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Article

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The Big Mac Index: A comprehensive bibliometric and systematic review

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ABSTRACT

This study presents a comprehensive bibliometric and systematic literature review analysis of the literature on the Big Mac Index (BMI) to identify its foundational aspects and summarize key findings. The BMI, an informal measure of purchasing power parity, has garnered scholarly interest in discussions about currency valuations, trade imbalances, and cross-country cost of living. This index encompasses a rich set of fields, including *pricing drugs*, *cigarette/smoking across countries*, professors' salaries, income inequality, and wages. The study provides the first bibliometric analysis in this field, revealing that the number of published articles and citations is relatively low, highlighting the undervaluation of the pricing of different products and services across countries. After several screening steps, 54 articles met the criteria for examination using VOSviewer. The study offers insights into the evolution of BMI literature and highlights leading authors, documents, countries, institutions, and journals. The results indicate that Tobacco Control is the top journal publishing paper and the top-cited journal article on BMI, with the United States leading in contributions. The paper presents potential future research directions in the field of BMI.

1. Introduction

In September 1986, Pam Woodall published The Big Mac Index in The Economist, an informal and humorous way of measuring parity between two currencies. This concept of measuring currency is called purchasing power parity (PPP). It helps to set the prices of different goods and exchange rates among different currencies under the exchange rate theory (The Economist, 1998). This index has introduced the branch of economics, “*burgernomics*,” which was initially not the formal way of measuring exchange rates. However, with time, this phenomenon is widely accepted in texts, books, and scholarly communities. Since then, this index has been regularly published in The Economist. Portes and Atal (2014) defined the BigMac Index as a national rule of thumb for valuing national currencies with each other, mostly with the U.S. Dollar. They found evidence of lagging overall inflation rates. The Big Mac was chosen because burgers worldwide use standardized ingredients. The Big Mac index helps policymakers decide on monetary policies, reforms, and trade agreements. It also shows

disparities in currency valuations, cost of living, and economic conditions. Castro, Tamayo and Strauch (2024) also highlight that the Big Mac Index is relevant due to high currency depreciation worldwide. Akarsu, Gharehgozli and Atal (2024) also emphasized that the Big Mac Index is appropriate for policymakers. Akarsu, Gharehgozli, and Atal (2023) also found that the Big Mac Index may highlight regional disparities.

The theory behind BMI is the purchasing power parity (PPP) theory, which states that the exchange rate of two currencies should equalize the price of a basket of identical goods. The first article, published in 1996, explained the failure of the purchasing power parity of exchange rates using Big Mac (BM) prices (Click, 1996). The issue with this PPP theory was the choice of the basket of goods (Ong, 1997). Ong (1997) reported that this index accurately tracked exchange rates over the long run. Clements, Lan, and Seah (2012) pointed out that BMI suffers from bias. However, per purchasing power parity theory, the index successfully tracked the exchange rate over the medium to long term. The index is a good industry standard for predicting future currency value, like a random walk model for the short term. It provides a quick and easily

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understandable measure of whether a currency is undervalued or overvalued in real-world purchasing power (K. W. Clements, Lan, & Seah, 2012). Given its simplicity, it has become a widely recognized tool in discussions about currency valuations, trade imbalances, and the cost of living across diverse nations, providing substantial insights into the dynamics of currency markets.

Despite the Big Mac Index (BMI) being a two-decade-old phenomenon, there is a gap in the comprehensive review paper on this issue. To the best of the author's knowledge, no review study is available on the topic. The number of studies available on the Big Mac Index is less significant to understand and lacks a comprehensive literature review. The global inflation and exchange rate volatility pave the way for the comprehensive review study of the Big Mac index. The authors argued that the Big Mac Index might help predict future exchange rates and policy-making to benefit from each other trade. It is also essential that less focus on BMI research results in missed opportunities for innovative applications in macroeconomics or public policy. The Big Mac Index prices drugs and cigarettes across countries, professors' salaries, and gender wages. Some variants of the BMI include the Tall Latte index, the iPod index, IKEA's Billy bookshelf, the Gold-Mac-Index, The Chai Latte Global Index, and The Big Mac Pay Gap Index. This index is a good value for the money and provides much information about the future exchange rate. However, few studies have been published, and there is a need for more papers. Despite its huge popularity in the international press and academia, there is no single review paper on the bibliometric of the Big Mac Index. Therefore, this study is the effort to study the question, what are the trend in Big Mac Index literature. This study further delve into the details of who is the leading authors, documents, countries, institutions, and journals.

A growing body of literature has been dedicated to examining the BMI. Scholars, policymakers, and industry experts have delved deep, exploring the various facets, implications, and applications of the BMC. Various streams of research exist in the literature. Many studies have discussed the fundamental characteristics and underpinnings of the BMI itself (Ong, 1997; Pakko & Pollard, 2003), closely examining its alignment with traditional measures of PPP. Additionally, a multitude of investigations have analyzed the diverse benefits of employing the index, including understanding inflation dynamics, currency valuations, cost of living disparities among countries, analyses of real-income disparities, wage comparisons, and the pricing of products like cigarettes (Ashenfelter & Jurajda, 2001; Atal, 2014; Gharehgozli & Atal, 2020a; Loveridge & Paredes, 2018; Ong & Mitchell, 2000; Parsley & Wei, 2007). The literature also addresses the limitations inherent in employing the BMI (K. W. Clements et al., 2012). It is essential to have a bibliometric study to provide a systematic review and analyze scholarly contributions within a specific domain, thereby providing insights into the developmental trajectory and emerging trends in that field (Donthu, Kumar, Mukherjee, Pandey, & Lim, 2021). Notably, to the best of the authors' knowledge, no previous research has undertaken a bibliometric exploration of BMI, rendering this study the first one to review the extensive body of work focused on BMI systematically and to fill the gap in the literature.

This review aims to study the current research trends, future research directions, historical development, and background of the Big Mac Index. This effort to collect a bibliometric analysis will help develop literature, research gaps, and future directions on the exchange rate, purchasing power parity, and Big Mac Index. This paper is the first known review paper on the Big Mac Index since the development of the index in 1986. This is an important to know the recent trend about the famous measure of currency valuation and frequently discussed informal measure of currency prices, trade balances, cigrates prices, professor salaries and other phenomenon. Although, the academic literature got less focus due to informal measure of currency depreciation and linking with Mac Bugers but business world has more usage of these term. Therefore, this an important study to discuss prominent world wide issue. From 1986 to Feb 2023, there were only 60 papers

available on the issue, of which only 54 papers were considered for the paper. The Current Review paper is an effort to get the answers to the following questions: i) what is the state and current trend of research on the Big Mac Index? ii) What are the top journals, authors, articles, citations, and countries regarding the number of citations and documents published? iii) The literature development over the span of 1996 to 2023. iv) The important research trends and future directions emerging from this topic. SCOPUS database is used to retrieve data from one of the largest bibliometric databases. This data is used by many researchers from many fields, including finance and management,

