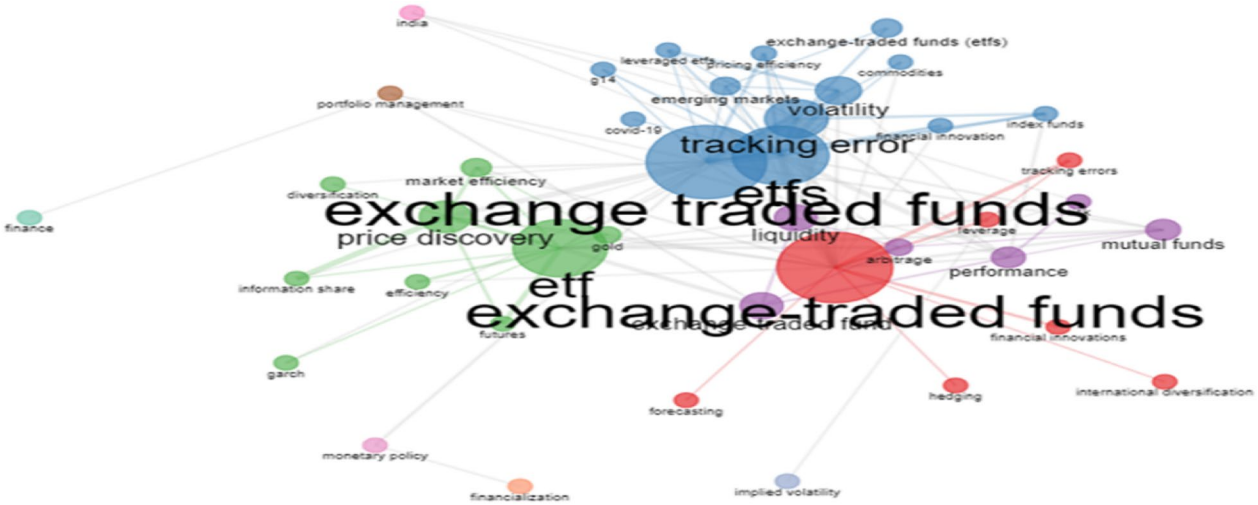

Fig. 10 Keyword co-occurrence

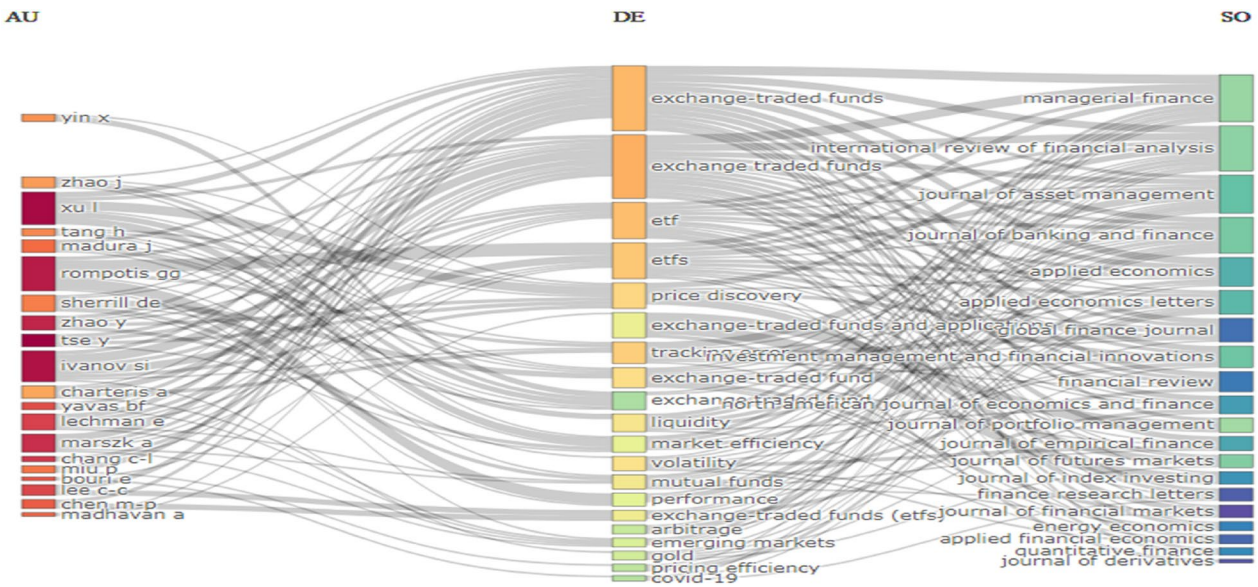

Fig. 11 Threefold plot

advice and co-operation. Threefold plot also provides information about the prestigious journals connected to the release of these studies. The journal entries may be useful in identifying the potential journals for future publications in the identical area of research.

Co-citation analysis

Figure 12 shows the co-citation analysis associated with ETFs. Initially, 1690 authors were considered for the analysis. Out of those, disconnected nodes representing standalone articles were removed. The figure represents the top 100 nodes and their co-citation analysis. The higher the node size and the font, the better the author is in terms of co-citation. From the figure, the top 5 authors linked by co-publications are Ben David., Amihud Yakov., Delcoure Natalya., Elton Edwin, and Hasbrouck Joel.

Bibliometric coupling

Bibliometric coupling is a completely different process from co-citation analysis, and in this case, papers referenced by the author while writing the article play a major role. This indicates that the most recent 2023 paper is likely to have bibliometric coupling associated with the old research article on a similar subject. This analysis is mainly carried out to find out the related articles and create a relationship with them by using the citation analysis. From Fig. 13, it can be seen that Zhu et al. [137] with an article published in the Journal of Futures Market have referenced earlier authors working in a similar area like Chen Louis., Broman, Lachance, etc.

