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Foreign direct investment and economic growth: a dynamic study of measurement approaches and results

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ABSTRACT

The relationship between foreign direct investment and economic growth (FDI-EG) has been subject to extensive research. The first document related to FDI-EG research in Web of Science was published in 1992 so that the research time is close to 30 years. This article aims to make a bibliometric study to measure the FDI-EG research from different points of view. 1,075 documents with respect to FDI-EG research were collected, and a strong bibliometric analysis was carried out by Bibliometrix software and review of approaches. The Bibliometrix software has revealed the leading researchers, conceptual structure, and thematic evolution of the FDI-EG research. At the same time, reviewing the literature helps to make content analysis, the most influential document analysis, co-authorship analysis, and citation and co-citation analysis. Amongst the findings, C. Chen, *Journal of International Economics,* and the USA are the most influential researcher, journal, and country, respectively. The FDI-EG research are focussed on the technology and firm performance, research modelling, and theoretical inquiry. More discussions are made in terms of current research status, avenues for future research, advantages and drawbacks of the methods. This article helps in understanding the evolution of the FDI-EG research from the perspectives of the bibliometric and review.

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1. Introduction

Investments are the engine of economic growth (Liesbeth et al., 2009) and human development (Torabi, 2015), due to that it is an effective means to increase wealth in national economy, and human community. Amongst the multiple investments, foreign direct investment (FDI) has a vital influence on the economic growth (EG) of a nation, as a condition to attract investors to develop and improve the economy and the quality of human resources (Simionescu & Naros, 2019). The World Trade Organization (WTO) gave the definition of FDI that occurs when an investor based

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in a country acquires an asset in another country with the intent to manage that asset. The FDI contains many management dimensions, such as bonds, portfolio investment in foreign stocks. Since FDI can bring much-needed additional foreign capital, and advanced technology and improved managerial skills, it is considered as an essential part of economic growth and the financial globalisation process (Alfarro, 2017). Specially, FDI can also represent a decisive factor for EG at macroeconomic and microeconomic levels in some certain areas (Cicea et al., 2019). In general, EG could be measured by the increase of gross domestic product and the quality of life and living standards (Botha et al., 2020). FDI was the principal source of flow to the developing countries in 1990 (Mahmoodi & Mahmoodi, 2016). The characteristics of FDI are that it shows a fewer volatility degree and has an irregular pro-cyclical behaviour. Since the late 1980s and 1990s, the FDI inflows have increased rapidly almost around the world, and it is very important for less developed countries to support development and economic growth. This issue makes it necessary to reveal the development of the study between foreign direct investment and economic growth (FDI-EG). Therefore, it is an important and necessary issue for countries or organisations to study the FDI-EG research in the field of international economics. A bibliometric study of the FDI-EG is valuable to grasp the features and understand the research status from various perspectives, as scholars always suffer more from economic problems.

The purpose of this article aims to explore and provide a critical review for measuring the FDI-EG relationship according to bibliometric analysis via Bibliometrix, an open-source instrument based on R language. The contributions of this article to the FDI-EG research lie in three ways: (1) The relevant literature during past 30 years is analysed and presented with a holistic assessment to reveal the development tendency, considering leading researchers, conceptual structure, and thematic evolution. (2) With the identification of the citations of publications, the FDI-EG research is revealed to outline the different perspectives from aspects of contents, the influential documents, co-authorship, citation and co-citation. (3) An objective view of the FDI research and a profound discussion of potential future pathways for measuring FDI-EG are presented, which not only would be beneficial for scholars who are interested in this field, but also for a range of stakeholders when making the relevant economic decisions.

The structure of the article is organised as follows: We first describe the data source and methodology. Subsequently, the bibliometric results on the FDI-EG relationship are present from three aspects. This is followed by a critical review for measuring the FDI-EG relationship from different perspectives. Finally, we end the article with the discussions and conclusions.

2. Data source and methodology

2.1. Data source

In order to make a comprehensive bibliometric analysis of the FDI-EG research, a systematic search was launched to collect the literature data on the Web of Science Core Collection (WoS) database, which yields the highest quality of publications, and provides multi-disciplinary bibliographic data (Raghuram et al., 2019). Consistent

with the theme of this study, the term "foreign direct investment" is presented in the title to identify the boundary of the field, and the term "economic growth" needs to occur in the title or abstract or keywords of the publication to ensure the nature of our search. Therefore, the data search process in WoS jointly combined the search string with Boolean operator as follows:

$$\text{Database} = \text{Core Collection database};$$

$$\text{Title} = \text{foreign direct investment AND Topic} = \text{economic growth};$$

$$\text{Timespan} = 1900-2021.$$

It is noted that the data was derived on March 20, 2021, and the start searching time that set as 1900 is the earliest time in WoS system. As a result, 1,075 documents were retrieved after removing the duplicated publications, and were exported in plain text and Comma-Separated Values (CSV) file formats which contain detailed and representative perspective information, such as title, abstract, keywords, citations and references (Ji et al., 2021). Since the first document was published in *Journal of Political and Military Sociology* in 1992, with respect to direct foreign investment, safety, and levels of manufacturing growth in Asia and Latin-America (Pattnayak, 1992), the time span of collect data is close to 30 years.

2.2. Methodology

Bibliometric analysis is one of the suitable methods to look into the study of the FDI-EG research, since it could reveal the evolution and measure the inner relationship of various items with the extensive intersection and combination of statistics, philology, and information science (He et al., 2017). It has been a mature way to analyse the evolution of a journal or a subject (Shang et al., 2015) and has been widely applied in some fields, like group decision making (Wang et al., 2021), digitalisation and business models (Caputo et al., 2021) as well as journals, such as *Economic Research-Ekonomska Istraživanja* (Wang et al., 2020), and *Technological and Economic Development of Economy* (Yu et al., 2019).

This study makes the bibliometric analysis by Bibliometrix, an open-source instrument based on R language, which refers to some methods as follows: (1) Leading researchers' analysis. Researchers are key participants in driving the development within a particular field, and the productivity and impact are usually deemed as two important facets for measuring their contributions (Forliano et al., 2021). In this representation, the area of the circle is proportional to the number of publications per year, and the colour depth concerning the circle is proportional to the average annual citations since publication (Shi et al., 2020). (2) Conceptual structure analysis. The keywords are distributed in the form of dots in the two dimensional space, clearly revealing the relationship between them and the spatial distribution of the themes (Shi et al., 2020). To be specific, the stronger the relevance of the keywords, the closer they are presented in the concept structure diagram. In addition, they would be

distinguished by different colours and regions. (3) Thematic evolution analysis. Different kinds of topics would be distributed in four different quadrants, from the two dimensions of centrality and density, which allows us to have a nutshell and intuitive overview regarding the research hotspots (Cobo et al., 2011). Specifically, centrality gauges the level of inter-cluster interaction, i.e., how well the current topic is connected to other topics, while density tells us the level of intra-cluster cohesion, i.e., how tightly the keywords in the cluster are connected (Forliano et al., 2021). Topics in the first quadrant (upper-right) are usually considered as the motor topics, topics in this area are well developed and vital for building the corresponding field. Highly specialised and isolated topics are usually located in the second quadrant (upper-left). Topics in the third quadrant (bottom-left) indicate emerging topics. In contrast to the topics in the other quadrants, these topics are relatively weakly developed. Finally, with high-centrality and low-density characteristics, topics in the fourth quadrant (bottom-right) are regarded as basic topics. These topics cover important future research directions, but are not receiving effective attention at this stage (Lam-Gordillo et al., 2020). At the same time, each circle in the diagram represents a topic, the name of which is determined by the keyword with the highest frequency. Also, the size of the circle is influenced by the frequency of keyword, the higher the frequency, the larger the area of the circle.

3. The bibliometric results on the FDI-EG research

A basis of the bibliometric analysis is conducted by 1,075 documents through Bibliometrix software, and the results are presented by science mapping from the perspectives of leading researchers, conceptual structure, and thematic evolution.