This study substantially contributes to the existing body of literature in multiple ways. It identifies publications related to BMI and organizes this literature into six distinct clusters, acknowledging the most influential authors, countries, and institutions. Furthermore, this study highlights potential directions for future research in BMI. As far as the authors know, there has been no prior bibliometric examination of BMI, making this study a pioneering exploration in this area on a fascinating and highly debated topic. This review paper has contributed in several ways to the literature on exchange rates and other macroeconomic issues. This paper offers interesting and fresh insights into the literature and existing body of knowledge. The study used bibliometric analysis, integrating quantitative and qualitative approaches, science mapping, visualization techniques, bibliographic coupling, and performance analysis. The number of papers increased in 2013, with a maximum of 7 in 2017. The article type comprised 81.5 % of papers, followed by conference papers at 7.4 %. Guindon et al. (2002) is the most cited paper with 148 citations. Tobacco Control, published by the British Journal of Management, is the top journal with the highest number of papers and citations. World Health Organization and Switzerland is the top organization in the country. Big Mac index is the most popular keyword, with the most repetition of 12 times. The topics in BMI are diverse, indicating a range of using BMI in measuring prices of drugs, cigarettes, and smoking across countries, exploring professor salaries, and analyzing income distributions and inequality among countries and genders. Moreover, this study suggests that future research should extend the BMI to assess and compare other research areas. There should also be work on addressing the limitations of the MBI, and various indicators should be used to assess the robustness of the PPP theory. A vital policy initiative is to use BMI as a macroeconomic variable in research instead of just computing the value of BMI. These facts highlight the importance of BMI and its usefulness in policy and academia.

The subsequent sections of this paper are organized as follows. Section 2 discusses the data sources and methodological approach. Section 3 provides insights into the outcomes of our bibliometric, systematic, content analysis, and trend analyses. Section 4 provides potential directions for future exploration. Section 5 discusses study limitations, and Section 6 presents our concluding remarks.

2. Methodology and data

2.1. Data

The research query utilized multiple keywords, including "big mac index", or "bigmac index" or "big-mac Index" or "macparity" or "mac parity" or "big Macparity" or "big mac parity". A comprehensive search yielded a total of 60 documents, including various types such as journal articles, conference papers, letters, notes, short surveys, book chapters, and conference reviews. To ensure the relevance of the selected documents, a screening filter was applied based on predetermined inclusion and exclusion criteria (Table 1). According to the guidelines of PRISMA (Moher, Liberati, Tetzlaff, & Altman, 2010), the sample size was narrowed down to 54 documents. This sample is a whole population, and SCOPUS has one of the most detailed studies. The SCOPUS database is one of the most extensive collections of research. Therefore, these are the maximum number of studies published on the topic. The Web of Science has fewer studies, while Google Scholar has many irrelevant

Table 1
Search query for Big Mac Index documents.

Description	Conditions	Number of Documents
Search query TITLE-ABS-KEY	TITLE-ABS-KEY ("big mac index" OR "bigmac index" OR "big-mac Index" OR "macparity" OR "mac parity" OR "big Macparity" OR "big mac parity")	60 Documents
Document and source type	We have excluded erratum, books	58 Documents
Language	We have limited the search to documentation in English writing	54 Documents
Years	We have included all the years	
Access	We have included both open and non-open-access documents	
Query search date	21 February 2023	
Subject area	We have included all subject areas.	
Final query after refines	TITLE-ABS-KEY ("big mac index" OR "bigmac index" OR "big-mac Index" OR "macparity" OR "mac parity" OR "big Macparity" OR "big mac parity") AND (EXCLUDE (DOCTYPE, "bk")) AND (EXCLUDE (SRCTYPE, "b")) AND (LIMIT-TO (LANGUAGE, "English"))	

documents other than academic literature. Therefore, SCOPUS was used because it has detailed, authentic and relevant documents. Besides, the study did not consider any papers published later than the search query data (21 February 2023). The stepwise exclusion process is depicted in Fig. 1. First, the study excluded four documents based on refining documents and source type. Then, two additional papers were excluded as they were not written in English. We use the Scopus database for a bibliometric analysis (Donthu et al., 2021; Mukherjee, Lim, Kumar, & Donthu, 2022). After several refining steps, our final collection includes 54 documents presented in Table 1.

2.2. Methodology

The bibliometric analysis and systematic literature review was employed in this study. We integrated both qualitative and quantitative approaches, visualization techniques and science mapping, bibliographic coupling, and incorporating performance analysis. These combined analytical methods are such a powerful tool to study any specific topic with prolonged and existing research (Gallego-Losada, Montero-

Navarro, Rodríguez-Sánchez, & González-Torres, 2022; Kumar & Goyal, 2015). Therefore, this study conducted research by performing a keyword search of the Big Mac index in its related literature. The study was limited to documents in the database of Scopus, which has been widely appreciated for its comprehensive and high-quality published documents and a wide range of subjects (Karim, Lucey, Naeem, & Uddin, 2022) and has been utilized in other bibliometric studies (Ellili, 2022; Nobanee, 2021; Nobanee et al., 2021). The detailed process of delimiting literature is explained below in Fig. 1.

The study methodology flow chart is given in Fig. 2, which helps us to answer questions posed in the introduction section. The recent trends in the literature on BMI are studied, and clusters are formed to understand the concept better. The citation analysis and co-authorship analysis are given below for better analysis results. Fig. 2 briefly emphasized the methodology of bibliometric analyses in this study: descriptive, citation, co-citation, co-authorship, keywords, and bibliographic coupling. These multiple analyses were conducted using VOS viewer and Cite Space software. In addition, the published documents were studied using traditional systematic and content analyses to explore various topics and findings (Gallego-Losada et al., 2022).

3. Results and discussions

3.1. Evolution and growth in Big Mac Index research over time

Fig. 3 illustrates the number of documents published on the Big Mac Index (BMI). The first article, published in 1996, explained the failure of the purchasing power parity of exchange rates using Big Mac (BM) prices (Click, 1996). Although the first publication in this field was in 1996, the research development in this field was slow, with an average of one to three documents published annually between 1996 and 2012. There was a significant increase in the number of published documents from 2013 to 2021, averaging between three to seven documents per year. This trend indicates a sustained interest among researchers in utilizing the BMI to analyze various aspects such as income distribution and inequality, exchange rates, price indices, and comparative country studies. Although the quantity of published documents in this has increased in recent years, the current volume of studies in this field remains relatively limited, necessitating further exploration through additional scholarly papers.