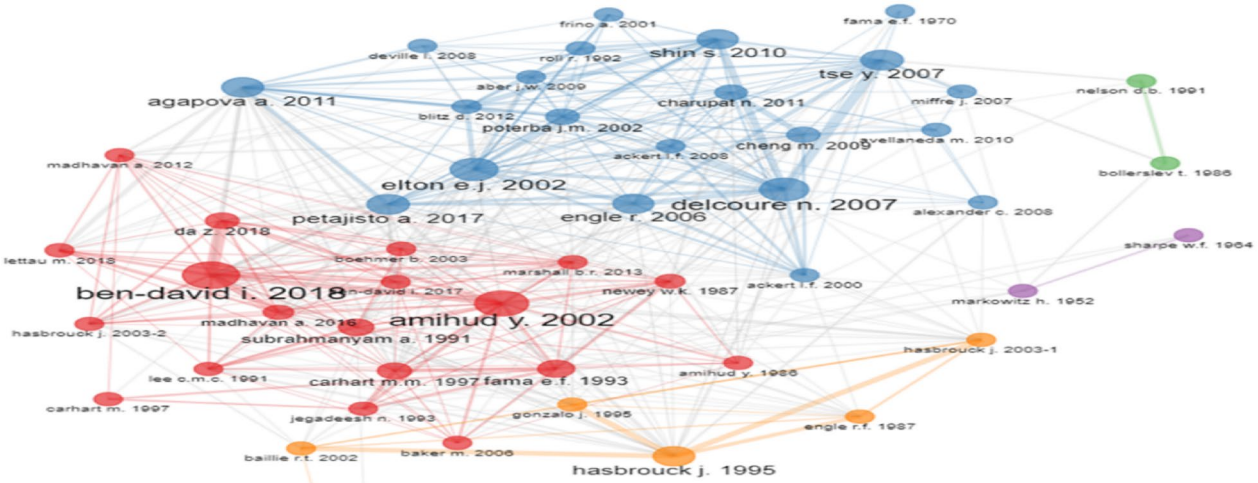

Fig. 12 Co-citation analysis

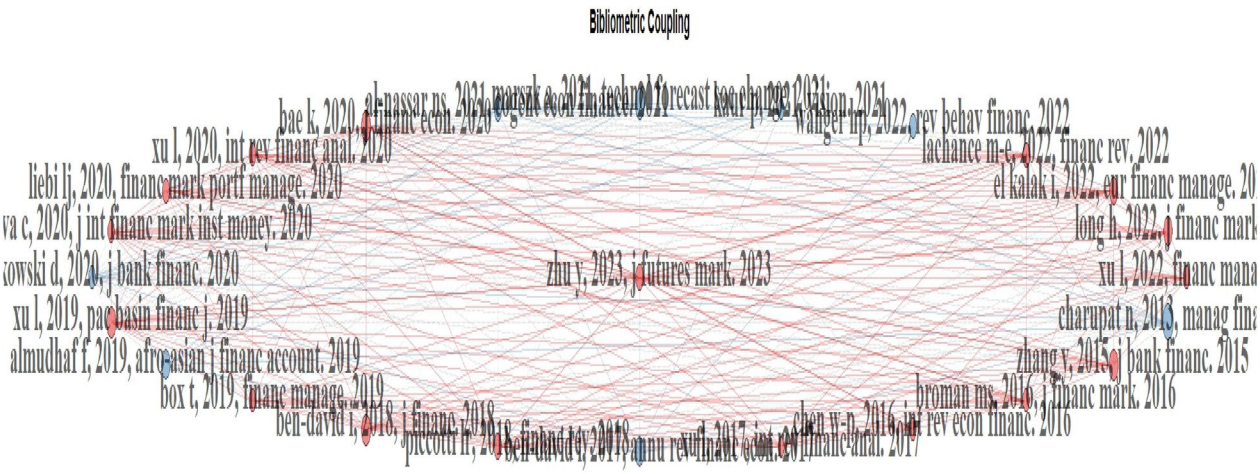

Fig. 13 Bibliometric coupling

Data clustering

Different major sets of articles on the research topic can be obtained by using the technique of data clustering. It is observed that the articles belonging to the single set of sectors normally are similar in their characteristics and research area. Therefore, the fact that both articles are part of the same cluster aids in our comprehension of the co-occurrence and related sub-themes of the research issue. Data clustering was employed by the authors in order to determine the recurring themes in the literature related to exchange-traded funds (ETFs), and the details are available in Table 9. Clusters 1,2,3,4, respectively, represented 46,88,81,35 articles as per Table 10, and the top 10 page ranked articles from each cluster have been chosen below.

Cluster 1 investigates several aspects associated with ETFs, such as the effect of increased ownerships of ETFs on pricing and volatility, corporate bond ETFs, liquidity and volatility associated with ETFs, pricing of ETFs and leveraged ETFs.

Cluster 2 discusses various topics such as ETF pricing inefficiency, factors affecting the flows of funds into ETFs, tracking errors, emerging market ETFs, volatility and tracking errors, hedging of ETFs, feedback trading, premiums and discounts associated with ETFs.

Table 10 No of research papers associated with each cluster

Cluster number	Number of research papers
1	46
2	88
3	81
4	35

Cluster 3 describes research articles associated with ETF arbitrage, the relationship between ETFs and volatility, innovation and informed trading associated with ETFs, return spillovers from USA and Canada markets, and return predictability of ETFs.

Cluster 4 provides invitation results associated with momentum strategies of ETFs, why active mutual funds are taking positions in ETFs, a return comparison of large-cap and small-cap exchange-traded funds, climate change ETFs and ESG ETFs, behavioral finance and ETFs.

Thus, cluster analysis associated with ETFs describes various dimensions associated with the research area in the form of sub-topics in four clusters, although they share a common relationship.

Table 9 Top research articles per cluster on exchange-traded funds with co-citations

Cluster 1	Cluster 2
Israeli et al. [63]	Petajisto [104]
Dannhauser [38]	Clifford et al. [35]
Krause et al. [70]	Shin and Soydemir [116]
Wang and Xu [130]	Blitz and Huij [21]
Hegde et al. [55]	Aber et al. [1]
Li and Zhao [83]	Alexander and Barbosa [4]
DeFusco et al. [39]	Hilliard [58]
Hasbrouck [54]	Levy and Lieberman [82]
Ivanov et al. [64]	Charteris et al. [30]
Schlusche [112]	Shanmugham and Zabiulla [113]
Cluster 3	**Cluster 4**
Ben-David et al. [16]	Tse [125]
Ben-David et al. [18]	Bhattacharya et al. [19]
Broman [23]	Sherrill et al. [115]
Lettau and Madhavan [80]	Caginalp et al. [26]
Brown et al. [25]	Hsu et al. [59]
Ackert and Tian [2]	Fiordelisi [46]
Broman and Shum [24]	Kwon [74]
Bhojraj et al. [20]	Pornpikul and Nettayanun [105]
Investment Company Institute [60]	Long [90]
Krause et al. [71]	Valadkhani [126]

Cluster 1 is associated with the traditional topics associated with the ETFs concerning the operational and demographic aspects of ETFs and covers important parameters of pricing, volatility, investment demographics, and liquidity.

Cluster 2 represents an era of ETFs, where more and more ETFs started listing, trading, and the difficulties they faced during the period in the form of pricing inefficiency and tracking errors associated with ETFs. It also challenged the results of traditional operational aspects as new findings associated with high volumes emerged. It throws light on aspects related to hedging of ETFs, feedback trading, behavioral finance, and passive investments.

Cluster 3 represents the period past 2010, after the 2008 financial crisis, when ETFs became populate investment instruments and discusses the research associated with ETF arbitrage, informed trading in ETFs, and return predictability associated with ETFs. These characteristics indicate stability and growth associated with ETFs, and the risks involved in the investment process.

Cluster 4 is associated with the recent ongoing period, and it represents various topics associated with ETFs, such as ESG investing, which in the recent past has generated tremendous wealth for many investors, behavioral fiancé aspects associated with ETFs, and momentum strategies associated with ETFs. Thus, cluster analysis helps us understand the variety of sub-topics and associations in the area of ETFs.

Table 10 represents the number of articles associated with each cluster, from which the top 10 articles with the highest impact are listed in Table 8 as a part of cluster analysis.