3.1. Leading researchers

Figure 1 depicts the year-wise distribution of the 20 most productive authors during the period 1995 to 2019 with citations. Obviously, it can be seen that the seminal author C. Chen from the Australian National University constantly produces research on FDI-EG, with an uninterrupted series of papers from 1995 to 2019. Preliminary work on FDI-EG entitled "The role of foreign direct investment in China's post-1978 economic development" was published in *World Development*, revealing the positive stimulating effects of FDI on China's economic reforms (Chen et al., 1995). Apart from C. Chen, C.F. Tang and Y. Wang are scholars who have been more active in the FDI-EG field in recent years. In terms of longevity, J.W. Lee and B. Li have both published consistently for more than 15 years over the course of their careers and are in the second and third positions respectively. Notable here is that most articles are generated from the 2010s onwards. It implies that the field of FDI-EG has gained ongoing academic attention in the last decade, thus attracting researchers to submit their research results. Conversely, the indicator total citations per year is deployed to assess the impacts of publications written by researchers. In the specific case of the influential articles, C.F. Tang, J.W. Lee and M. Shahbaz received the higher number of citations per year. For instance, J.W. Lee posted an article in 1998 called "How

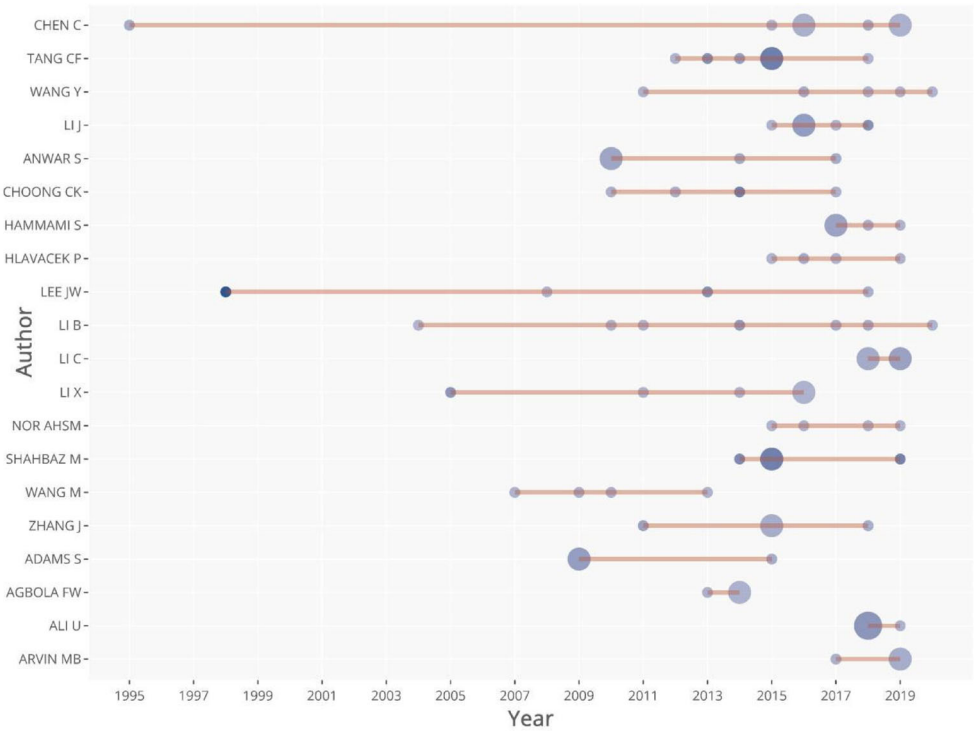

Figure 1. Top authors' production over the time (1995-2019).
Source: Authors' own research.

does foreign direct investment affect economic growth?", which illustrated that FDI is an essential tool for technology transfer and contributes relatively more to growth than domestic investment and has been cited 1,782 times thus far (Borensztein et al., 1998). This reflects, in part, their outstanding contributions to the FDI-EG research.

3.2. Conceptual structure analysis

In this part, we exploit the conceptual structure function embedded in Bibliometrix to explore the conceptual structure landscape of the FDI-EG research. According to Aria and Cuccurullo (2017), diverse dimensionality reduction techniques could be employed to achieve the identification of conceptual structure, including multidimensional scaling (MDS), multiple correspondence analysis (MCA) and correspondence analysis (CA). In this study, we adopt MCA, a generalisation of CA. By using the top 50 high frequency keywords in the FDI-EG literature, thus, three clusters of documents communicating similar concepts are outlined and exhibited in Figure 2. As a supplementary instruction, Figure 3 gives a detailed presentation on the topic dendrogram of hierarchical cluster analysis within the top 50 high frequency keywords plus in the field of FDI-EG. Combining the outcomes of Figures 2 and 3, it could be easily observed that the first cluster (in red) contains 9 keywords, suggesting the concerns on technology and firm performance. Cluster two (in blue) involves the most keywords (30 keywords), paying more attention on the research in modelling. Whilst

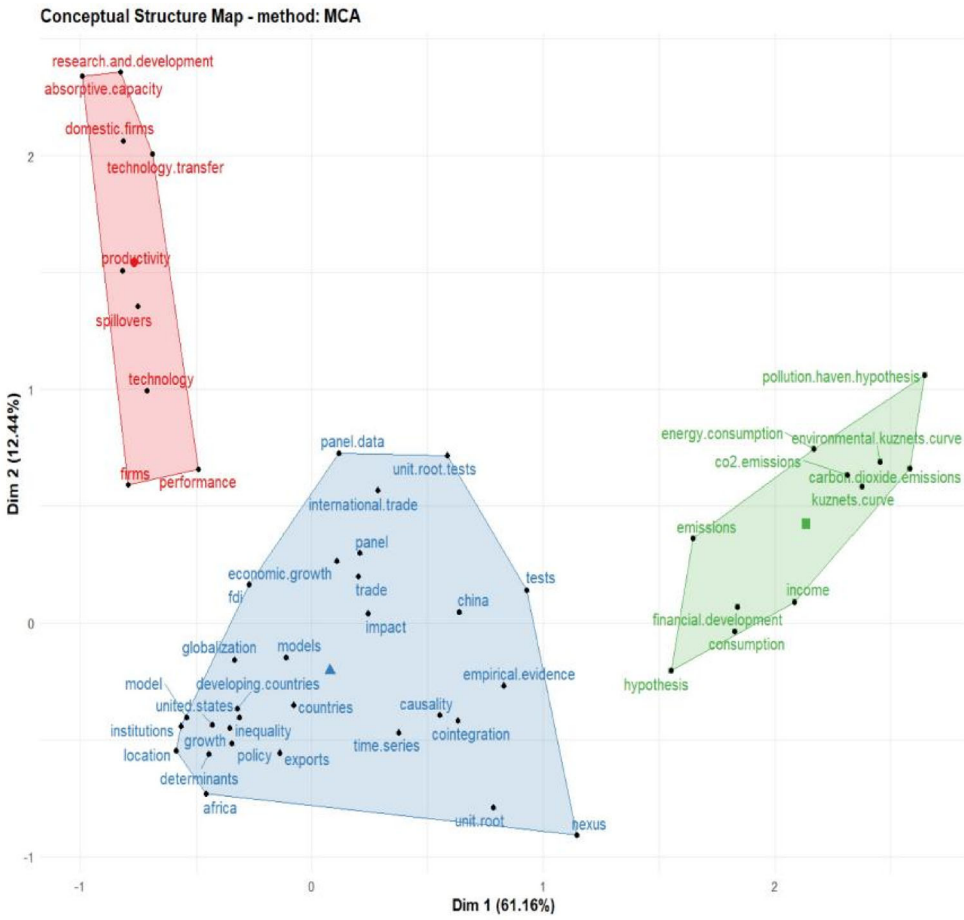

Figure 2. Conceptual structure map.
Source: Authors' own research.

cluster three (in green) is dealing with theoretical inquiry, 11 keywords are classified and grouped.

In addition, the most contributing papers associated with each cluster could be investigated via Bibliometrix, as reported in Figure 4. For cluster one, five papers are detected. To name a few, Huang et al. (2012) developed a threshold model using the data from 29 Chinese provinces from 1985 to 2008 so as to analyze the relationship between FDI spill-over effects and regional innovation. The results showed that regional innovation has a significant double-threshold effect on FDI productivity spill-over. Focussing on work related to the developing countries, Alfarro (2017) tried to understand how FDI affects the host economies. Besides, Zhang and Chen (2020) empirically examined the influence of China's outward FDI on its export sophistication. The investigation results indicated that accelerating economic development and increasing absorptive capacity could boost the contribution of outward FDI to the complexity of China's exports.