3.2. Distribution of documents by type

Within the academic literature on the BMI topic, this section diverse

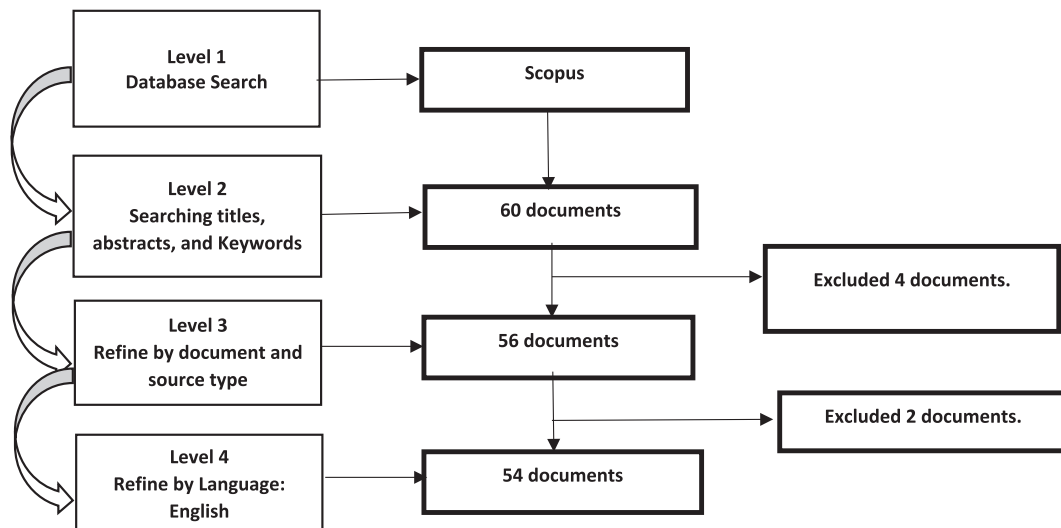


Fig. 1. Process applied for delimiting literature (PRISMA chart).

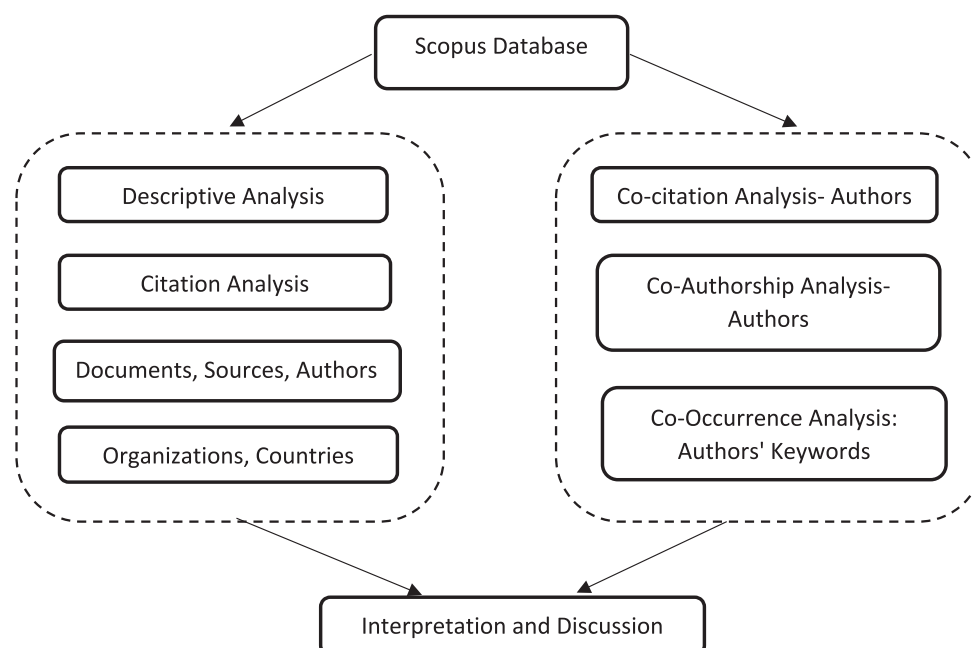


Fig. 2. Methodological flowchart illustrating the steps from Scopus database analysis to interpretation and discussion.

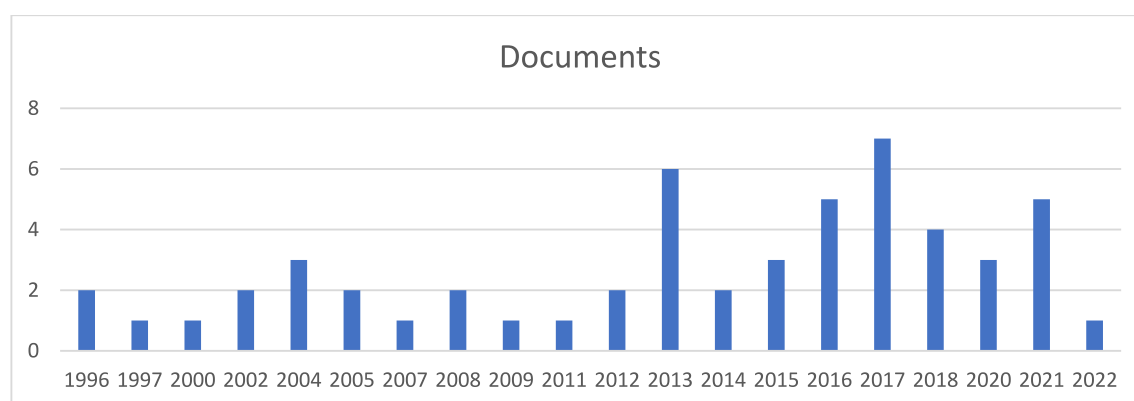


Fig. 3. Publication growth of Big Mac Index research for all documents and journal articles.

its distributions through available publication patterns. After applying exclusion criteria and from the Scopus database, 54 documents were retrieved. These documents were categorized into different types, as depicted in Fig. 4. Findings from Fig. 4 reveal that articles constitute the majority of the BMI research (81.5 %), followed by conference papers (7.4 %), letters (7.4 %), notes (1.9 %), and short surveys (1.9 %). Despite the initial publication of the BMI in 1996, the quantity of this topic's related published documents is still limited.

3.3. Top cited documents

Fig. 5 and Table 2 present top-cited documents with their key objectives, main findings, and topic ranges. The analysis encompasses all published documents with at least 10 citations, as presented in Table 2.

Fig. 5 illustrates six main clusters of top-cited documents related to BMI. The first cluster (blue) was developed by Guindon, Tobin, and Yach (2002). In particular, the documents in this cluster examine the application of BMI in assessing the prices of cigarettes, smoking, drugs and fulvestrant (Lal & Scollo, 2002; O'Reilly, Abu Al-Saud, O'Reilly, & Ronayne, 2021). The second cluster (yellow) was established by Ong (1997), featuring studies that compare actual academic salaries using

the BM indices instead of traditional currency conversion (Bates, 2013; Li, 2014; Soh, 2013). The third cluster (red) originated from the work of Click (1996). In this cluster, the documents using BM Purchasing Power Parity (PPP) to evaluate currency value and explore the theory of PPP exchange rates (Bojanic, Warnick, & Musante, 2007; Caetano, Moura, & Da Silva, 2004; Maesepp, 2009). The fourth cluster (green) emerged from the research conducted by (Gharehgozli & Atal, 2020a), investigating household income inequality and gender wage inequality using BMI as a proxy of real wages (Gharehgozli & Atal, 2020b, 2021; Orkideh & Vidya, 2021). The fifth and sixth clusters (purple and orange) were developed by Jiawen (2004) and K. W. Clements et al. (2012). In this cluster, studies employed BMI as a guideline for currency evaluation and assessing the uncertainty associated with exchange rate mispricing (K. Clements, Lan, & Si, 2018; O'Brien & de Vargas, 2017; Vo, 2017).