Conceptual framework of ETF investments

Figure 14 depicts a conceptual framework that summarizes a thorough content examination of clusters. This framework illustrates the overall ETF investment process from the retail investor perspective. As of today, 7 out of 10 investors in USA invest in the financial markets by using ETFs or passive investments. The thrust on the ETF investment has increased, as direct mutual fund schemes have not been able to beat the respective benchmark indices during the last few years. Therefore, it is critical to comprehend different factors that are important in ETF investments and the benefits that investors receive out of investing in ETFs.

The impact of social and demographic factors on investment in ETFs is especially important in today's context, especially after the COVID-19 pandemic [99]. It has been observed that investors of younger age, middle- to high-income investors with better financial literacy, and living in cities tend to invest directly in ETFs by using robo-advisory services [15]. It has also been observed that males tend to be more confident and invest higher amounts via passive routes than females [117]. Some other important factors that investors consider while making passive investment include impact investing, risk tolerance, investment goals, behavioral biases, diversification, tax considerations, region and economy of investment and ESG factors [68, 97]. In a nutshell, social and demographic factors, behavioral factors, structural factors, domestic factors, and traditional factors play a critical part in the individual investment process in ETFs.

Along with the factors discussed above, passive investment risks such as tracking errors [116], liquidity issues, concentration risks [6] are some of the factors along with

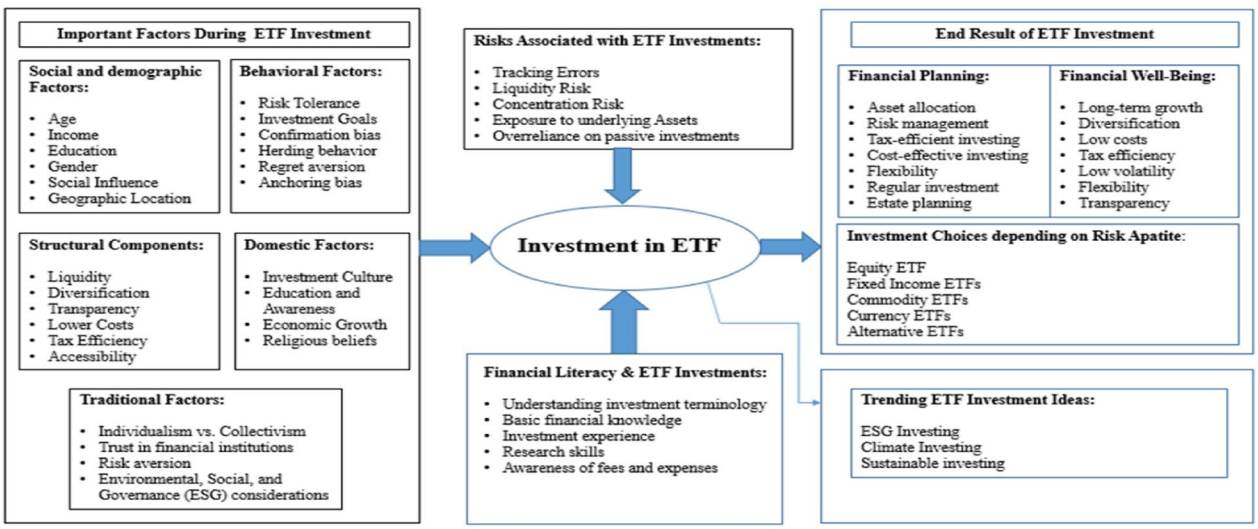

Fig. 14 Conceptual framework

the financial literacy [127] considered important while investing in ETFs.

Some of the benefits of investing in ETFs include lower maintenance fees, long-term consistent returns, diversification, and low volatility [95]. Thus investors invest in different types of ETFs [9] depending on their risk appetite for favorable returns. Recent themes of ETFs such as ESG ETFs, sustainability ETFs, and green ETFs have provided the best returns to investors in the last few years [121].

Results and conclusion

It is important to interpret the results associated with ETF bibliometric analysis in a systematic manner, and authors have used the technique of sense-making approach for the same [84]. It involves three steps, viz. scanning, sensing, and substantiating. Scanning involves the understanding of the results from important steps of bibliometric analysis like publication and citation metrics, citation and co-citation analysis, coupling analysis, etc. It provides a firm foundation for succeeding phases of sense-making by laying a foundation for the broader analysis, which is done in the sensing phase. Sensing describes the analysis in the form of possible reasons by using "what," "why," and "how" approaches. It provides a more complete and comprehensive perspective on bibliometric results, uncovering established, untapped, and unknown aspects. Substantiating helps in the trustworthiness of the overall results by following the process of credibility, dependability, transferability, and conformity. It increases the research's recognition and dependability, increasing its adoption by scholars as well as business experts.

Scanning

In financial research, exchange-traded fund (ETF) represents a crucial financial resource and is useful in a range of financial and investment contexts. Although it is a heavily explored topic with an increasing number of publications, the current surge (2020, 2021, 2022) in publications highlights the depth and promise of ETFs. In order to establish a distinct backdrop and research boundaries, the article lists the most noteworthy research publications, authors, keywords, and related research clusters of ETFs, by using a bibliometric analysis of 958 research papers published over a 50-year period (1973–2022) that were obtained from the Scopus database after a thorough review of the literature.

According to the findings, the USA is the major contributing nation to ETF research, which is followed by China, the UK, and Canada, and Spain. Barring China, there is hardly any contribution from emerging market economies in the ETF research. Citation-based analysis, articles, and authors reveal that Tse Yiuman., Xu Liao., Ivanov Stoyu., Rompotis Gerasimos., Zhao Yang. were the most influential authors, whereas Tse Yiuman., Ivanov Stoyu., Rompotis Gerasimos., Xu Liao., Liu Qingfu. were the most impactful authors of ETFs research. The majority of these researchers are from established nations, which suggests that emerging markets have not contributed much to the field of research. According to keyword-based analysis, exchange-traded fund, etfs, volatility, liquidity, tracking error, and price discovery are the main keyword-based dimensions of ETF research.

Keyword co-occurrence further reveals that operational aspects of the traditional ETFS, pricing inefficiency, tracking errors associated with ETFs, post-financial crisis ETF characteristics such as ETF arbitrage, informed trading in ETFs, and return predictability associated with ETFs and recent trends in ETFs such as ESG investing, machine learning, behavioral finance, and momentum strategies are most important sub-themes of ETF research revealed from the cluster analysis.

Sensing

ETFs as financial products took time to establish, and one of the obvious reason was, it took time for the people to understand the product and its benefits. During the 1990s people slowly started realizing that active mutual funds despite charging heavy maintenance fees were unable to beat the benchmark returns and people started turning toward ETFs. SPIDER and QQQ ETF schemes in the 1990s were the big success stories of the USA due to the above reasons. It took time for ETFs to establish themselves in the developed world, and they faced issues faced by developing financial products like high volatility, low liquidity, higher tracking error, and difficulty in price discovery. The same problems are currently faced by developing countries, where the passive investment trend is emerging, and these are represented as a part of cluster 1 analysis. 2008 financial crisis turned out to be a major boost for ETFs. People lost substantial money in direct equity and mutual fund investments during the market crash, and they started realizing the power of index investing with minimum maintenance fees and transparency. Over a period, direct investments in equities and mutual funds in developed markets have been declining, and the ETFs are gaining that market share. Important factors such as the use of ETFs for hedging and investor behavior during passive investment were some of the important topics represented in cluster 2. In case of cluster 3, the thrust has been given to risk management associated with the ETFs, whereas cluster 4 talks about new-age ETFs such as green ETFs, ESG ETFs, and sustainable ETFs. From scanning, it can be seen that

although ETFs have existed for a number of years, the researcher's interest is overwhelming and new areas in the ETF space have been continuously explored. It has been found that most of the research has been done in developed countries as ETFs were prospering, whereas authors from developing markets have started making contributions to the body of literature, as ETFs are gaining ground in emerging markets. Overall, it seems that ETFs are here for a long haul, and as the figures indicate, they will surpass the active investments in days to come.