An equal number of five articles in the cluster two are identified. To be specific, taking the Beijing-Tianjin-Hebei region as an example, Zhu et al. (2017) examined

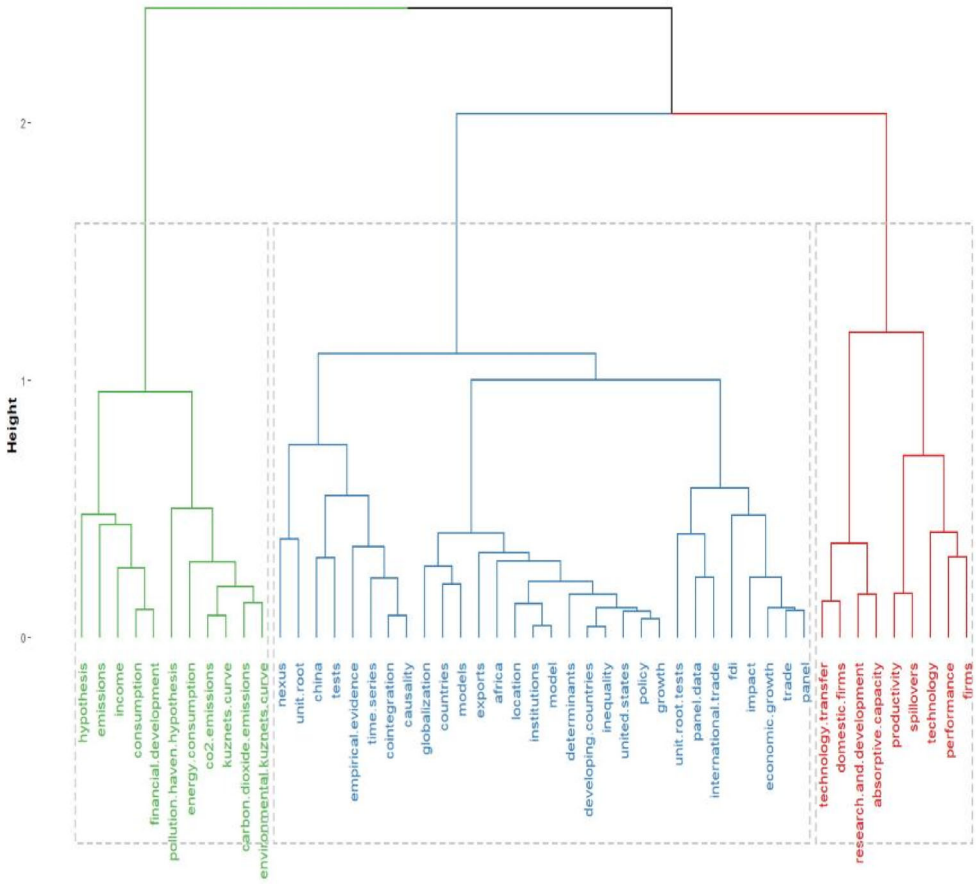

Figure 3. Topic dendrogram of hierarchical cluster analysis of keywords plus in the field of FDI-EG.
Source: Authors' own research.

the spatial impact of FDI on sulfur dioxide emissions. The findings depicted that FDI has a significant positive effect on sulfur dioxide emissions, put differently, an additional inflow of FDI would raise local air pollution levels. Uzar (2019) explored the relationship between FDI and carbon dioxide emission based on the race to the bottom methodology in Turkey during 1970 to 2014. Empirical analysis showed that Environmental Kuznets Curve is valid. The relationship between FDI and economic growth is a long-studied relationship in the economic literature and is of particular significance for the economic and social development of any country. For this reason, with the help of bibliometric analysis, Cicea and Marinescu (2020) combed some phenomena of economic reality. Furthermore, four documents with the highest contributions are found in the cluster three. For example, in a multivariate framework, Shahbaz et al. (2015) explored the nonlinear correlation between FDI and environmental degradation. In their work, the pollution haven hypothesis was verified. What is more, there was a bidirectional causal connection between CO_2 emissions and FDI at the global level. Based upon a panel data analysis, Ansari et al. (2019) pointed out that FDI reduces environmental degradation and thus the pollution haven hypothesis is not valid in Southeast Asia. Zafar et al. (2020) examined the effects of FDI and

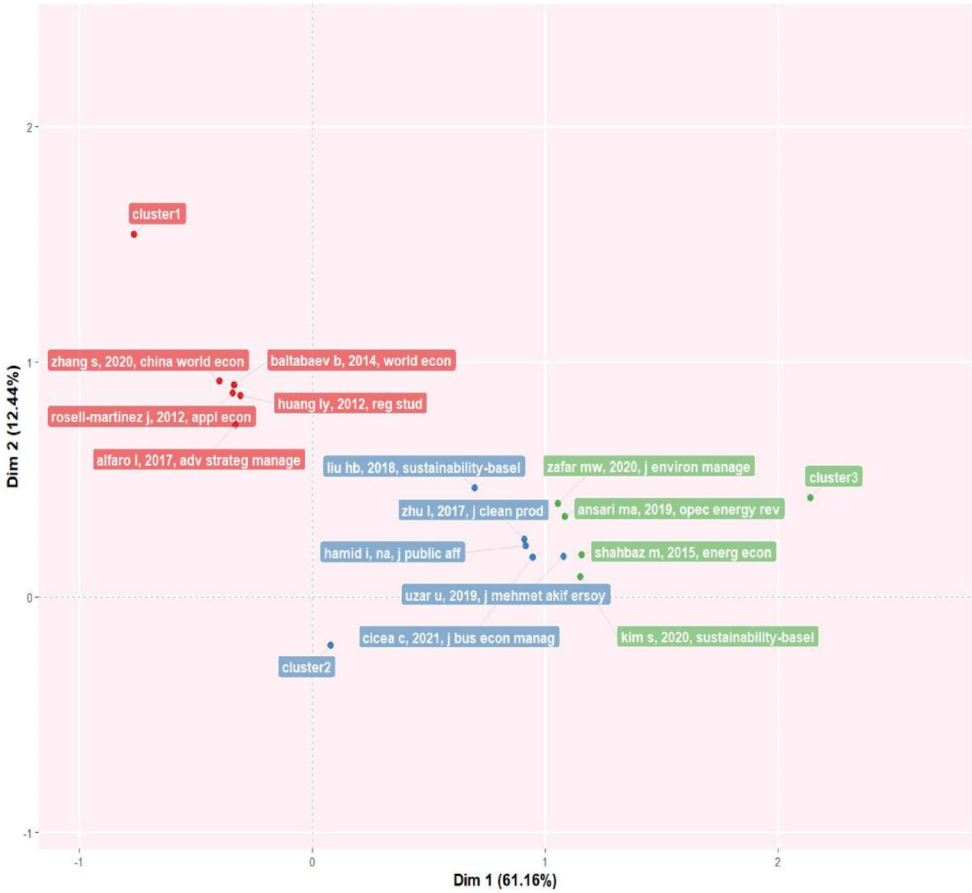

Figure 4. Factorial map of the documents with the highest contributions.
Source: Authors' own research.

education on environmental quality via controlling for income, energy consumption and urbanisation levels in Asian countries from 1990 to 2018.

3.3. Thematic evolution analysis

To comprehend the knowledge structure in different periods addressed by the authors, based on a dynamic perspective, we conduct a thematic evolution analysis on FDI-EG literature from 1992 to 2021. By performing a co-occurrence analysis for top 500 high frequency keywords plus and setting the number of cutting points (in year) for our collection as three, the three cut-off points 2012, 2016 and 2019 are identified. As a result, the strategic diagrams for four consecutive sub-periods, 1992-2012, 2013-2016, 2017-2019 and 2020-2021 are produced, as illustrated in Figure 5. This is quite logical, since limited papers are issued in early years and abundant articles are published in recent years (see Figure 1).

In terms of the two-dimensional distribution of topics, the majority of topics are located in the second and fourth quadrants. Studies related to spill-over efficiency,

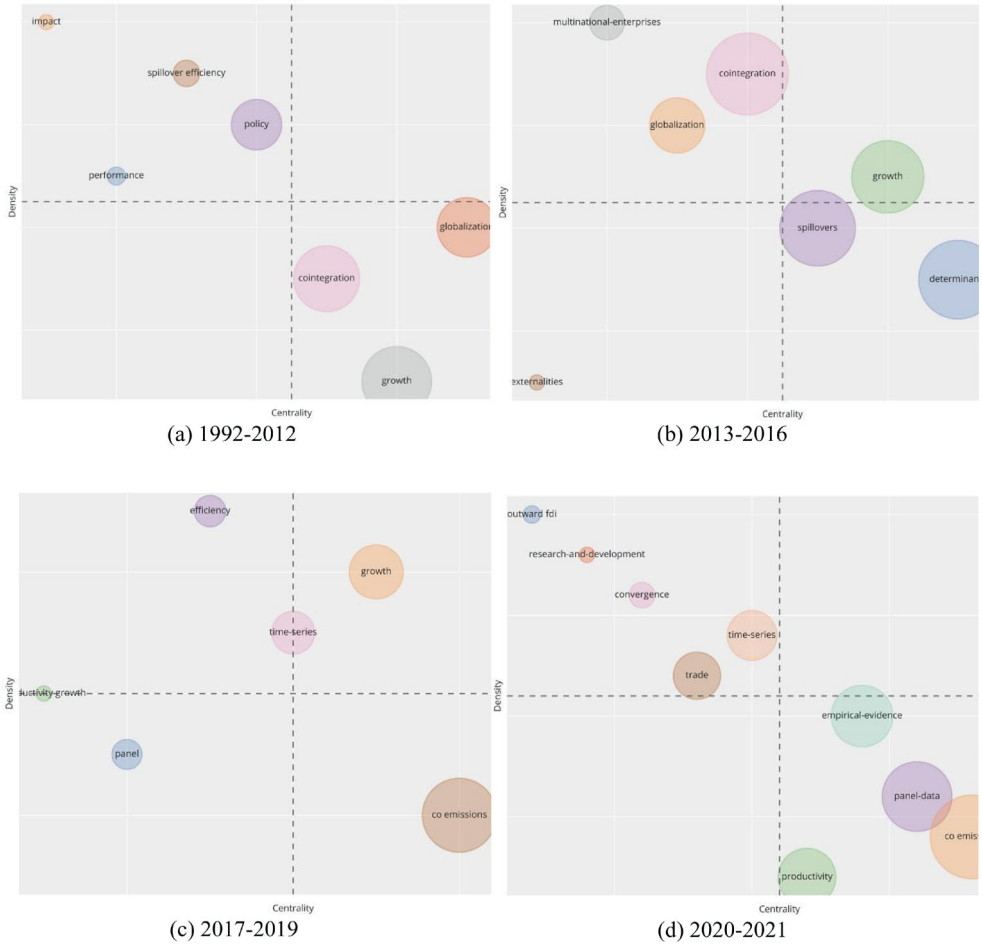

Figure 5. Strategic diagrams of FDI-EG research (1992-2021).
Source: Authors' own research.