3.4. Top journals

Table 3 provides an overview of top-cited journals, showcasing the number of documents and their respective citation counts, and Fig. 6 shows the top-cited journals Network map. The range of published documents varies from one to eight, where citations exhibit considerable

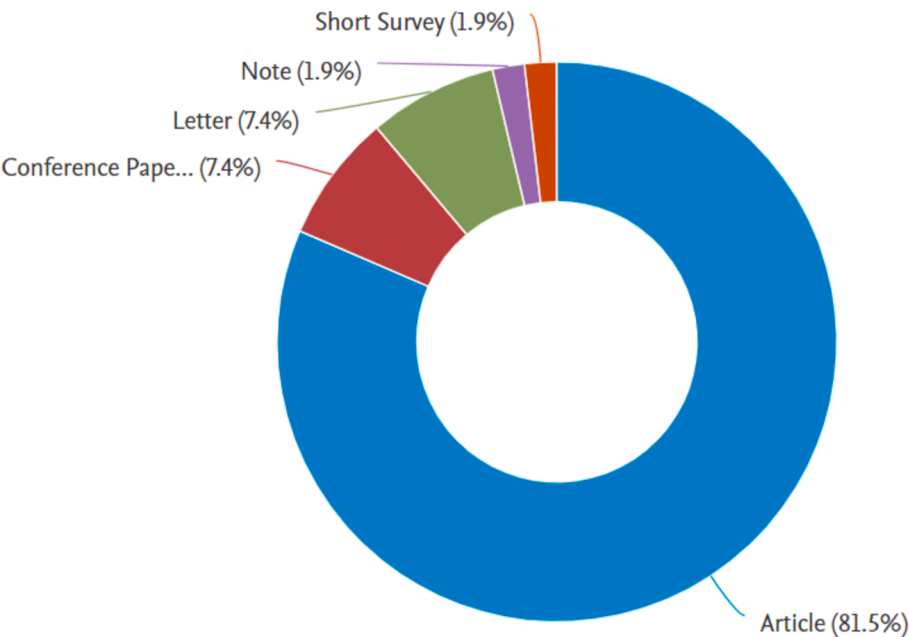


Fig. 4. Distribution of documents by type.

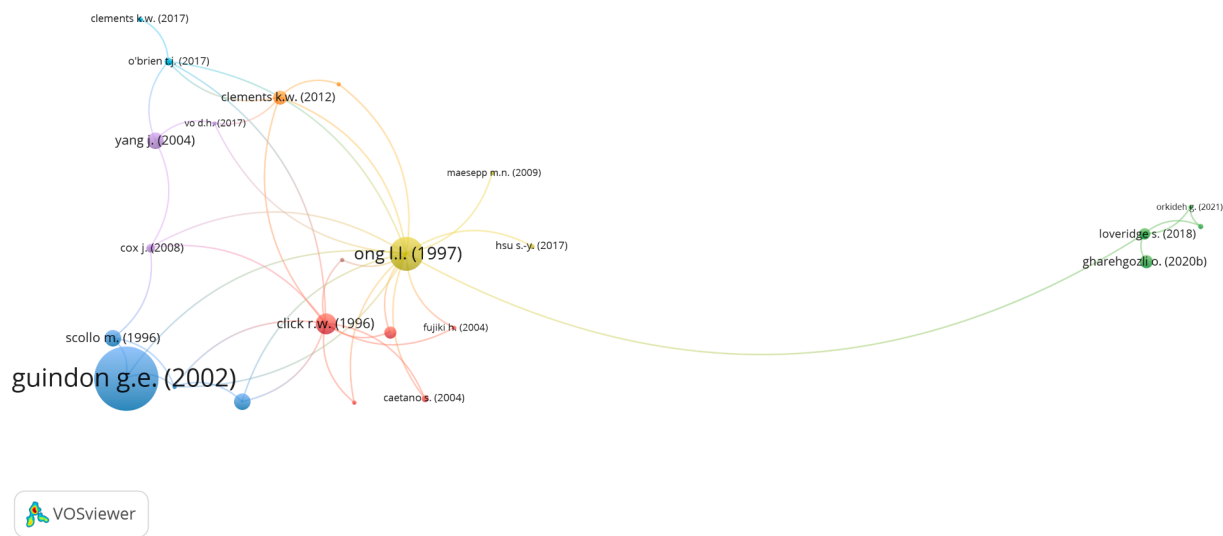


Fig. 5. Top cited documents.

Table 2
Top cited documents.

Rank	Document	Citations
1	Guindon et al., (2002)	148
2	Ong, (1997)	49
3	Click, (1996)	21
4	Lal and Scollo, (2002)	20
5	Jiawen, (2004)	14
6	Ong and Mitchell, (2000)	14
7	Scollo, (1996)	14
8	Dorn and Suessmair (2016)	11
9	Clements et al., (2012)	11
10	Gharehgozli and Atal, (2020)	10

Note: We rank the selected articles by the number of citations in a descending order from the most cited article to the least cited article ranked from 1 to 10 as of the time we extract the bibliometric data.

variation across journals. Among the eight journals included, the

majority (4 out of 8) are published by Elsevier. The highest number of papers and citations belongs to *Tobacco Control* (3 and 182, respectively), followed by the *Journal of International Money and Finance* (49 citations). The second-highest number of published documents by *Applied Economics* (2), followed by *Economic Letters*, *China Economic Review*, *Global Business and Economic Review*, *International Journal of Finance and Economics* and *Economic Analysis and Policy* with one paper each. Furthermore, it should be noted that the Cite Score varies across different journals.

Fig. 6 illustrates four primary clusters representing the sources of published documents related to BMI. The network includes sources that have received one citation at least. The first red cluster comprises six sources, including *Journal of Cultural Economics*, *Economics Bulletin*, and *Economics Letters*. *Economics Bulletin* is the most outstanding in this first cluster. The journals published in these journals employ BMI to explain the failure of the purchasing power parity (PPP) theory of exchange rate, income and trade barriers (Caetano et al., 2004; Click, 1996; Cox, 2008).

Table 3

Top cited journals.

Rank	Source	Documents	Citations	CiteScore	Publisher
1	Tobacco Control	3	182	11	BMJ
2	Journal of International Money and Finance	1	49	3.9	Elsevier
3	Economics Letters	1	21	3.2	Elsevier
4	Applied Economics	2	14	2.8	Taylor & Francis
5	China Economic Review	1	14	6.5	Elsevier
6	Global Business and Economics Review	1	11	0.9	Inderscience
7	International Journal of Finance and Economics	1	11	2.1	Wiley
8	Economic Analysis and Policy	1	10	4.7	Elsevier

Note: We report the top cited journals for the searched terms with the source (Name of the journals), number of documents, citations, Cite Score, and publisher. The bibliometric data are extracted as the time of the articles collected using the searched terms.