Substantiating

Referring to the most prolific journals and most cited articles, it provides us credibility regarding the importance of ETFs as sustainable financial products and its importance [13]. We can easily cross-validate these articles by considering the number of territories covered and important institutions through which the ETF research is conducted for credibility [128]. Co-citation analysis of ETFs can be easily cross verified using bibliometric coupling [42]. Conformity regarding ETF analysis can be easily established by the thorough analysis of the topic using the proven bibliometric analysis and associated citations [72]. In case of ETFs, credibility and conformity have been already established, which further helps to establish the dependency of the study over a period from existing reviews [86]. These findings from ETF bibliometric analysis are very important and pave the way for the transferability [85] to different close areas like derivatives. ESG and sustainable investing where the ETF products associated with these areas already exist.

These results have significant implications for prospective academics and researchers. Various sub-themes obtained from the results can be interlinked to explore new areas of research associated with ETFs. Policymakers especially from the emerging markets may find this analysis useful to understand the pain points associated with passive investments in emerging markets. If these pain points are properly addressed, it will help in further progress of ETFs in emerging economies. All things considered, research scholars, and senior research fellows alike may find this paper helpful in understanding the breadth and potential of ETF research.

Future trends

The above study highlights that most of the work related to ETFs is done in developed countries, although developing countries like China have shown decent contribution to the existing body of knowledge in recent years. ETFs have been first choice of investments for many retail and institutional investors in developed countries and emerging markets are slowly adopting to this western market changes. However, developing countries are facing issues like tracking errors, liquidity, volatility, limited product offerings, pricing of ETFs, etc. Each market has got unique set of characteristics, and hence although previous studies in this area will help, it has also opened up a wide area of research on above points in emerging markets.

Figure 15 provides a picture regarding trending topics in ETFs. Use of machine learning for passive investments, COVID-19, and its impact on ETF investments are some of the trending and forthcoming research areas.

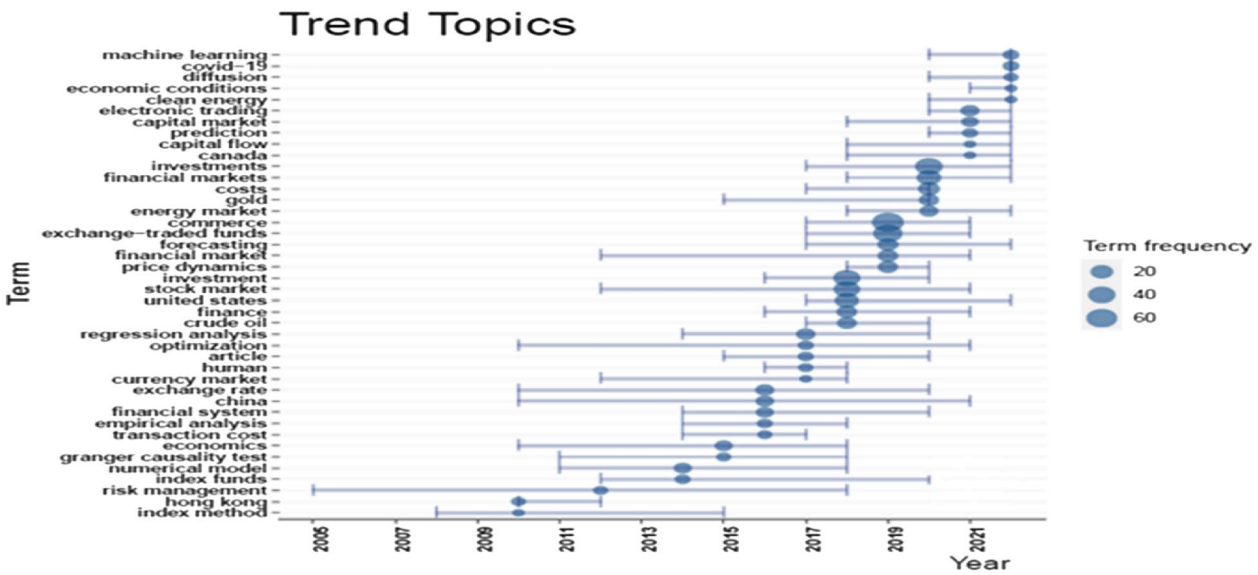

Fig. 15 Trend topics

Lot of focus is currently associated with clean energy and associated commodity ETFs, and ESG (environment, social governance) ETFs are of the upcoming research areas. Forecasting ETF returns by using AI, ML are the current trending topics as well as upcoming future areas of research in the ETF space. AI and ML are important in passive investments as these are used to set the algorithms for investment into passive schemes for robo-advisory services. Although some of such experiments have been already successful in the developed world, this is one of the future area of research in emerging economies. ETFs play major role in hedging and risk management. Considering current geopolitical and economic uncertainties due to global inflationary trends, research associated with interest rate ETFs, currency ETFs, commodity ETFs, and their role in overall stability of the markets is an upcoming area of research (Fig. 15).

Limitations

The research was conducted only on Scopus database, which has certain advantages and limitations, which are discussed in details as a part of methodology. The study considers top 958 articles in ETFs, which are highly cited and important. The insignificant articles associated with the topic have been eliminated. Perhaps the omitted articles may come out with slightly different perspective associated with ETFs.

Abbreviations

ETF	Exchange-traded funds
MF	Mutual funds
AUM	Asset under management
NAV	Net asset value
TC	Total citations
SCP	Single-country publication
MCP	Multiple country publication
NP	Number of publications

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Author contributions

GJ was responsible for the creation of the bibliometric analysis by using various software and was also responsible for interpretation, overall data analysis, and major contributor in writing the manuscript. RKD helped in interpretation, cluster analysis, conceptual framework, and writing the manuscript. All authors read and approved the final manuscript. Authors GJ and RKD spent equal time to revise the manuscript as per suggestion from reviewers.

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Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate

Not applicable.

Consent for publication

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Competing interests

The authors declare that they have no competing interests.