policy, cointegration, outward FDI and so on in the second quadrant are well developed internally, but their influence is lacking. Topics in the fourth quadrant have changed to a greater extent over time. Between 1992 and 2012, research on globalisation, cointegration and economic-growth are mainstream subjects. Then, transversal topics between 2013 and 2016, i.e., spill-overs, determinants and FDI, become the high impact subjects. For the period 2017 to 2019, the FDI from the previous period is retained and new CO_2 emissions is emerged. And more recently (2020-2021), in addition to economic-growth and CO_2 emissions, which have already appeared earlier, three additional themes arise that have not been fully developed. In this sense, these sunrise topics leave a broad avenue for future research. On the flip side, from the first to the last sub-period, we can easily find that the overall number of topics is increasing despite the decreasing time horizon. This reflects the growing richness and diversity of work in the FDI-EG field, which has led to a wide variety of research branches.

Concretely, Figure 6 summarises the evolution process concerning the above topics over time by using a Sankey diagram. From an overall perspective, since the first sub-

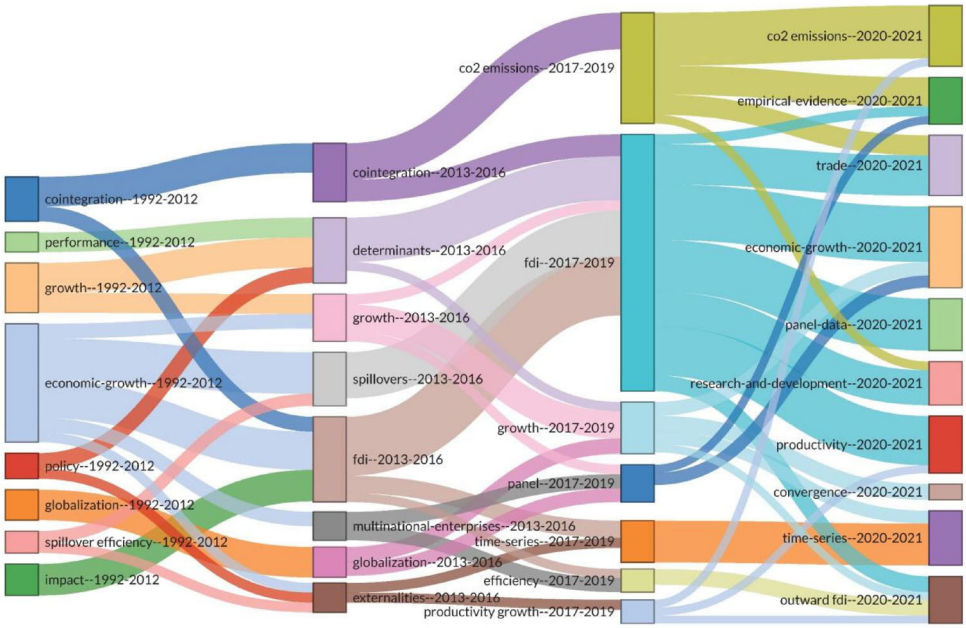

Figure 6. Thematic evolution of FDI-EG research (1992-2021).
Source: Authors' own research.

period gives birth to eight topics, subsequent topics have been differentiated, integrated and regenerated on its basis, indicating a good succession and coherence of FDI-EG research. More importantly, the third sub-period evolves to the fourth sub-period when the differentiation of topics is most obvious, which once again confirms the complexity and refinement of FDI-EG research in recent years.

4. Review of approaches for measuring the FDI-EG research

In this section, the FDI-EG research is measured by review of approaches from four aspects, i.e., content analysis, the most influential documents analysis, co-authorship analysis, citation and co-citation analysis.

4.1. Content analysis

Over time, scholars have studied the nature of the FDI-EG relationship affected by various factors under complex environment from different points of view. Most researchers appreciate the crucial role of FDI for economic growth, and the FDI-EG research has become a central point to initiate economic recovery measures under the uncertain environment especially affected by the epidemic. Table 1 lists three main attitudes of the nature of the FDI-EG relationship.

Osei and Kim (2020) found that the positive impact of FDI-EG depends on a country's level of financial market development, because it increases the efficiency of investment and lead to different phrases' increases in growth. Considering complex factors, such as the scope for efficiency spill-overs to domestic firms, FDI-EG

Table 1. The nature of the FDI-EG relationship identified in the relevant literature.

The nature of the FDI-EG relationship	Representative references
Positive	Osei and Kim (2020); Khan et al. (2019); Li and Liu (2005)
Ambivalent	Li and Resnick (2003); Mawugnon and Qiang (2011); De Mello (1997)
Curvilinear relationship	Shahbaz et al. (2019); Hanif et al. (2019)

Source: Authors' summary based on the literature review.

Table 2. The factors for the FDI-EG relationship identified in the relevant literature.

The factor for the FDI-EG relationship	Representative references
Financial development	Hermes and Lensink (2003); Macek et al. (2020)
Technology transfer	Borensztein et al. (1998); De Mello (1999)
Exports, imports and inflation	Ameer et al. (2017); Mahmoodi and Mahmoodi (2016)
Political relations	Song et al. (2020); Rădulescu and Druica (2014); Jensen (2003)

Source: Authors' summary based on the literature review.

Table 3. The FDI-EG research in different fields of activity identified in the relevant literature.

The activity of the FDI-EG research	Representative references
Tourism	Bezic and Radic (2017); Broz et al. (2015)
Agriculture	Cicea et al. (2020)
Construction and building	Dylewski and Adamczyk (2012)
Environment	Pao and Tsai (2011); Sarkodie and Strezov (2019); Salahuddin et al. (2018)

Source: Authors' summary based on the literature review.

relationship presents an ambivalent relationship (Mawugnon & Qiang, 2011). Moreover, there are some curvilinear relationships referred to long-run and short-run impacts of fossil fuels consumption and FDI-EG on carbon emissions (Hanif et al., 2019; Shahbaz et al., 2019). Recent studies have demonstrated that there is a string econometric connection of FDI-EG relationship (Hagan & Amoah, 2019).

By and large, the literature shows that the economic effects of FDI are contingent on many factors, such as financial development, technology transfer, export and imports, and country policies. Table 2 provides some factors for the FDI-EG relationship in the literature. Empirical evidence regarding the connection of FDI-EG that the benefits of FDI vary across countries and sectors, and its impact on EG depends on the financial development of the host economy. The development of the financial system of the recipient country is an important precondition for FDI to have a positive impact on economic growth (Hermes & Lensink, 2003). Borensztein et al. (1998) suggested that FDI is an important vehicle for the transfer of technology, contributing relatively more to growth than domestic investment. The economic benefits of attracting multinational corporations come at tremendous political costs, arguing that democratic political systems attract lower levels of international investment than their authoritarian counterparts (Jensen, 2003).

Up to now, the FDI-EG research has been widely developed and studied in various fields of activities, where some are listed in Table 3. Bezic and Radic (2017) was to investigate the causal relationship between foreign direct investment in tourism and tourism gross value added in Croatia. Shahbaz et al. (2015) investigated the nonlinear correlation between foreign direct investment and environmental degradation. In case of UAE covering the period of 1975-2011, FDI, trade openness and carbon emissions decline energy demand, while economic growth and clean energy have positive impact on energy consumption (Sbia et al., 2014). To summarise, there are different

perspectives to make the FDI-EG research, because it would promote productivity and improve employment, export markets in the host county.