The second cluster (yellow) consists of three sources, *Tobacco Control* and *An American Society of Clinical Oncology Journal*, with *Tobacco Control* leading the cluster. Most papers published in this journal utilize the BMI to facilitate comparisons and assess the affordability of prices, focusing on cigarettes, drugs, and fulvestrant prices (Guindon et al., 2002; Lal & Scollo, 2002; O'Reilly et al., 2021). The third cluster (green) comprises four sources led by *Applied Economics Letters*. Studies within this cluster primarily study income distribution and gender wage inequality using BMI (Gharehgozli & Atal, 2020a, 2020b). The fourth cluster (blue) encompasses three sources: *Economics Papers*, the *International Journal of Money and Finance*, and international conference papers. The *International Journal of Money and Finance* led this cluster (Ong, 1997). Most studies in this cluster used the BM index as an international money standard to evaluate exchange rates and PPP comparisons among countries.

3.5. Publications and citations by authors

Table 4 illustrates each author's quantity of documents and citations, while Fig. 7 depicts the network map. Guindon, G. E., Tobin, S., and Yach, D., have co-authored a paper on BMI (Guindon et al., 2002), which also gets the most citations (148). Ong, L.L., received 63 citations for their paper on using BMI to evaluate the exchange rates and the theory of PPP. Scollo, M., Click, R.W. and Lal, A., followed with 34, 21 and 20 citations, respectively.

3.6. Publications and citations by organization

Table 5 shows the number of documents and citations by organization, while Fig. 8 depicts their network map. The University of Western Australia and the Montclair State University at the United States had two published documents, while other organizations had one published document. The World Health Organization in Switzerland and the Organization for Economic Cooperation and Development had the highest published citations (148). The University of Western Australia in Australia and George Washington University in the US had 49 and 21 citations, respectively. They were followed by Albertus Magnus Monument in Germany, the University of Lueneburg in Germany, Montclair State University in the US and the University of Technology, Sydney, in Australia, with 8 to 12 citations.

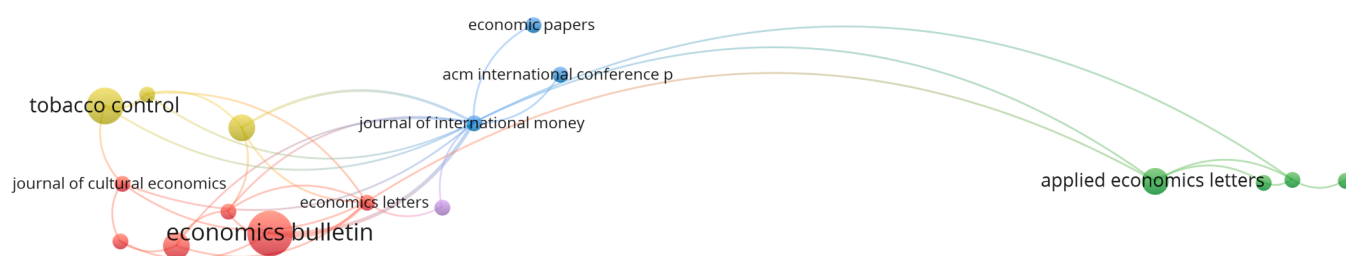
In addition, Fig. 8 indicates the main cluster of organizations' contributions to BMI publication which determines potential wide-range

Table 4

Top cited authors.

Rank	Author	Documents	Citations
1	Guindon G.E.	1	148
2	Tobin S.	1	148
3	Yach D.	1	148
4	Ong L.L.	2	63
5	Scollo M.	2	34
6	Click R.W.	1	21
7	Lal A.	1	20
8	Mitchell J.D.	1	14
9	Yang J.	1	14
10	Clements K.W.	2	13

Note: we report the top cited authors in the related fields using the searched terms. The top cited authors are ranked by the number of published documents and citations.

**Fig. 6.** Top sources.

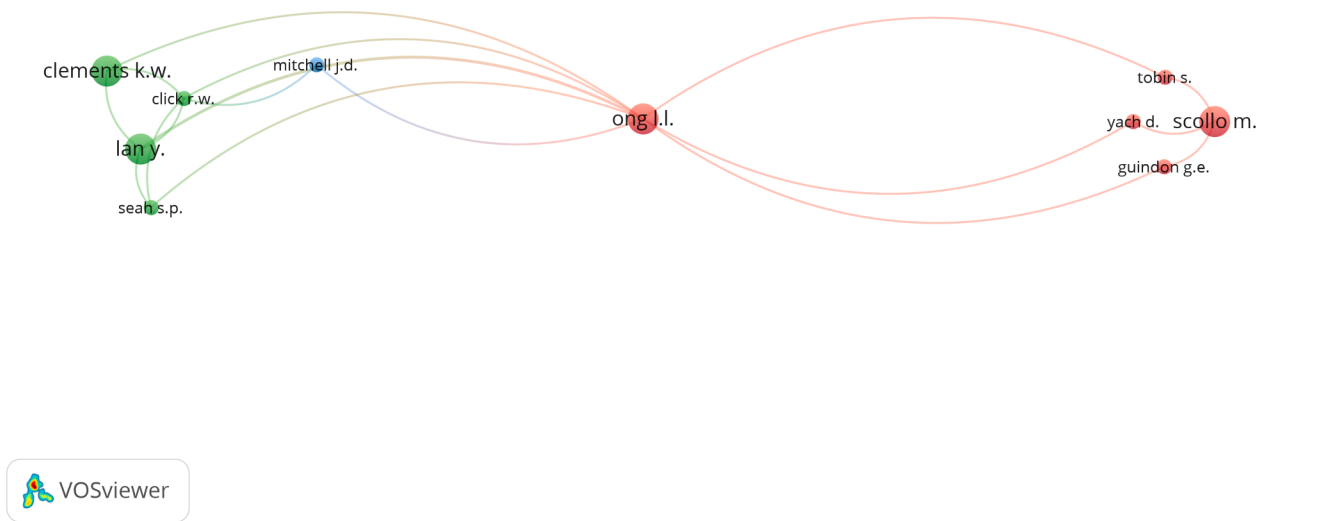


Fig. 7. Top cited authors.

Table 5
Top cited organizations.

Rank	Organization	Country	Documents	Citations
1	World Health Organization	Switzerland	1	148
2	Organization for Economic Cooperation and Development	France	1	148
3	University Of Western Australia	Australia	4	75
4	George Washington University	United States	2	35
5	Albertus Magnus Monument	Germany	1	11
6	University Of Lueneburg	Germany	1	11
7	Montclair State University	United States	2	10
8	University Of Technology, Sydney	Australia	1	8

Note: We report the top cited organizations where the authors are affiliated, including the name of organizations (universities), country located, number of document, and citation counts.

and international research collaborations. These organizations were included in their analysis with eight citations at least. Besides, Fig. 8 shows four top organizational clusters by different colors.

3.6. Top countries

Table 6 provides an overview of the documents and citation quantity by country, while the network map is presented in Fig. 9. The US had the highest contribution to publications on the BMI with 12 papers,

Table 6
Top cited countries.