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References:

1. Aber JW, Li D, Can L (2009) Price volatility and tracking ability of ETFs. J Asset Manag 10(4):210–221. https://doi.org/10.1057/jam.2009.13
2. Ackert LF, Tian YS (2008) Arbitrage, liquidity, and the valuation of exchange traded funds. Financ Mark Inst Instrum 17(5):331–362. https://doi.org/10.1111/j.1468-0416.2008.00144.x
3. Agapova A (2011) Conventional mutual index funds versus exchange-traded funds. J Financ Markets 14(2):323–343. https://doi.org/10.1016/j.finmar.2010.10.005
4. Alexander C, Barbosa A (2008) Hedging index exchange traded funds. J Bank Finance 32(2):326–337. https://doi.org/10.1016/j.jbankfin.2007.03.012
5. Almahdi S, Yang SY (2017) An adaptive portfolio trading system: a risk-return portfolio optimization using recurrent reinforcement learning with expected maximum drawdown. Expert Syst Appl 87:267–279. https://doi.org/10.1016/j.eswa.2017.06.023
6. Anadu K, Kruttli M, McCabe P, Osambela E (2020) The shift from active to passive investing: risks to financial stability? Financ Anal J 76(4):23–39. https://doi.org/10.1080/0015198X.2020.1779498
7. Ang A, Madhavan A, Sobczyk A (2017) Crowding, capacity, and valuation of minimum volatility strategies. J Index Invest 7(4):41–50. https://doi.org/10.3905/jii.2017.7.4.041
8. Angel JJ, Broms TJ, Gastineau GL (2016) ETF transaction costs are often higher than investors realize. J Portf Manag 42(3):65–75. https://doi.org/10.3905/jpm.2016.42.3.065
9. Antoniewicz R, Heinrichs J (2014) Understanding exchange-traded funds: how ETFs work. SSRN Electron J. https://doi.org/10.2139/ssrn.2523540
10. Asai M, Chang C-L, McAleer M, Pauwels L (2022) A new structural multivariate GARCH-BEKK model: causality of green, sustainable and fossil energy ETFs. Commun Stat: Case Stud Data Anal Appl 8(2):215–233. https://doi.org/10.1080/23737484.2021.2017807
11. Asness CS, Krail RJ, Liew JM (2001) Do hedge funds hedge? J Portf Manag 28(1):6–19. https://doi.org/10.3905/jpm.2001.319819
12. Avellaneda M, Lee J-H (2010) Statistical arbitrage in the US equities market. Quant Financ 10(7):761–782. https://doi.org/10.1080/14697680903124632
13. Bamel N, Kumar S, Bamel U, Lim WM, Sureka R (2022) The state of the art of innovation management: insights from a retrospective review of the European Journal of Innovation Management. Eur J Innov Manag. https://doi.org/10.1108/EJIM-07-2022-0361
14. Bandyopadhyay P, Hackard J, Tse Y (2010) The effect of stock splits on iShare exchange-traded funds. Manag Financ 36(2):134–159. https://doi.org/10.1108/03074351011014550
15. Baulkaran V, Jain P (2023) Who uses robo-advising and how? Financ Rev 58(1):65–89. https://doi.org/10.1111/fire.12324
16. Ben-David I, Franzoni F, Moussawi R (2018) Do ETFs increase volatility? J Financ 73(6):2471–2535. https://doi.org/10.1111/jofi.12727
17. Ben-David I, Franzoni FA, Moussawi R (2017) Exchange Traded Funds (ETFs). Natl Bureau Econ Res 1(1):169–189. https://doi.org/10.2139/ssrn.2865734
18. Ben-David I, Franzoni F, Moussawi R (2016) Exchange traded funds (ETFs). Natl Bureau Econ Res 1(1):169–189. https://doi.org/10.3386/w22829
19. Bhattacharya U, Loos B, Meyer S, Hackethal A (2017) Abusing ETFs*. Rev Financ 21(3):1217–1250. https://doi.org/10.1093/rof/rfw041
20. Bhojraj S, Mohanram P, Zhang S (2020) ETFs and information transfer across firms. J Account Econ 70(2–3):101336. https://doi.org/10.1016/j.jacceco.2020.101336