4.2. The most influential documents analysis

A vital issue in the FDI-EG research is the influence on the academic and industrial fields. The number of citations is an important indicator to measure the quality of the document. According to the dataset related to the FDI-EG research, Table 4 lists the top 10 highly total cited documents, and Table 5 lists the top 10 highly average cited documents. It is noted that Tables 4 and 5 rank in terms of the number of citations (NC) and the number of average citations (AC) respectively, and contain some indicators to describe the detailed information of documents, such as source, type, published year, the number of author (AN), the number of institution (IN), and the number of countries/regions (CN). The interesting phenomenon is that all documents in Table 5 were accomplished by cooperation, and six of them are transnational cooperation, while the number of the situations are more than Table 4. The reason may be that the published years of documents in Table 4 are most before 2010, while documents in Table 5 are published in recent 10 years. With the development of the society and technology, it is more convenient to have the cooperation. In addition, the characteristic indicates that it seems to be an effective way to make great contributions on academic research, and it would be the tendency because of the cross of multi-disciplinary and convenient international communication.

The citation analysis shows that the most influential document with respect to the FDI-EG research was written by Borensztein et al. (1998) and published in *Journal of International Economics*, with the highest NC (1,788) and the highest AC (74.50) that are far ahead of the second one. Specifically speaking, the results of the top 10 highly total cited documents revealed that FDI is an important vehicle for the transfer of technology, contributing relatively more to growth than domestic investment (Borensztein et al., 1998). FDI contributes to economic growth only when a sufficient absorptive capability of the advanced technologies is available in the host economy (Balasubramanyam et al., 1996). Democratic political systems attract higher levels of FDI inflows both across countries and within countries over time (Jensen, 2003). The net effect of democracy on FDI inflows is contingent on the relative strength of these two competing forces. Both property rights protection and democracy-related property rights protection encourage FDI inflows; after controlling for their positive effect through property rights protection, democratic institutions reduce FDI inflows (Li & Resnick, 2003). Although FDI is expected to boost long-run growth in the recipient economy via technological upgrading and knowledge spill-overs, the extent to which FDI is growth-enhancing depends on the degree of complementarity and substitution between FDI and domestic investment (De Mello, 1999). In attracting FDI, developing countries should strictly examine the qualifications for foreign investment or to promote environmental protection through the coordinated know-how and technological transfer with foreign companies to avoid environmental damage (Pao & Tsai, 2011). The ultimate impact of FDI on output growth in the recipient economy depends on the scope for efficiency spill-overs to domestic firms, by which FDI leads

Table 4. The top 10 highly total cited documents related to the FDI-EG relationship.

Rank	Title	Source	Type	Year	NC	AC	AN	IN	CN
1	How does foreign direct investment affect economic growth?	Journal of International Economics	Article	1998	**1,788**	74.50	3	4	3
2	Foreign direct investment and growth in EP and IS countries	Economic Journal	Article	1996	**453**	17.42	3	1	1
3	Democratic governance and multinational corporations: Political regimes and inflows of foreign direct investment	International Organization	Article	2003	**430**	22.63	1	1	1
4	Reversal of fortunes: Democratic institutions and foreign direct investment inflows to developing countries	International Organization	Article	2003	**422**	22.21	2	2	1
5	Foreign direct investment-led growth: evidence from time series and panel data	Oxford Economic Papers-New Series	Article	1999	**421**	18.30	1	1	1
6	Multivariate Granger causality between CO2 emissions, energy consumption, FDI (foreign direct investment) and GDP (gross domestic product): Evidence from a panel of BRIC (Brazil, Russian Federation, India, and China) countries	Energy	Article	2011	**407**	37.00	2	1	1
7	Foreign direct investment in developing countries and growth: A selective survey	Journal of Development Studies	Article	1997	**377**	15.08	1	1	1
8	When and where does foreign direct investment generate positive spill-overs? A meta-analysis	Journal of International Business Studies	Review	2009	**330**	25.38	2	2	2
9	Foreign direct investment, financial development and economic growth	Journal of Development Studies	Article	2003	**322**	16.95	2	2	1
10	Foreign direct investment and economic growth: An increasingly endogenous relationship	Word Development	Article	2005	**311**	18.29	2	2	1

Source: Authors' summary based on the literature review.

Table 5. The top 10 highly average cited documents related to the FDI-EG relationship.

Rank	Title	Source	Type	Year	NC	AC	AN	IN	CN
1	How does foreign direct investment affect economic growth?	Journal of International Economics	Article	1998	1,788	**74.50**	3	4	3
2	Effect of foreign direct investments, economic development and energy consumption on greenhouse gas emissions in developing countries	Science of the Total Environment	Article	2019	199	**66.33**	2	1	1
3	The effects of electricity consumption, economic growth, financial development and foreign direct investment on CO2 emissions in Kuwait	Renewable and Sustainable Energy Reviews	Review	2018	157	**39.25**	4	4	4
4	Multivariate Granger causality between CO2 emissions, energy consumption, FDI (foreign direct investment) and GDP (gross domestic product): Evidence from a panel of BRIC (Brazil, Russian Federation, India, and China) countries	Energy	Article	2011	407	**37.00**	2	1	1
5	The impact of energy consumption, income and foreign direct investment on carbon dioxide emissions in Vietnam	Energy	Article	2015	250	**35.71**	2	1	1
6	Investigation of the environmental Kuznets curve for carbon emissions in Malaysia: Do foreign direct investment and trade matter?	Energy Policy	Article	2014	271	**33.88**	3	1	1
7	Foreign direct Investment-CO2 emissions nexus in Middle East and North African countries: Importance of biomass energy consumption	Journal of Cleaner Production	Article	2019	100	**33.33**	3	4	4
8	Fossil fuels, foreign direct investment, and economic growth have triggered CO2 emissions in emerging Asian economies: Some empirical evidence	Energy	Article	2019	93	**31.00**	4	4	2
9	A contribution of foreign direct investment, clean energy, trade openness, carbon emissions and economic growth to energy demand in UAE	Economic Modelling	Article	2014	216	**27.00**	3	4	3
10	Does foreign direct investment impede environmental quality in high-, middle-, and low-income countries?	Energy Economics	Article	2015	179	**25.57**	4	5	3

Source: Authors' summary based on the literature review.

to increasing returns in domestic production, and increases in the value-added content of FDI-related production (De Mello, 1997). There is a curvilinear relationship between spill-overs and the host country's level of development in terms of income, institutional framework and human capital (Meyer & Sinani, 2009). The development of the financial system of the recipient country is an important precondition for FDI to have a positive impact on economic growth (Hermes & Lensink, 2003). The interaction of FDI with human capital exerts a strong positive effect on economic growth in developing countries, while that of FDI with the technology gap has a significant negative impact (Li & Liu, 2005).

In Table 5, most documents were published in recent 10 years considering the indicator AC, which is different from documents in Table 1. Therefore, top 10 highly total cited documents show the classical theory or results with respect to FDI-EG research, while top 10 highly average cited publications can be regarded as the hot topic or directions related to FDI-EG research. Except for two documents that are both in Tables 1 and 2, the main findings of the rest documents are summarised in the following. FDI inflows with clean technological transfer and improvement in labour and environmental management practices will help developing countries to achieve the sustainable development goals (Sarkodie & Strezov, 2019). Findings indicate that economic growth, electricity consumption, and FDI stimulate CO2 emissions in both the short and long run (Salahuddin et al., 2018). Energy consumption, FDI and income are the key determinants of CO2 emissions in Vietnam. Adoption of clean technologies by foreign investment is important in curtailing CO2 emissions in the country, and sustaining economic development at the same time (Tang & Tan, 2015). The inverted-U shaped relationship does exist between economic growth and CO2 emission in both the short- and long-run for Malaysia after controlling for two additional explanatory variables, namely FDI and trade (Lau et al., 2014). The link between economic growth and carbon emissions is inverted-U and N-shaped, and the connection between biomass energy use and CO2 emissions is also bidirectional (Shahbaz et al., 2019). FDI is a source of environmental degradation that increases carbon emissions at the domestic level, thus reducing the consumption of fossil fuels and fostering an environmentally friendly economic growth strategy in these developing countries will prove helpful for the well-being of this part of the developing world (Hanif et al., 2019). FDI, trade openness and carbon emissions decline energy demand. Economic growth and clean energy have positive impact on energy consumption (Sbia et al., 2014). The bidirectional causality between CO2 emissions and FDI is observed globally, and they are sensitive to different income groups and regional analyses (Shahbaz et al., 2015). As we can see, the most popular topic about FDI has focussed on environment, energy, carbon emissions, and sustainable development. Scholars in economic or business fields could refer documents in Tables 4 and 5 for inspiring new ideas.

4.3. Co-authorship analysis

From the viewpoint of social network, co-authorship analysis could mine the structure of scientific collaboration and the status or characteristics of individual

Table 6. The top 10 countries/regions of publications in co-authorship analysis.