Rank	Country	Documents	Citations
1	Switzerland	2	150
2	France	1	148
3	Australia	8	85
4	United States	12	62
5	Germany	4	15

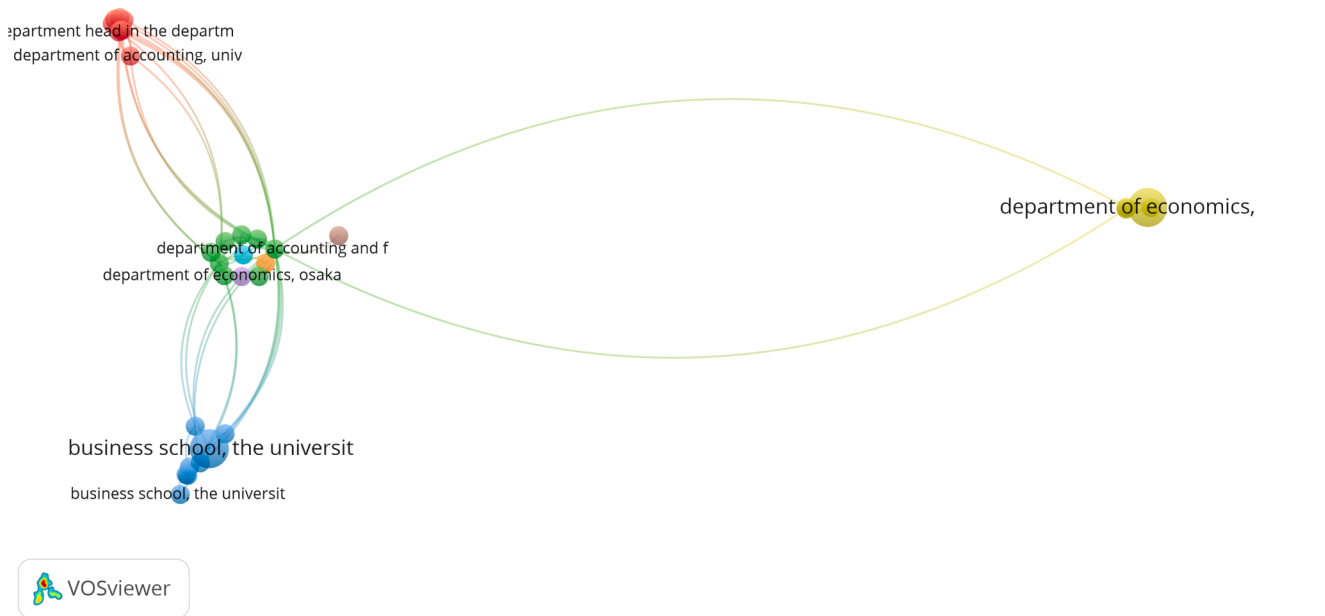


Fig. 8. Top cited organizations.

accounting for 44 % of the top-cited countries’ publications. While the US contributed the most publications, Switzerland (2 documents) and France (1 document) were the top countries in terms of citations, with 150 and 148 citations, respectively. Australia (8 documents) and Germany (4 documents) followed with 85 and 15 citations, respectively. Furthermore, Fig. 9 identified the primary clusters of contributing countries to BMI research, which shows possible potential international collaboration from BMI-interested researchers. Fig. 9 shows 11 countries and two main clusters. The United States is outstanding in the first red cluster with the highest published documents quantity and research collaborations compared with others from Australia, Germany, France, Japan, the United Kingdom, Chile, Switzerland, and Brazil. Besides, Australia is outstanding in the second green cluster with the second-highest publications number and the third number of published citations. Australia conducted several collaborative studies with the United States, Germany, Taiwan, Vietnam, Brazil, France, Switzerland, Chile, and Japan.

3.7. Keyword analysis

In our investigation of BMI-related keywords, Table 7 shows the most frequently appeared ones. Rather than the primary focus of the BMI keyword, “purchasing power parity” is the highest occurrence, indicating its significance in relation to BMI. This also indicates that BMI is the recognizable index used to evaluate purchasing power parity and capture the researchers’ attention. The keyword “exchange rate” is the second most commonly occurring keyword. Other keywords, including comparative country studies, economic, income distribution, smoking, and tax, had lower occurrences, while keywords such as costs, drug cost, fees and charges and income inequality have the fewest number of appearances. Fig. 11 indicates five major clusters: (1) purchasing power parity, (2) exchange rates, (3) economics, (4) comparative country

Table 7
Occurrences of keywords.

Rank	Keyword	Occurrences
1	big mac index	12
2	purchasing power parity	9
3	exchange rate	4
4	comparative country studies	3
5	Economics	3
6	income distribution	3
7	Smoking	3
8	Tax	3
9	Costs	2
10	drug cost	2
11	fees and charges	2
12	income inequality	2

studies and (5) income. The purchasing power parity is the largest cluster (yellow) which includes big mac PPP focused studies to evaluate whether a currency is under or overvalued. In exchange rate cluster (purple), studies mainly examine exchange rate and exchange rate uncertainties using the big mac index (O’Brien & de Vargas, 2017; Vo, 2017). In the economic cluster (red), studies mainly have explored the big mac index of affordability prices using cigarette prices and tax levels (Lal & Scollo, 2002; O’Reilly et al., 2021). Table 8 presents a content analysis for each of the aforementioned clusters.

3.8. Overall discussion

This section discusses the findings of the study. The first notable challenge is that despite the increase in interest in BMI in recent years, there is still a general lack in the number of BMI documents. The analysis delved into BMI topics and their evolution from 1996 to 2022, demonstrating that BMI remains attractive research. The topics in BMI are