21. Blitz D, Huij J (2012) Evaluating the performance of global emerging markets equity exchange-traded funds. Emerg Mark Rev 13(2):149–158. https://doi.org/10.1016/j.ememar.2012.01.004
22. Brathwaite AC (2003) Selection of a conceptual model/framework for guiding research interventions. Int J Adv Nurs Pract 6(1):1–10
23. Broman MS (2016) Liquidity, style investing and excess comovement of exchange-traded fund returns. J Financ Markets 30:27–53. https://doi.org/10.1016/j.finmar.2016.05.002
24. Broman MS, Shum P (2018) Relative liquidity, fund flows and short-term demand: evidence from exchange-traded funds. Financ Rev 53(1):87–115. https://doi.org/10.1111/fire.12159
25. Brown DC, Davies SW, Ringgenberg MC (2021) ETF arbitrage, non-fundamental demand, and return predictability. Rev Financ 25(4):937–972. https://doi.org/10.1093/rof/rfaa027
26. Caginalp G, DeSantis M, Sayrak A (2014) The nonlinear price dynamics of US equity ETFs. J Econom 183(2):193–201. https://doi.org/10.1016/j.jeconom.2014.05.009
27. Carhart MM (1997) On persistence in mutual fund performance. J Financ 52(1):57–82. https://doi.org/10.1111/j.1540-6261.1997.tb03808.x
28. Chan KC, Hendershott PH, Sanders AB (1990) Risk and return on real estate: evidence from equity REITs. Real Estate Econ 18(4):431–452. https://doi.org/10.1111/1540-6229.00531
29. Chandler B (2022) Global ETF Assets Hit Usd9.37 Trillion. https://etfexpress.com/2022/08/15/global-etf-assets-hit-usd937-trillion/
30. Charteris A, Chau F, Gavriilidis K, Kallinterakis V (2014) Premiums, discounts and feedback trading: evidence from emerging markets' ETFs. Int Rev Financ Anal 35:80–89. https://doi.org/10.1016/j.irfa.2014.07.010
31. Charupat N, Miu P (2013) Recent developments in exchange-traded fund literature: pricing efficiency, tracking ability, and effects on underlying securities. Manag Financ 39(5):427–443. https://doi.org/10.1108/03074351311313816
32. Chen J-H, Edwards N (2021) The spillover, risk and leverage effects of smart beta management exchange-traded fund (ETF). Glob Econ J 21(03):1. https://doi.org/10.1142/S2194565921500160
33. Chen J, Xu L, Zhao Y (2020) Do ETF flows increase market efficiency? Evidence from China. Account Financ 60(5):4795–4819. https://doi.org/10.1111/acfi.12667
34. Cheng LTW, Fung H-G, Tse Y (2008) China's exchange traded fund: Is there a trading place bias? Rev Pac Basin Financ Mark Policies 11(01):61–74. https://doi.org/10.1142/S021909150800126X
35. Clifford CP, Fulkerson JA, Jordan BD (2014) What drives ETF flows? Financ Rev 49(3):619–642. https://doi.org/10.1111/fire.12049
36. Cremers M, Ferreira MA, Matos P, Starks L (2016) Indexing and active fund management: International evidence. J Financ Econ 120(3):539–560. https://doi.org/10.1016/j.jfineco.2016.02.008
37. Dabić M, Vlačić B, Paul J, Dana L-P, Sahasranamam S, Glinka B (2020) Immigrant entrepreneurship: a review and research agenda. J Bus Res 113:25–38. https://doi.org/10.1016/j.jbusres.2020.03.013
38. Dannhauser CD (2017) The impact of innovation: evidence from corporate bond exchange-traded funds (ETFs). J Financ Econ 125(3):537–560. https://doi.org/10.1016/j.jfineco.2017.06.002
39. DeFusco RA, Ivanov SI, Karels GV (2011) The exchange traded funds' pricing deviation: analysis and forecasts. J Econ Financ 35(2):181–197. https://doi.org/10.1007/s12197-009-9090-6
40. Deville L (2008) Exchange traded funds: history, trading, and research. In: Springer optimization and its applications, pp 67–98. https://doi.org/10.1007/978-0-387-76682-9_4
41. Donthu N, Kumar S, Mukherjee D, Pandey N, Lim WM (2021) How to conduct a bibliometric analysis: an overview and guidelines. J Bus Res 133:285–296. https://doi.org/10.1016/j.jbusres.2021.04.070
42. Donthu N, Marc Lim W, Kumar S, Pandey N (2023) Tribute to a marketing legend: commemorating the contributions of Shelby D. Hunt with implications for the future of marketing. J Bus Res 164:113954. https://doi.org/10.1016/j.jbusres.2023.113954
43. Elton EJ, Gruber MJ, Comer G, Li K (2002) Spiders: Where are the bugs? J Bus 75(3):453–472. https://doi.org/10.1086/339891
44. Engle RF, Sarkar D (2006) Premiums-discounts and exchange traded funds. J Deriv 13(4):27–45. https://doi.org/10.3905/jod.2006.635418
45. Finnerty P, Todd B, Spiryda M (2020) COVID-19 and the mutual fund industry. https://www.pwc.com/us/en/industries/financial-services/library/pdf/pwc-covid-19-and-the-mutual-fund-industry.pdf
46. Fiordelisi F, Galloppo G, Paimanova V (2023) Climate change shocks and socially responsible investments. Bus Ethics Environ Respons 32(1):40–56. https://doi.org/10.1111/beer.12477
47. Fulkerson JA, Jordan SD, Travis DH (2015) Are bond ETF investors smart? J Fixed Income 24(4):60–83. https://doi.org/10.3905/jfi.2015.24.4.060
48. Furbush D (1989) Program trading and price movement: evidence from the October 1987 Market Crash. Financ Manag 18(3):68. https://doi.org/10.2307/3665650
49. Gerakos JJ, Linnainmaa JT, Morse A (2019) Asset managers: institutional performance and factor exposure. SSRN. https://doi.org/10.2139/ssrn.2733147
50. Gittelsohn J (2019) End of era: passive equity funds surpass active in epic shift. Bloomberg. https://www.bloomberg.com/news/articles/2019-09-11/passive-u-s-equity-funds-eclipse-active-in-epic-industry-shift
51. Gleason KC, Mathur I, Peterson MA (2004) Analysis of intraday herding behavior among the sector ETFs. J Empir Financ 11(5):681–694. https://doi.org/10.1016/j.jempfin.2003.06.003
52. Goel G, Dash SR (2022) Investor sentiment and government policy interventions: evidence from COVID-19 spread. J Financ Econ Policy 14(2):242–267. https://doi.org/10.1108/JFEP-02-2021-0038
53. Hansen PR, Huang Z, Shek HH (2012) Realized GARCH: a joint model for returns and realized measures of volatility. J Appl Economet 27(6):877–906. https://doi.org/10.1002/jae.1234
54. Hasbrouck J (2003) Intraday price formation in U.S. equity index markets. J Financ 58(6):2375–2400. https://doi.org/10.1046/j.1540-6261.2003.00609.x
55. Hegde SP, McDermott JB (2004) The market liquidity of Diamonds, Q's, and their underlying stocks. J Bank Finance 28(5):1043–1067. https://doi.org/10.1016/S0378-4266(03)00043-8
56. Hendershott T, Jones CM (2005) Island goes dark: transparency, fragmentation, and regulation. Rev Financ Stud 18(3):743–793. https://doi.org/10.1093/rfs/hhi013
57. Hill J, Nadig D, Hougen M (2015) A comprehensive guide to exchanget-raded funds. https://www.cfainstitute.org/-/media/documents/book/rf-publication/2015/rf-v2015-n3-1-pdf.ashx
58. Hilliard J (2014) Premiums and discounts in ETFs: an analysis of the arbitrage mechanism in domestic and international funds. Glob Financ J 25(2):90–107. https://doi.org/10.1016/j.gfj.2014.06.001
59. Hsu P-H, Hsu Y-C, Kuan C-M (2010) Testing the predictive ability of technical analysis using a new stepwise test without data snooping bias. J Empir Financ 17(3):471–484. https://doi.org/10.1016/j.jempfin.2010.01.001
60. Huang S, O'Hara M, Zhong Z (2021) Innovation and informed trading: evidence from industry ETFs. Rev Financ Stud 34(3):1280–1316. https://doi.org/10.1093/rfs/hhaa077
61. Investment Company Institute (2019) Investment company fact book–a review of trends and activities in the U.S. investment company industry. 59:194–202. https://www.ici.org/doc-server/pdf%3A2019_factbook.pdf
62. Irwin SH, Sanders DR (2012) Testing the masters hypothesis in commodity futures markets. Energy Econ 34(1):256–269. https://doi.org/10.1016/j.eneco.2011.10.008
63. Israeli D, Lee CMC, Sridharan SA (2017) Is there a dark side to exchange traded funds? An information perspective. Rev Acc Stud 22(3):1048–1083. https://doi.org/10.1007/s11142-017-9400-8
64. Ivanov SI, Jones FJ, Zaima JK (2013) Analysis of DJIA, S&P 500, S&P 400, NASDAQ 100 and Russell 2000 ETFs and their influence on price discovery. Glob Financ J 24(3):171–187. https://doi.org/10.1016/j.gfj.2013.10.005
65. Jo Y-H (2013) Web of Science facts sheet. Thomson Reuters. http://wokinfo.com/media/pdf/WoSFS_08_7050.pdf
66. Johnson B, Bioy H, Kellett A, Davidson L (2013) On the right track: measuring tracking efficiency in ETFs. J Index Invest 4(3):35–41. https://doi.org/10.3905/jii.2013.4.3.035
67. Kadapakkam P-R, Krause T, Tse Y (2015) Exchange traded funds, size-based portfolios, and market efficiency. Rev Quant Financ Acc 45(1):89–110. https://doi.org/10.1007/s11156-013-0429-x
68. Kannadhasan M, Aramvalarthan S, Mitra SK, Goyal V (2016) Relationship between biopsychosocial factors and financial risk tolerance: an empirical study. Vikalpa J Decis Mak 41(2):117–131. https://doi.org/10.1177/0256090916642685