Rank	Country/Region	Citations	Documents	Total link strength
1	USA	**7,298**	157	72
2	England	**2,853**	65	62
3	China	**2,210**	**197**	**101**
4	South Africa	**1,982**	24	14
5	Chile	**1,782**	2	2
6	Malaysia	**1,598**	55	25
7	Australia	**1,329**	50	32
8	France	**1,202**	25	24
9	Pakistan	**932**	41	47
10	Turkey	**863**	56	17

Source: Authors' summary based on the literature review.

researchers. Table 6 provides the top 10 countries/regions of documents related to FDI-EG research in co-authorship analysis, ranked according to the number of citations. The indicator "total link strength" means that the total number of co-authorships between the target country/region and other countries/regions.

In terms of the number of citations, the USA ranks the first (7,298), which is far ahead of the second one, i.e., England (2,853), followed by China (2,210), South Africa (1,982), and Chile (1,782). As we can see, top 10 highly cited countries/regions cover six continents, and countries/regions from Europe, Asia, and America have the great contributions on FDI-EG research. According to the number of documents and total link strength, documents from China take the first place, followed by USA, and England, indicating that authors from these countries/regions have made more researchers about FDI-EG, and preferred to have domestic or international cooperation. It is noted that although the number of documents and total link strength for Chile are only 2, the high citations are very significant, representing that these two documents make the great contributions that scholars almost recognised the contents and cite them. To sum, the FDI-EG research has been a popular subject covered 100 countries/regions. Documents from the USA have been more recognised and cited, while China has the most documents and cooperation.

4.4. Citation and Co-citation analysis

Citation analysis is a useful research method and has become one of the main contents in bibliometrics. According to the literature data related to FDI-EG research, Table 7 gives the top 10 highly cited sources of documents in citation analysis. Here, document corresponds to the number of the published source or journal, and the indicator "total link strength" means that the total number of citations between the target source and other sources.

The results show that two documents published in *Journal of International Economics* have cited 1,810 times so that the journal ranks the first. Combined with total link strength, the journal has been cited by 334 sources, and also indicated the great influential impact with respect to the FDI-EG research. The second place is *Word Development,* where 17 documents have been cited 992 times by 217 sources. Compared with the first one, the journal has published more documents but less total link strength, representing that the first source has been more widely recognised and cited. Then, the rank follows by *Energy* (935), *International Organization* (894), and

Table 7. The top 10 highly cited sources of documents in citation analysis.

Rank	Source	Citation	Document	Total link strength
1	Journal of International Economics	**1,810**	2	334
2	World Development	**992**	17	217
3	Energy	**935**	4	110
4	International Organization	**894**	3	64
5	Journal of Development Studies	**886**	6	209
6	Renewable and Sustainable Energy Reviews	**778**	7	145
7	Energy Policy	**749**	5	124
8	Economic Modelling	**699**	16	223
9	Economic Journal	**638**	2	151
10	Applied Economics	**518**	16	146

Source: Authors' summary based on the literature review.

Table 8. The top 10 highly cited sources of documents in co-citation analysis.

Rank	Source	Citation	Total link strength	Impact factor	Rank in Economics
1	Journal of International Economics	**1,147**	48,683	2.255	91/373
2	World Development	**946**	44,321	3.869	33/373
3	American Economic Review	**928**	41,277	5.558	9/373
4	Energy Policy	**859**	46,897	5.042	13/373
5	Journal of Development Economics	**692**	30,427	2.649	73/373
6	Journal of Econometrics	**651**	30,384	1.577	162/373
7	Quarterly Journal of Economics	**606**	28,159	11.375	1/373
8	Applied Economics	**563**	26,233	1.103	230/373
9	Journal of International Business Studies	**562**	35,683	9.158	3/373
10	Economic Modelling	**545**	28,534	1.930	113/373

Source: Authors' summary based on the literature review.

Journal of Development Studies (886). These journals have published the most influential documents, which make great contributions to the FDI-EG research. There is an interesting phenomenon that the journal with more documents does not mean with more total link strength or citations, but it is the fundamental premise to cite the document in the journal. Therefore, the high-quality documents would enhance the impact of the journal.

Co-citation analysis is a semantic similarity measure for documents that make use of citation relationships, which is different from the citation analysis. It is defined as the frequency with which two documents are cited together by other documents (Small, 1973). When at least one other document cites two documents in common, we regard it as co-cited. Table 5 lists the top 10 highly cited sources of documents in co-citation analysis with some detailed indicators, i.e., total link strength, impact factor, and rank in Economics. The more co-citations two documents in the source receive, the higher their co-citations. Here, "total link strength" means that the total number of co-citations between the target source and other sources.

As we can see, sources/journals in Table 8 appear to have great impact in the same category considering impact factor and rank in the field of Economics. *Journal of International Economics* also ranks the first with 1,147 citations and 48,683 total link strength, followed by *World Development*, *American Economic Review*, *Energy Policy*, and *Journal of Development Economics*. The results indicate that scholars who are interested in FDI-EG research have tended to reference popular or similar research directions published in the high-level journals, due to that these sources have more co-citations. On the other hand, it provides a forward-looking assessment

on documents similarity in these sources. The reason is that citations that a document receives in the future depend on the evolution of the FDI-EG research, thus the co-citation frequencies would still change. Overall, these sources have been paid attention by the researcher studied the FDI-EG relationship.

5. Discussions

According to the above-mentioned analysis, we make further discussions considering the current research status and avenues for future research, and advantages and drawbacks of measurement approaches.

5.1. Current status and avenues for future research

The FDI-EG research has been subject to extensive study, and refers to many dimensions and fields. After bibliometric analysis and review literature, current research status has more focussed on technology and firm performance, research modelling, and theoretical inquiry. On the one hand, scholars have paid attention to how the relationship of FDI-EG changes with one another factor. For example, does increased democracy promote or jeopardise FDI inflows to less-developed countries? How about the impact of FDI on capital accumulation, and output and total factor productivity growth in the recipient economy? How about the effect of the FDI, economic development, and energy consumption on greenhouse gas emissions? On the other hand, in term of the numbers of documents and citations, scholars in the USA, China, and England have made more contributions on the FDI-EG research. Considering the sources, several popular and influential journals have published more documents about the FDI-EG research, such as *Journal of International Economics, Word Development,* and *American Economic Review*. These sources provide the good reference for researchers to study the current status related to FDI-EG research.

According to the thematic evolution and the most influential documents analysis, the study of the relationship of FDI-EG and CO_2 emissions has been emerged. In order to aid sound economic policy making for improving environmental quality and sustainable economic development, recent studies have more focussed on the FDI-EG, clean energy, carbon emissions and environmental degradation. After all, these studies would be helpful for the well-being of this part of the developing world and foster an environmentally friendly economic growth strategy in countries. In addition, the epidemic has affected global economic development, under such a complex and uncertain environment, what impact or measures for FDI-EG is also a popular topic. Therefore, these topics about economic and environment leave a broad avenue for future research.

5.2. Advantages and drawbacks of measurement approaches

FDI is an important element of the global economy and a central component of economic development strategies of countries. The article has made a bibliometric and review study to measure the FDI-EG research. Our measurement approaches have

Table 9. Advantages and drawbacks of bibliometric and review measurement approaches.

Measurement approach	Advantages	Drawbacks
Science mapping analysis	Perceptual intuition	Non-deep understanding, data limited to database
Content analysis	Flexibility for scholars	Scholar subjectivity
Co-authorship analysis	Cooperation comparability	Data limited to database
Citation analysis	Impact comparability	Limited to self-citation, data limited to database
Co-citation analysis	Similarity comparability	Data limited to database

Source: Authors' summary based on the literature review.

identified the relevant literature from different points of view, and the main advantages and drawbacks of each approach in this study are summarised in Table 9.

As is evident from Table 9, there is no perfect measure approach for the FDI-EG research. Nevertheless, each measurement method has its features to identify the FDI-EG literature from various aspects. Science mapping analysis carries the advantage of perceptual intuition, but the limitation lies in the data source that focuses on the Web of Science database, which may lead to some missed documents. Content analysis carries the benefit of high flexibility for the scholars, but the scholar subjectivity may compromise the validity and reliability during the research process. Co-authorship analysis, citation analysis, and co-citation analysis have advantages of cooperation comparability, impact comparability, and similarity comparability, respectively, while the drawbacks are similar to the science mapping analysis. Although there are some limitations, this study provides a comprehensive and multidimensional views of the FDI-EG research, which have important implications for researchers, policy makers, and practitioners.

6. Conclusions

In conclusion, the bibliometric and review study on the 1,075 documents measures the research of foreign direct investment and economic growth from different points of view, and reveals the fundamental features, conceptual structure and thematic evolution with regard to the FDI-EG research. These measurement approaches integrate the relevant study of past, present, and future in terms of various items, and the evidences indicate that FDI-EG research is a popular subject or topic to make research combined with other factors.