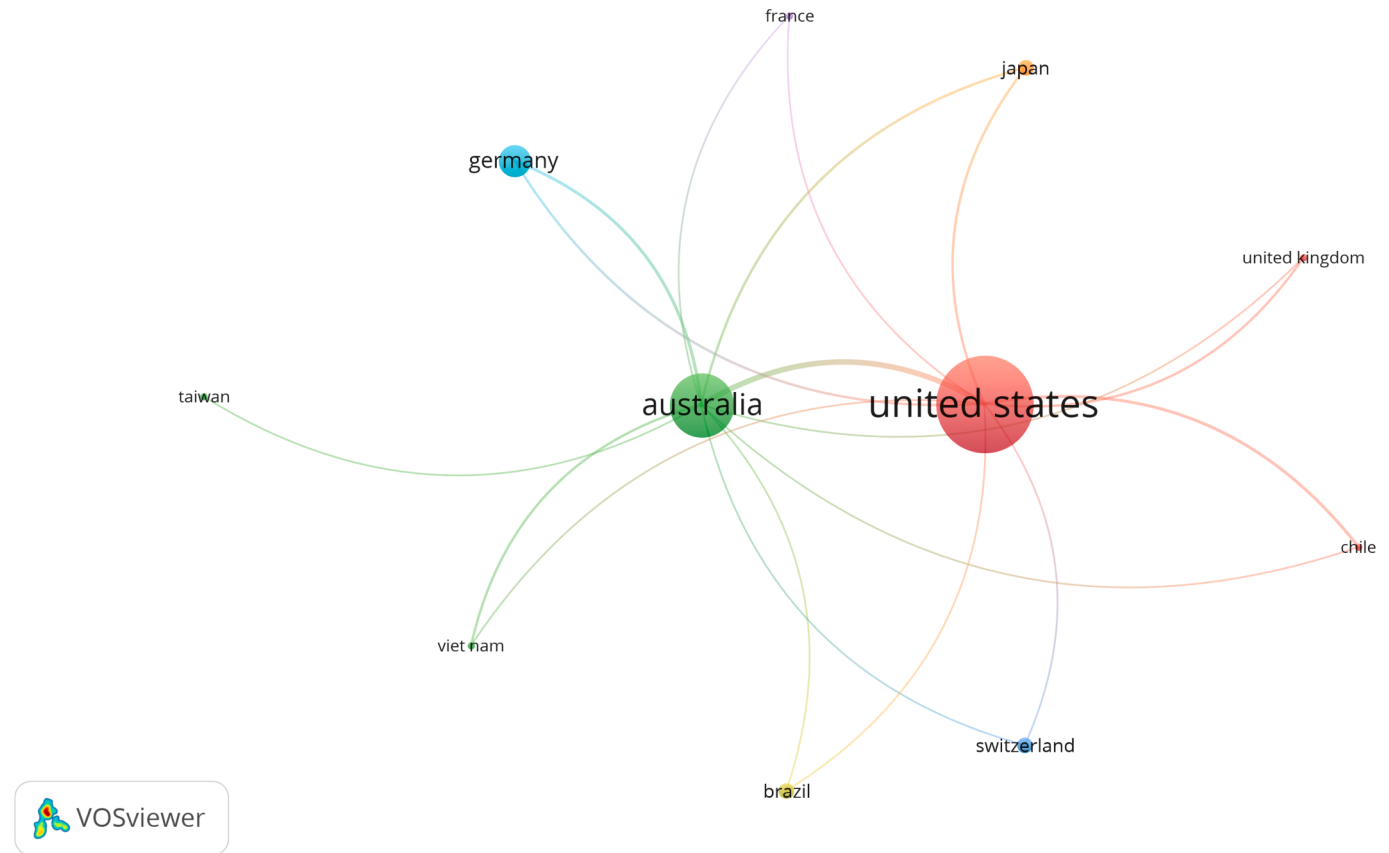


Fig. 9. Top cited countries.

Table 8

Citation, content, and cluster analysis of the journal articles concerning the BMI.

Authors	Main Objective	Main Finding
Drugs, Cigarettes, Smoking, and Fulvestrant		
Lal and Scollo (2002)	To identify the BMI of cigarette affordability using cigarette prices and tax levels.	The number of cigarettes per BM provides a slightly different picture than that offered by a simple conversion to \$US.
Guindon et al. (2002)	To use the BMI to facilitate comparison and to assess affordability prices by using cigarette price data.	Cigarette prices tend to be higher in wealthier countries with more robust tobacco control programs; thus, ample room to increase tobacco prices through taxation is available.
O'Reilly et al. (2021)	To identify the BMI of Fulvestrant by using monthly salaries.	The inequality in oncology was found by using Fulvestrant – BM index.
Purchasing Power parity		
Click (1996)	To demonstrate which propositions explain the failure of the PPP theory of exchange rates using BM prices.	The failure of PPP is due to time-invariant and country-specific deviation effects.
Caetano et al. (2004)	To revisit the robustness of the BMI in consideration to trade barriers.	The openness to trade helps to explain departures from the BMI.
Bojanic et al. (2007)	To use the Legendary Burger Index to measure PPP, extending the BMI.	The Legendary Burger Index performed slightly better than the BMI when examining currency valuations.
Cox (2008)	To adopt the BMI to establish the local price of video game consoles for PPP purposes.	The index of a high-tech product like video games is preferable to its greater product standardization and nearly zero marginal distribution cost.
(Maesepp, 2009)	To introduce the prices of postage stamps for international mail delivery for PPP aim, in the spirit of the BMI.	The postal index is suggested by its more general operation, representative of an everyday item, and more accurate representation of the domestic price ratio.
Price Index and Comparative Country Studies		
Fischer and Lipovská (2018)	To develop a PPP index based on the prices of Nespresso coffee capsules compared to the BMI.	The PPP index of the capsule was studied given its low cost, ease and fast computation and digestible for the lay public.
Loveridge and Paredes (2018)	To adapt the BMI approach to study whether the rural cost of living is lower.	Using the BMI as a promising index for pricing differences, urban areas' living costs were found to be slightly more expensive than rural ones.
Wolfson, Maimon, and Dominguez-Ramos (2021)	To study the index of paprika powder and its packing using the BMI and Environmental Performance Index.	The two indexes were studied to highlight that PET bags are better performers than jars, and pepper growth in India is preferable.
Income distribution and inequality		
Gharehgozli and Atal (2020a)	To study real-income households' inequality using the BMI.	The outpacing increase in the BMI affordability of the top decile led to rising income inequality in developed countries.
Gharehgozli and Atal (2020b)	To revisit the gender wage inequality in the US, focusing on the deciles level wage distribution using the BMI.	The disparity of wages between genders: a higher gender unemployment gap has been associated with a lower gender wage gap.

Table 8 (continued)

Authors	Main Objective	Main Finding
Gharehgozli and Atal (2021)	To explore gender wage differential at the wage distribution decile level using the BMI to define real wages.	The higher GDP per capita, the more significant the gender wage gap; the higher the wage decile, the larger the gender wage inequality.
Orkideh and Vidya (2021)	To use the BMI to offer a simple measure to study real income inequality.	Looking at BM prices, low-income people had a more price-elastic demand (products' prices fall), so their affordability increased.
Exchange Rate		
Vo (2017)	To evaluate Thailand's exchange rate using both Consumer Price Index and BMI and find lessons for Vietnam.	Weak evidence for BMI-based exchange rate was found, whereas PPP for CPI-based exchange rate was considered solid validity.
O'Brien and de Vargas (2017)	To distinguish between currency valuations, estimate the "adjusted" BMI based on the "raw" one.	The adjusted BMI was emphasized as a better forecast of accurate foreign exchange than the original one.
K. Clements et al. (2018)	To evaluate the uncertainty in exchange rate mispricing, use the "popular" BMI.	The "improve" approach has advantages over the "popular" BMI to currency valuation.
Professors' and Teachers' Wages		
Ong and Mitchell (2000)	To compare actual academic salaries, use the BMI instead of the traditional currency conversion.	Hong Kong and Singapore have the highest actual academic salaries, while Canada and New Zealand are more attractive places, given their academic salaries plus intrinsic considerations indicate.
Bates (2013)	To get a quick measure of academic significance in the style of the BMI.	The significant index of the BMI was found as "weak", and this index may not be seen as a theory of exchange rates.
Soh (2013)	To rejoin the paper of Bates (2013) as an attempt to have further clarifications.	The different viewpoints when measuring the academic significance of the BMI and suggesting other evaluations.
Li (2014)	To compare Chinese early childhood teachers' compensation levels using the BMI and house price-to-income ratio.	For housing purchasing power: Taipei teachers have the strongest, whereas the weakest is Singapore's.