69. Kostovetsky L (2003) Index mutual funds and exchange-traded funds. J Portf Manag 29(4):80–92. https://doi.org/10.3905/jpm.2003.319897
70. Krause T, Ehsani S, Lien D (2014) Exchange-traded funds, liquidity and volatility. Appl Financ Econ 24(24):1617–1630. https://doi.org/10.1080/09603107.2014.941530
71. Krause T, Tse Y (2013) Volatility and return spillovers in Canadian and U.S. industry ETFs. Int Rev Econ Financ 25:244–259. https://doi.org/10.1016/j.iref.2012.07.009
72. Kumar S, Sharma D, Rao S, Lim WM, Mangla SK (2022) Past, present, and future of sustainable finance: insights from big data analytics through machine learning of scholarly research. Ann Oper Res. https://doi.org/10.1007/s10479-021-04410-8
73. Kumar S, Tomar S, Verma D (2019) Women's financial planning for retirement. Int J Bank Market 37(1):120–141. https://doi.org/10.1108/IJBM-08-2017-0165
74. Kwon KY, Min B-K, Sun C (2022) Enhancing the profitability of lottery strategies. J Empir Financ 69:166–184. https://doi.org/10.1016/j.jempfin.2022.09.003
75. Lachance M (2022) ETFs' two-sided trading costs and order imbalances. Financ Rev 57(2):273–294. https://doi.org/10.1111/fire.12292
76. Lau MCK, Vigne SA, Wang S, Yarovaya L (2017) Return spillovers between white precious metal ETFs: the role of oil, gold, and global equity. Int Rev Financ Anal 52:316–332. https://doi.org/10.1016/j.irfa.2017.04.001
77. Lauricella T, DiBenedetto G (2019) A look at the road to asset parity between passive and active U.S. funds. Morningstar. https://www.morningstar.com/insights/2019/06/12/asset-parity
78. Lechman E, Kaur H (2016) Financial markets diffusion patterns: The case of Mexican investment funds. SSRN Electron J. https://doi.org/10.2139/ssrn.2749986
79. Lee C-C, Chen M-P (2021) The effects of investor attention and policy uncertainties on cross-border country exchange-traded fund returns. Int Rev Econ Financ 71:830–852. https://doi.org/10.1016/j.iref.2020.10.015
80. Lettau M, Madhavan A (2018) Exchange-traded funds 101 for economists. J Econ Perspect 32(1):135–154. https://doi.org/10.1257/jep.32.1.135
81. Levinthal D, Myatt J (1994) Co-evolution of capabilities and industry: the evolution of mutual fund processing. Strateg Manag J 15(S1):45–62. https://doi.org/10.1002/smj.4250150905
82. Levy A, Lieberman O (2013) Overreaction of country ETFs to US market returns: Intraday vs. daily horizons and the role of synchronized trading. J Bank Financ 37(5):1412–1421. https://doi.org/10.1016/j.jbankfin.2012.03.024
83. Li M, Zhao X (2014) Impact of leveraged ETF trading on the market quality of component stocks. North Am J Econ Financ 28:90–108. https://doi.org/10.1016/j.najef.2014.02.001
84. Lim WM, Kumar S (2024) Guidelines for interpreting the results of bibliometric analysis: a sensemaking approach. Glob Bus Organ Excell 43(2):17–26. https://doi.org/10.1002/joe.22229
85. Lim WM, Kumar S, Pandey N, Rasul T, Gaur V (2023) From direct marketing to interactive marketing: a retrospective review of the Journal of Research in Interactive Marketing. J Res Interact Mark 17(2):232–256. https://doi.org/10.1108/JRIM-11-2021-0276
86. Lim WM, Rasul T, Kumar S, Ala M (2022) Past, present, and future of customer engagement. J Bus Res 140:439–458. https://doi.org/10.1016/j.jbusres.2021.11.014
87. Lin J-C (2020) How do inverse exchange-traded funds targeting Taiwan shares track their underlying indices? Asian Econ Financ Rev 10(6):714–726. https://doi.org/10.1888/journal.aefr.2020.106.714.726
88. Linnenluecke MK, Marrone M, Singh AK (2020) Conducting systematic literature reviews and bibliometric analyses. Aust J Manag 45(2):175–194. https://doi.org/10.1177/0312896219877678
89. Liu Q, Tse Y (2017) Overnight returns of stock indexes: evidence from ETFs and futures. Int Rev Econ Financ 48:440–451. https://doi.org/10.1016/j.iref.2017.01.005
90. Long H, Zaremba A, Zhou W, Bouri E (2022) Macroeconomics matter: Leading economic indicators and the cross-section of global stock returns. J Financ Markets 61:100736. https://doi.org/10.1016/j.finmar.2022.100736
91. Madan DB, Wang K (2021) Pricing and hedging options on assets with options on related assets. J Derivat 29(1):27–47. https://doi.org/10.3905/jod.2021.1.132
92. Mangram ME (2013) A simplified perspective of the Markowitz portfolio theory. Glob J Bus Res 7(1):1
93. Martinez-Perez C, Alvarez-Peregrina C, Villa-Collar C, Sánchez-Tena MÁ (2020) Current state and future trends: a citation network analysis of the academic performance field. Int J Environ Res Public Health 17(15):5352. https://doi.org/10.3390/ijerph17155352
94. Martinez V, Tse Y, Kittiakarasakun J (2013) Volatility, trade size, and order imbalance in China and Japan exchange traded funds. J Econ Financ 37(2):293–307. https://doi.org/10.1007/s12197-011-9184-9
95. Meier M, Maier C (2022) From stocks to ETFs: explaining retail investors' migration behavior. Internet Res. https://doi.org/10.1108/INTR-09-2021-0695
96. Miffre J (2007) Country-specific ETFs: an efficient approach to global asset allocation. J Asset Manag 8(2):112–122. https://doi.org/10.1057/palgrave.jam.2250065
97. Migliavacca M, Patel R, Paltrinieri A, Goodell JW (2022) Mapping impact investing: a bibliometric analysis. J Int Finan Markets Inst Money 81:101679. https://doi.org/10.1016/j.intfin.2022.101679
98. Miralles-Quirós JL, Miralles-Quirós MM, Nogueira JM (2019) Diversification benefits of using exchange-traded funds in compliance to the sustainable development goals. Bus Strateg Environ 28(1):244–255. https://doi.org/10.1002/bse.2253
99. Murashima M (2023) The impact of the COVID-19 pandemic on motivating factors affecting individual investors' socially responsible investment decision: a comparative analysis of the USA, Germany and Japan. Corp Govern Int J Bus Soc 1:1. https://doi.org/10.1108/CG-08-2022-0342
100. Nair D (2022) Global ETF industry recorded net inflows of $80bn in May. https://www.thenationalnews.com/business/money/2022/06/15/global-etf-industry-recorded-net-inflows-of-80bn-in-may/
101. Nijmeijer KJ, Fabbricotti IN, Huijsman R (2014) Making franchising work: a framework based on a systematic review. Int J Manag Rev 16(1):62–83. https://doi.org/10.1111/ijmr.12009
102. Patel R, Goodell JW, Oriani ME, Paltrinieri A, Yarovaya L (2022) A bibliometric review of financial market integration literature. Int Rev Financ Anal 80:102035. https://doi.org/10.1016/j.irfa.2022.102035
103. Paul J, Merchant A, Dwivedi YK, Rose G (2021) Writing an impactful review article: What do we know and what do we need to know? J Bus Res 133:337–340. https://doi.org/10.1016/j.jbusres.2021.05.005
104. Petajisto A (2017) Inefficiencies in the pricing of exchange-traded funds. Financ Anal J 73(1):24–54. https://doi.org/10.2469/faj.v73.n1.7
105. Pornpikul C, Nettayanun S (2022) Stock return drivers: a mix of reasons and emotions. Rev Behav Financ 14(5):751–771. https://doi.org/10.1108/RBF-04-2021-0059
106. Poterba JM, Shoven JB (2002) Exchange-traded funds: a new investment option for taxable investors. Am Econ Rev 92(2):422–427. https://doi.org/10.1257/000282802320191732
107. Richie N, Madura J (2007) Impact of the QQQ on liquidity and risk of the underlying stocks. Q Rev Econ Financ 47(3):411–421. https://doi.org/10.1016/j.qref.2006.04.002
108. Rosado-Serrano A, Paul J, Dikova D (2018) International franchising: a literature review and research agenda. J Bus Res 85:238–257. https://doi.org/10.1016/j.jbusres.2017.12.049
109. Rosenthal R (1995) Writing meta-analytic reviews. Psychol Bull 118(2):183–192. https://doi.org/10.1037/0033-2909.118.2.183
110. Sackley WH (2009) Leveraged ETFs: a risky double that doesn't multiply by two. CFA Digest 39(1):44–45. https://doi.org/10.2469/dig.v39.n1.4
111. Sangvinatsos A (2017) A random walk down wall street: the time-tested strategy for successful investing. Quantitative Finance 17(3):327–330. https://doi.org/10.1080/14697688.2016.1256598
112. Schlusche B (2009) Price formation in spot and futures markets: exchange traded funds vs index futures. J Derivat 17(2):26–40. https://doi.org/10.3905/JOD.2009.17.2.026
113. Shanmugham R, Zabiulla. (2012) Pricing efficiency of nifty BeES in bullish and bearish markets. Glob Bus Rev 13(1):109–121. https://doi.org/10.1177/097215091101300107