The main findings are summarised as follows:

1. C. Chen has produced on FDI-EG research with the longest time from 1995 to 2019, and J.W. Lee and B. Li have both published consistently for more than 15 years and are in the second and third positions respectively. To some extent, this shows their long-term contributions to the FDI-EG research.
2. *Journal of International Economics* is the most influential journal in the FDI-EG field according to the citation analysis, followed by *Word Development*, *Energy*, *International Organization*, and *Journal of Development Studies*. These journals have published the most influential documents that have been recognised by scholars and made great contributions to the FDI-EG research.
3. The FDI-EG research has been a popular subject covered 100 countries/regions. Documents from the USA have been more recognised and cited, while China has the most documents and cooperation. The USA ranks the first in term of

citations by co-authorship analysis, followed by England, China, South Africa and Chile. This reflects that researchers from these countries/regions pay more attention to the FDI-EG research, and they have established great cooperation and made good contribution on this field.

4. The conceptual structure map reflects that the FDI-EG research has been mainly focussed on the technology and firm performance, research modelling, and theoretical inquiry, which are key research directions in the FDI-EG field. Meanwhile, Bibliometrix has also investigated the most contributing papers associated with each point to make further discussions.
5. There are four consecutive sub-periods for thematic evolution, i.e., 1992-2012, 2013-2016, 2017-2019 and 2020-2021. In the first sub-period, globalisation, cointegration and economic-growth are mainstream subjects. Research on spill-overs, determinants and FDI, becomes the high impact subjects between 2013 and 2016. Later, the FDI from the previous period is retained and new CO_2 emissions is emerged from 2017 to 2019. In the last sub-period, economic-growth, CO_2 emissions, and other three additional themes that have not been fully developed arise. These sunrise topics leave a broad avenue for future research. In addition, thematic evolution confirms the complexity and refinement of FDI-EG research in recent years.

Facing the dynamic environment and the strategy of sustainable development, this study provides the possible hot topics and makes some profound discussions about current statue and future avenues. In the future, we will go on paying attention to the development of the FDI-EG research, and more advanced approaches will further be used to make comprehensive measurement and analysis.

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References

Alfarro, L. (2017). Gains from foreign direct investment: macro and micro approaches. *World Bank Economic Review*, *30*, 2–15.

Ameer, W., Xu, H. L., & Alotaish, M. S. M. (2017). Outward foreign direct investment and domestic investment: evidence from China. *Economic Research-Ekonomska Istraživanja*, *30* (1), 777–788. https://doi.org/10.1080/1331677X.2017.1314824

Ansari, M. A., Khan, N. A., & Ganaie, A. A. (2019). Does foreign direct investment impede environmental quality in Asian countries? A panel data analysis. *OPEC Energy Review*, *43*(2), 109–135. https://doi.org/10.1111/opec.12144

Aria, M., & Cuccurullo, C. (2017). bibliometrix: An R-tool for comprehensive science mapping analysis. *Journal of Informetrics*, *11*(4), 959–975. https://doi.org/10.1016/j.joi.2017.08.007

Balasubramanyam, V. N., Salisu, M., & Sapsford, D. (1996). Foreign direct investment and growth in EP and IS countries. The Economic Journal, *106*(434), 92–105. https://doi.org/10.2307/2234933

Bezic, H., & Radic, M. N. (2017). Tourism foreign direct investment led tourism gross value added: a co-integration and causality analysis of Croatian tourism. *Economic Research-Ekonomska Istrazivanja*, *30* (1), 1443–1460.

Borensztein, E., De Gregorio, J., & Lee, J. W. (1998). How does foreign direct investment affect economic growth? *Journal of International Economics*, *45*(1), 115–135. https://doi.org/10.1016/S0022-1996(97)00033-0

Botha, I., Botezatu, M. A., & Coanca, M. (2020). Innovative calculation model for evaluating regional sustainable development. *Economic Computation and Economic Cybernetics Studies and Research*, *54*(3), 5–24.

Broz, T., Buturac, G., & Tkalec, M. (2015). To what extent does Croatia really cooperate with SEE countries in the fields of foreign trade, direct investment and tourism? *Economic Research-Ekonomska Istraživanja*, *28* (1), 879–906. https://doi.org/10.1080/1331677X.2015.1092703

Caputo, A., Pizzi, S., Pellegrini, M. M., & Dabić, M. (2021). Digitalization and business models: Where are we going? A science map of the field. *Journal of Business Research*, *123*, 489–501. https://doi.org/10.1016/j.jbusres.2020.09.053

Chen, C., Chang, L., & Zhang, Y. M. (1995). The role of foreign direct-investment in china post-1978 economic-development. *World Development*, *23*(4), 691–703. https://doi.org/10.1016/0305-750X(94)00143-M

Cicea, C., & Marinescu, C. (2020). Bibliometric analysis of foreign direct investment and economic growth relationship. *Journal of Business Economics and Management*, *22*(2), 445–466. https://doi.org/10.3846/jbem.2020.14018

Cicea, C., Popa, I., Marinescu, C., & Ștefan, S. C. (2019). Determinants of SMEs' performance: Evidence from European countries. *Economic Research-Ekonomska Istraživanja*, *32* (1), 1602–1620. https://doi.org/10.1080/1331677X.2019.1636699

Cicea, C., Subic, J., & Turlea, C. (2020). Specific economic efficiency indicators of investments in agriculture. *Journal of Central European Agriculture*, *11*(3), 255–264.

Cobo, M. J., López-Herrera, A. G., Herrera-Viedma, E., & Herrera, F. (2011). An approach for detecting, quantifying, and visualizing the evolution of a research field: A practical application to the Fuzzy Sets Theory field. *Journal of Informetrics*, *5*(1), 146–166. https://doi.org/10.1016/j.joi.2010.10.002

De Mello, L. R. (1997). Foreign direct investment in developing countries and growth: A selective survey. *Journal of Development Studies*, *34*(1), 1–34. https://doi.org/10.1080/00220389708422501

De Mello, L. R. (1999). Foreign direct investment-led growth: evidence from time series and panel data. *Oxford Economic Papers*, *51*(1), 133–151. https://doi.org/10.1093/oep/51.1.133

Dylewski, R., & Adamczyk, J. (2012). Economic and ecological indicators for thermal insulating building investment. *Energy and Buildings*, *54*, 88–95. https://doi.org/10.1016/j.enbuild.2012.07.021

Forliano, C., De Bernardi, P., & Yahiaoui, D. (2021). Entrepreneurial universities: A bibliometric analysis within the business and management domains. *Technological Forecasting and Social Change*, *165*, 120522. https://doi.org/10.1016/j.techfore.2020.120522

Hagan, E., & Amoah, A. (2019). Foreign direct investment and economic growth nexus in Africa New evidence from the new financial fragility measure. *African Journal of Economic and Management Studies*, *11*(1), 1–17. https://doi.org/10.1108/AJEMS-05-2019-0180

Hanif, I., Raza, S. M. F., Gago-de-Santos, P., & Abbas, Q. (2019). Fossil fuels, foreign direct investment, and economic growth have triggered CO2 emissions in emerging Asian economies: Some empirical evidence. *Energy*, *171*, 493–501. https://doi.org/10.1016/j.energy.2019.01.011

He, X. R., Wu, Y. Y., Yu, D. J., & Merigo, J. M. (2017). Exploring the ordered weighted averaging operator knowledge domain: A bibliometric analysis. *International Journal of Intelligent Systems*, *32*(11), 1151–1166. https://doi.org/10.1002/int.21894

Hermes, N., & Lensink, R. (2003). Foreign direct investment, financial development and economic growth. *Journal of Development Studies*, *40*(1), 142–163. https://doi.org/10.1080/00220380412331293707

Huang, L. Y., Liu, X. M., & Xu, L. (2012). Regional innovation and spillover effects of foreign direct investment in China: A threshold approach. *Regional Studies*, *46*(5), 583–596. https://doi.org/10.1080/00343404.2010.520694

Jensen, N. M. (2003). Democratic governance and multinational corporations: Political regimes and inflows of foreign direct investment. *International Organization*, *57*(3), 587–616. +. https://doi.org/10.1017/S0020818303573040

Ji, B., Zhao, Y., Vymazal, J., Mander, Ü., Lust, R., & Tang, C. (2021). Mapping the field of constructed wetland-microbial fuel cell: A review and bibliometric analysis. *Chemosphere*, *262*, 128366. https://doi.org/10.1016/j.chemosphere.2020.128366

Khan, M. B., Xie, H. B., & Saleem, H. (2019). Direct impact of inflow of foreign direct investment on poverty reduction in Pakistan: a bond testing approach. *Economic Research-Ekonomska Istraživanja*, *32* (1), 3647–3666. https://doi.org/10.1080/1331677X.2019.1670088

Lam-Gordillo, O., Baring, R., & Dittmann, S. (2020). Ecosystem functioning and functional approaches on marine macrobenthic fauna: A research synthesis towards a global consensus. *Ecological Indicators*, *115*, 106379. https://doi.org/10.1016/j.ecolind.2020.106379

Lau, L. S., Choong, C. K., & Eng, Y. K. (2014). Investigation of the environmental Kuznets curve for carbon emissions in Malaysia: Do foreign direct investment and trade matter? *Energy Policy*, *68*, 490–497. https://doi.org/10.1016/j.enpol.2014.01.002

Liesbeth, C., Maertens, M., & Swinnen, J. (2009). Foreign direct investment as an engine for economic growth and human development: A review of the arguments and empirical evidence. *Human Rights and International Legal Discourse*, *3*, 177–227.