diverse, indicating a range of uses in measuring the prices of drugs, cigarettes, and smoking across countries, exploring professor salaries, and analyzing income distributions and inequality among countries and genders. In addition, the BMI is used to measure PPP and exchange rates across countries. Despite the first paper being published in 1996, the number of documents in this research field is still limited, and the overall citation count for authors and documents is not high. Furthermore, the University of Western Australia in Australia and Montclair State University in the US are taking the lead in BMI research. The research shows some recent trends in research on BMI. Notably, this index is used as a measure of currency interlinkages, cigarette prices, professor salaries and many other useful besides prices of Big Mac burgers. This is also a good indicator of inflation in countries, although this is an informal measure. This also indicates that BMI is the recognizable index used to evaluate purchasing power parity and capture the researchers' attention. The keyword "exchange rate" is the second most commonly occurring keyword. Other keywords, including comparative country studies, economics, income distribution, smoking, and tax, had lower occurrences. In contrast, keywords such as costs, drug cost, fees

and income inequality have the fewest appearances. The US had the highest contribution to publications on the BMI with 12 papers, accounting for 44 % of the top-cited countries' publications. While the US contributed the most publications, Switzerland (2 documents) and France (1 document) were the top countries in terms of citations, with 150 and 148 citations, respectively. Guindon, G. E., Tobin, S., and Yach, D., have co-authored a paper on BMI (Guindon et al., 2002), which also gets the most citations (148).

4. Future research

This section and Fig. 10 outline future research directions. The future researchers can explore the utilization of BMI in comparison and assessment of the affordability prices of goods (Guindon et al., 2002; Lal & Scollo, 2002), propose explanations for the failure of PPP in a different dimension, encompassing various countries and time periods (Click, 1996), investigate other approaches for PPP purposes rather than BMI (Bojanic et al., 2007; Fischer & Lipovská, 2018; Maesepp, 2009), evaluate the other roles of BMI as a reasonable macroeconomic indicator (O'Brien & de Vargas, 2017; Orkideh & Vidya, 2021; Vo, 2017), evaluate the importance of BMI in academic area (Soh, 2013).

Moreover, this study suggests that future research should extend the BMI for assessing and comparison purposes in other targets or other areas. In addition, it suggests enhancing the robustness of the BMI by addressing the identified limitations. Furthermore, it is recommended that future studies employ various indicators of the robustness of PPP.

The future roles of BMI indicators in academic research should be explored rather than computing the actual value, acting as macroeconomic indicators such as gender wage inequality. Investigating the use of BMI for future currency prediction and exploring its roles within academic research would be valuable topics for future research. These areas of inquiry hold interest at both academic and research levels.

5. Limitations

This study provides intriguing insights into BMI, despite several limitations. Firstly, the research query encompassed various keywords associated with BMI, including big mac index, bigmac index, big-mac index, macparity, mac parity, big Macparity, and big mac parity in keywords, abstracts, and title. Nevertheless, despite these efforts, the number of published documents on this topic remained relatively low. Furthermore, it is important to note that given Scopus database was extracted thus, this study may not possibly include all of the BMI-related publications. Additionally, it is worth considering that the study's analysis on citation could have been influenced by the Matthew effect, where highly cited documents are referenced without researchers necessarily verifying their quality (Nobanee & Ellili, 2023).

6. Conclusions

This study employs bibliometric, evolutionary, and systematic analysis to examine the current trends and developments in research on



Fig. 10. Directions for future research.

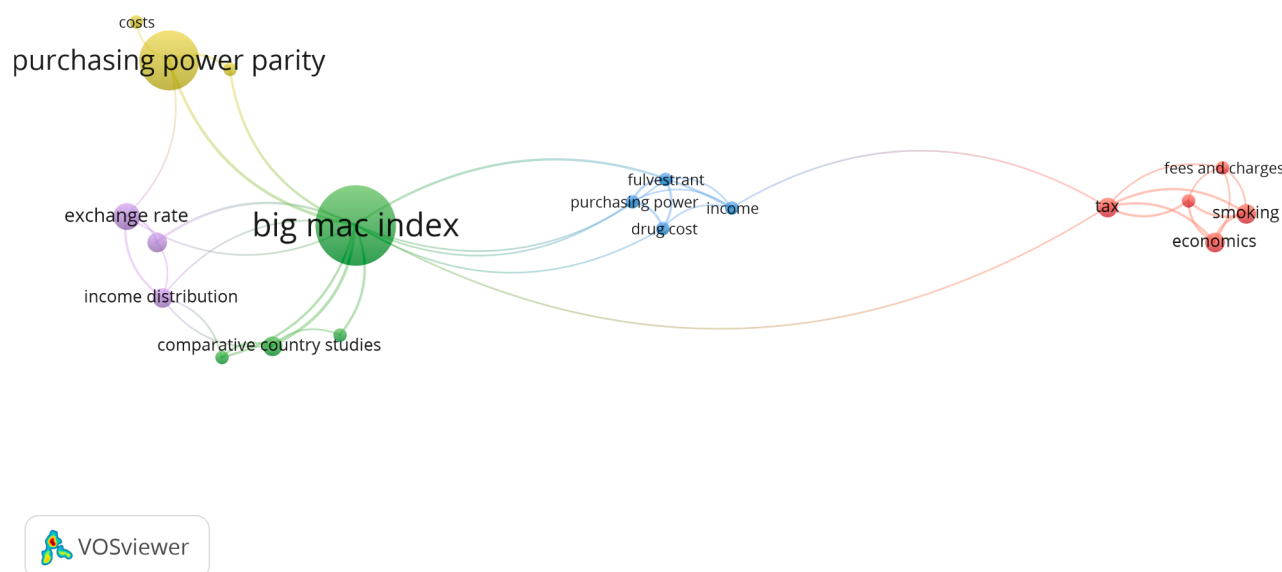


Fig. 11. A Visualization map of the most frequent keywords.

BMI from 1996 to 2023. The study provides insights into the landscape of BMI research by identifying top-cited documents, top journals, influential authors, organizations, and leading countries. Through cluster and content analysis, various streams within BMI have been identified, covering a wide range of topics such as pricing drugs, cigarettes, smoking and fulvestrant, Purchasing Power Parity, income distribution and equality, exchange rates, professors' and teachers' wages, price indices and cross-country comparisons. Another notable finding of this study is the relative scarcity of BMI documents, despite the growing interest in this field in recent years. This highlights a challenge and emphasizes the need for more research papers in this field. Increasing the volume of literature in this area can enhance understanding of BMI's applications and implications. Based on the findings, several future research directions are suggested through the research questions.

Declaration of Generative AI and AI-assisted technologies in the writing process

During the preparation of this work the author(s) used Grammarly Software (<https://app.grammarly.com/>) in order to avoid errors in the English language. After using this tool/service, the author(s) reviewed and edited the content as needed and take(s) full responsibility for the content of the publication.

CRediT authorship contribution statement

Haitham Nobanee: Writing – review & editing, Visualization, Validation, Supervision, Software, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Diem Thi Hong Vo:** Writing – original draft, Visualization, Validation, Conceptualization. **Hai Hong Trinh:** Writing – original draft, Visualization, Validation, Conceptualization. **Saif Ullah:** Writing – original draft, Visualization, Validation, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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