114. Sharpe WF (1964) Capital asset prices: a theory of market equilibrium under conditions of risk. J Financ 19(3):425. https://doi.org/10.2307/2977928
115. Sherrill DE, Shirley SE, Stark JR (2017) Actively managed mutual funds holding passive investments: What do ETF positions tell us about mutual fund ability? J Bank Financ 76:48–64. https://doi.org/10.1016/j.jbankfin.2016.11.025
116. Shin S, Soydemir G (2010) Exchange-traded funds, persistence in tracking errors and information dissemination. J Multinatl Financ Manag 20(4–5):214–234. https://doi.org/10.1016/j.mulfin.2010.07.005
117. Sinha A, Shunmugasundaram V (2023) Behavioral factors influencing investment decisions: a systematic review using prisma. Int J Account Financ Rev 14(1):40–52. https://doi.org/10.4681/ijafr.v14i1.1968
118. Sivanmalaiappan M (2013) Performance persistence of Indian fund of mutual funds: with special reference to bull and bear market. SSRN Electron J. https://doi.org/10.2139/ssrn.2354296
119. Statista Research Department (2023) Number of exchange traded funds (ETFs) worldwide from 2003 to 2022
120. Struck S, Stewart-Tufescu A, Asmundson AJN, Asmundson GGJ, Afifi TO (2021) Adverse childhood experiences (ACEs) research: a bibliometric analysis of publication trends over the first 20 years. Child Abuse Negl 112:104895. https://doi.org/10.1016/j.chiabu.2020.104895
121. Sun L, Small G (2022) Has sustainable investing made an impact in the period of COVID-19?: evidence from Australian exchange traded funds. J Sustain Financ Invest 12(1):251–273. https://doi.org/10.1080/20430795.2021.1977577
122. Sushko V, Turner G (2018) The implications of passive investing for securities markets. BIS Q Rev, March, pp 113–131. https://www.bis.org/publ/qtrpdf/r_qt1803j.pdf
123. Talan G, Sharma G (2019) Doing well by doing good: a systematic review and research agenda for sustainable investment. Sustainability 11(2):353. https://doi.org/10.3390/su11020353
124. Tarassov E (2016) Exchange traded funds (ETF): history, mechanism, academic literature review and research perspectives. J Corporate Financ Res 10(2):89–108. https://doi.org/10.1723/j.jcfr.2073-0438.10.2.2016.89-108
125. Tse Y (2015) Momentum strategies with stock index exchange-traded funds. North Am J Econ Financ 33:134–148. https://doi.org/10.1016/j.najef.2015.04.003
126. Valadkhani A (2022) Do large-cap exchange-traded funds perform better than their small-cap counterparts in extreme market conditions? Glob Financ J 53:100743. https://doi.org/10.1016/j.gfj.2022.100743
127. van Rooij MCJ, Lusardi A, Alessie RJM (2012) Financial literacy, retirement planning and household wealth. Econ J 122(560):449–478. https://doi.org/10.1111/j.1468-0297.2012.02501.x
128. Varma A, Kumar S, Lim WM, Pandey N (2023) Personnel review at age 50: a retrospective using bibliometric analysis. Pers Rev 52(4):1291–1320. https://doi.org/10.1108/PR-05-2021-0313
129. Versace M, Bhatt R, Hinds O, Shiffer M (2004) Predicting the exchange traded fund DIA with a combination of genetic algorithms and neural networks. Expert Syst Appl 27(3):417–425. https://doi.org/10.1016/j.eswa.2004.05.018
130. Wang H, Xu L (2019) Do exchange-traded fund flows increase the volatility of the underlying index? Evidence from the emerging market in China. Accounting & Finance 58(5):1525–1548. https://doi.org/10.1111/acfi.12437
131. Weiss CH (1997) Theory-based evaluation: past, present, and future. New Direct Eval 76:41–55
132. Wigglesworth R (2020) Active managers struggle to prove their worth in a turbulent year. https://www.ft.com/content/621d51de-f732-48e3-b3e3-be83f42baec3
133. Wong KHY, Shum WC (2010) Exchange-traded funds in bullish and bearish markets. Appl Econ Lett 17(16):1615–1624. https://doi.org/10.1080/13504850903085035
134. Xu L, Yin X, Zhao J (2022) Are the flows of exchange-traded funds informative? Financ Manage 51(4):1165–1200. https://doi.org/10.1111/fima.12396
135. Xu X, Chen X, Jia F, Brown S, Gong Y, Xu Y (2018) Supply chain finance: A systematic literature review and bibliometric analysis. Int J Prod Econ 204:160–173. https://doi.org/10.1016/j.ijpe.2018.08.003
136. Yavas BF, Rezayat F (2016) Country ETF returns and volatility spillovers in emerging stock markets, Europe and USA. Int J Emerg Mark 11(3):419–437. https://doi.org/10.1108/IJOEM-10-2014-0150
137. Zhu Y, Luo X, Xu Q (2023) Industry variance risk premium, cross-industry correlation, and expected returns. J Futur Mark 43(1):3–32. https://doi.org/10.1002/fut.22376
138. Zupic I, Čater T (2015) Bibliometric Methods in Management and Organization. Organ Res Methods 18(3):429–472. https://doi.org/10.1177/1094428114562629

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