Li, X. Y., & Liu, X. M. (2005). Foreign direct investment and economic growth: An increasingly endogenous relationship. *World Development*, *33*(3), 393–407. https://doi.org/10.1016/j.worlddev.2004.11.001

Li, Q., & Resnick, A. (2003). Reversal of fortunes: Democratic institutions and foreign direct investment inflows to developing countries. *International Organization*, *57*(1), 175–211. +. https://doi.org/10.1017/S0020818303571077

Macek, A., Ovin, R., Divjak, M., Skoko, H., & Horvat, T. (2020). Foreign direct investments' openness in local communities - the case of Slovenia and Serbia. *Economic Research-Ekonomska Istrazivanja*, *34*(1), 1013–1032. https://doi.org/10.1080/1331677X.2020.1819848

Mahmoodi, M., & Mahmoodi, E. (2016). Foreign direct investment, exports and economic growth: evidence from two panels of developing countries. *Economic Research-Ekonomska Istraživanja*, *29* (1), 938–949. https://doi.org/10.1080/1331677X.2016.1164922

Mawugnon, A. K., Qiang, F. (2011). The relationship between foreign direct investment and economic growth in Togo [1991-2009]. In *Proceedings of the 8th International Conference on Innovation and Management* (pp. 1269–1273).

Meyer, K. E., & Sinani, E. (2009). When and where does foreign direct investment generate positive spillovers? A meta-analysis. *Journal of International Business Studies*, *40*(7), 1075–1094. https://doi.org/10.1057/jibs.2008.111

Osei, M. J., & Kim, C. J. (2020). Foreign direct investment and economic growth: Is more financial development better? *Economic Modelling*, *93*, 154–161. https://doi.org/10.1016/j.econmod.2020.07.009

Pao, H. T., & Tsai, C. M. (2011). Multivariate Granger causality between CO2 emissions, energy consumption, FDI (foreign direct investment) and GDP (gross domestic product): Evidence from a panel of BRIC (Brazil, Russian Federation, India, and China) countries. *Energy*, *36*(1), 685–693. https://doi.org/10.1016/j.energy.2010.09.041

Pattnayak, S. R. (1992). Direct foreign investment, safety, and levels of manufacturing growth in Asia and Latin-America. *Journal of Political and Military Sociology*, *20*(1), 83–106.

Rădulescu, M., & Druica, E. (2014). The impact of fiscal policy on foreign direct investments. Empiric evidence from Romania. *Economic Research-Ekonomska Istraživanja*, *27* (1), 86–106. https://doi.org/10.1080/1331677X.2014.947133

Raghuram, S., Hill, N. S., Gibbs, J. L., & Maruping, L. M. (2019). Virtual work: Bridging research clusters. *Academy of Management Annals*, *13*(1), 308–341. https://doi.org/10.5465/annals.2017.0020

Salahuddin, M., Alam, K., Ozturk, L., & Sohag, K. (2018). The effects of electricity consumption, economic growth, financial development and foreign direct investment on CO2 emissions in Kuwait. *Renewable and Sustainable Energy Reviews*, *81*, 2002–2010. https://doi.org/10.1016/j.rser.2017.06.009

Sarkodie, S. A., & Strezov, V. (2019). Effect of foreign direct investments, economic development and energy consumption on greenhouse gas emissions in developing countries. *The Science of the Total Environment*, *646*, 862–871. https://doi.org/10.1016/j.scitotenv.2018.07.365

Sbia, R., Shahbaz, M., & Hamdi, H. (2014). A contribution of foreign direct investment, clean energy, trade openness, carbon emissions and economic growth to energy demand in UAE. *Economic Modelling*, *36*, 191–197. https://doi.org/10.1016/j.econmod.2013.09.047

Shahbaz, M., Balsalobre-Lorente, D., & Sinha, A. (2019). Foreign direct Investment-CO2 emissions nexus in Middle East and North African countries: Importance of biomass energy consumption. *Journal of Cleaner Production*, *217*, 603–614. https://doi.org/10.1016/j.jclepro.2019.01.282

Shahbaz, M., Nasreen, S., Abbas, F., & Anis, O. (2015). Does foreign direct investment impede environmental quality in high-, middle-, and low-income countries? *Energy Economics*, *51*, 275–287. https://doi.org/10.1016/j.eneco.2015.06.014

Shang, G. Z., Saladin, B., Fry, T., & Donohue, J. (2015). Twenty-six years of operations management research (1985-2010): authorship patterns and research constituents in eleven top rated journals. *International Journal of Production Research*, *53*(20), 6161–6197. https://doi.org/10.1080/00207543.2015.1037935

Shi, J., Duan, K., Wu, G., Zhang, R., & Feng, X. (2020). Comprehensive metrological and content analysis of the public–private partnerships (PPPs) research field: a new bibliometric journey. *Scientometrics*, *124*(3), 2145–2184. https://doi.org/10.1007/s11192-020-03607-1

Simionescu, M., & Naros, M. S. (2019). The role of foreign direct investment in human capital formation for a competitive lobour market. *Management Research and Practice*, *11*(1), 5–14.

Small, H. (1973). Co-citation in the scientific literature: A new measure of the relationship between two documents. *Journal of the American Society for Information Science*, *24*(4), 265–269. https://doi.org/10.1002/asi.4630240406

Song, Y., Chen, B., Tao, R., Su, C. W., & Peculea, A. D. (2020). Does bilateral political relations affect foreign direct investment? *Economic Research-Ekonomska Istraživanja*, *33* (1), 1485–1509. https://doi.org/10.1080/1331677X.2020.1755880

Tang, C. F., & Tan, B. W. (2015). The impact of energy consumption, income and foreign direct investment on carbon dioxide emissions in Vietnam. *Energy*, *79*, 447–454. https://doi.org/10.1016/j.energy.2014.11.033

Torabi, G. (2015). Foreign direct investment and human development: The law and economics of international investment agreements. *Journal of Human Development and Capabilities*, *16*(2), 316–317. https://doi.org/10.1080/19452829.2015.1028813

Uzar, U. (2019). The relationship among foreign direct investment, growth, and environmental quality: Is valid "race to the bottom" in Turkey? *Journal of Mehmet Akif Ersoy University Economics and Administrative Sciences Faculty*, *6*(2), 439–451.

Wang, X. X., Xu, Z. S., & Skare, M. (2020). A bibliometric analysis of Economic Research-Ekonomska Istrazivanja (2007-2019). *Economic Research-Ekonomska Istraživanja*, *33*(1), 865–886. https://doi.org/10.1080/1331677X.2020.1737558

Wang, X. X., Xu, Z. S., Su, S.-F., & Zhou, W. (2021). A comprehensive bibliometric analysis of uncertain group decision making from 1980 to 2019. *Information Sciences*, *547*, 328–353. https://doi.org/10.1016/j.ins.2020.08.036

Yu, D. J., Xu, Z. S., & Saparauskas, J. (2019). The evolution of "Technological and Economic Development of Economy": a bibliometric analysis. *Technological and Economic Development of Economy*, *25*(3), 369–385. https://doi.org/10.3846/tede.2019.10193

Zafar, M. W., Qin, Q. D., Malik, M. N., & Zaidi, S. A. H. (2020). Foreign direct investment and education as determinants of environmental quality: The importance of post Paris Agreement (COP21). *Journal of Environmental Management*, *270*, 110827. https://doi.org/10.1016/j.jenvman.2020.110827

Zhang, S., & Chen, C. L. (2020). Does outward foreign direct investment facilitate China's export upgrading? *China & World Economy*, *28*(5), 64–89. https://doi.org/10.1111/cwe.12328

Zhu, L., Gan, Q. M., Liu, Y., & Yan, Z. J. (2017). The impact of foreign direct investment on SO2 emissions in the Beijing-Tianjin-Hebei region: A spatial econometric analysis. *Journal of Cleaner Production*, *166*, 189–196. https://doi.org/10.1016/j.jclepro.2017.08.032