THE EFFECT OF FOREIGN DIRECT INVESTMENT ABROAD AND EXPORTS ON ECONOMIC GROWTH: BRICS

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Abstract

The main purpose of this paper is to examine the causality and long-run relationship between outward foreign direct investments (OFDI), exports, and home country economic growth for the BRICS countries during the period 1992-2018. To achieve this objective, panel data was used, Johansen Fisher Panel Co Integration Test were applied along with the error correction model to detect causality in the long run. The empirical results revealed the presence of a panel long-run and short-run relationship between OFDI and GDP. On the other hand, long-term exports and GDP moved together in the long run, but there was no short-term causal relationship between exports and GDP.

Keywords: Outward FDI, Exports growth, Economic growth, Co-integration, BRICS countries.

Jel classification : F43, F21, C21, C22

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أثر الاستثمار الأجنبي المباشر والصادرات على النمو الاقتصادي
حالة دول البريكس

ملخص:

تحاول هذه الدراسة اختبار العلاقة السببية طويلة المدى بين الاستثمار الأجنبي المباشر الصادر (OFDI) والصادرات من جهة، والنمو الاقتصادي من جهة ثانية، لدول البريكس خلال الفترة 1992–2018. حيث تم الاعتماد على بيانات البانل؛ من خلال تطبيق اختبار جوهانسون–فيشر لبيانات البانل، ونموذج تصحيح الخطأ لكشف السببية في المدى الطويل. من أهم النتائج التجريبية لهذه الدراسة وجود علاقة بين الاستثمار الأجنبي المباشر الصادر والناتج المحلي الإجمالي في المدى الطويل والمدى القصير، كما تتحرك الصادرات والناتج المحلي الإجمالي معًا على المدى الطويل، أضف الى ذلك وجود علاقة سببية طويلة الاجل من الصادرات نحو الناتج المحلي الاجمالي رغم عدم وجودها في المدى القصير.

كلمات مفتاحية: الاستثمار الأجنبي المباشر الصادر، الصادرات، النمو الاقتصادي، بيانات البانل، بريكس.

تصنيف *JEL*: *F43, F21, C21, C22*.

L'IMPACT DE L'INVESTISSEMENT DIRECT ETRANGER SUR LES EXPORTATIONS ET LA CROISSANCE ECONOMIQUE LE CAS DES PAYS BRICS

RÉSUMÉ

L'objectif principal de cet article est d'examiner la causalité et la relation à long terme entre les investissements directs étrangers (IDE), les exportations et la croissance économique pour les pays BRICS, au cours de la période 1992-2018. Les données du panel ont été utilisées ; En appliquant le Test d'intégration de Johansen Fisher Panel, Modèle de test et de correction d'erreurs pour détecter la causalité à long terme.

Les résultats expérimentaux ont montré qu'il existe une relation entre les investissements directs étrangers sortants et le PIB à long et à court terme, et les exportations et le PIB évoluent ensemble à long terme, en plus de cela, il existe une relation à long terme. Une relation causale entre les exportations et le PIB, mais pas à court terme.

MOTS CLÉS : IDE Sortant, Croissance des Exportations, Croissance Economique, Cointégration, Pays BRICS.

CLASSIFICATION JEL : F43, F21, C21, C22

INTRODUCTION

The BRICS countries are working to enhance their export capabilities and economic cooperation, with the aim of creating

an economic bloc that is characterized by integration, flexibility and the ability to better deal with global economic challenges and opportunities. Among the efforts taken, we find:

- Focusing on diversifying its investment portfolios to reduce dependence on traditional markets in addition to exploring new markets.
- Relying on large investments in infrastructure to facilitate trade, such as improving transportation networks, ports and logistics services to reduce costs and increase efficiency.
- Working on enhancing financial cooperation through institutions such as the New Development Bank (NDB), which finances infrastructure and sustainable development projects.

There are many efforts in this regard, including, in addition to the above, those related to exports; including efforts to coordinate regulations in all BRICS countries to simplify trade operations and reduce barriers.

With regard to economic growth and foreign direct investment; For example, we find support for investment in technology and innovation and support for emerging companies in the field of technology. In addition to focusing on strategic partnerships in order to benefit from the strengths and resources that each country enjoys to achieve mutual benefit.

Many emerging countries are working to join the BRICS countries; which has encouraged Algeria, for example, to carry out deep reforms to address economic and political challenges. This includes supporting emerging institutions to advance the economy and encourage exports, and working to improve the investment climate, In addition to adopting major infrastructure projects to facilitate trade and reduce costs.

In recent years, the home country effects of foreign direct investment (FDI) phenomena have reemerged in a new form. In

the past, the outward foreign direct investment (OFDI) was mainly associated with firms that originated from developed countries. So far, however, the growing importance of OFDI from emerging economies has stimulated researchers, particularly, OFDI from BRICS (Brazil, Russia, India, China, South Africa) which has increased significantly throughout the last decade. Firms originating from these countries invest not only in neighbouring developing but also in developed economies, e.g. the OECD countries.

The use of the term 'BRICS' as a summit club, has been established for more than seventeen years by Goldman Sachs (2003) Head Economist Jim O'Neill. Actually, it belongs to the ten largest countries in the world in terms of population and of GDP. The current richest countries of the world by 2050. Goldman Sachs predicts China and India to be the dominant global suppliers of manufactured goods and services. Likewise, Brazil and Russia will become similarly dominant suppliers of raw materials. For Brazil, it dominates soy and iron ore, while Russia has enormous supplies of oil and natural gas. Together, they are likely to become the most important commodity suppliers to India and China. According to a survey of the Boston Consulting Group, large companies from these countries are about to become major global players and will change the global business environment with innovative business models. Therefore, FDI from BRICs countries has become an important factor in the global economy.

Notwithstanding, most previous studies about OFDI from BIRCS has focused on a single country and are based on conceptual frameworks which have been developed to analyse FDI from developed countries. Therefore, this research paper examines the impact of foreign direct investment outwarded from five BRICS countries on their home economic activities,

namely export and economic growth. This research article will also provide an empirical investigation to a pertinent research question:

What is the impact of outward foreign direct investment (OFDI) in BRICS countries on economic growth?

In doing so, the paper used observation on foreign direct investment, and exports on BRICS economy during the period of 1992-2018, by examining the short run and long run effect of FDI and export on economic growth. Perhaps (we use perhaps when are not certain), more importantly while other researches use two-step (Engle and Granger, 1987) method or the maximum likelihood technique of Johansen and Juselius (1990) which requires a large sample size for validity, this research employs a newly developed method bounds testing (VECM).

The hypotheses of the study are as follows:

- Outward foreign direct investment leads to a significant increase in the economic growth of the BRICS countries in the short and long term.
- There is a positive relationship between exports and outward foreign direct investment to the BRICS countries

This paper reads as follows : The next section on theory and empirical reviews the extent literature. This part is followed by the development of hypotheses. The next section includes the methodology, data analysis and results. The following section discusses the findings and their implications.

1. LITERATURE REVIEW

Today, the inflows of foreign direct investment FDI were encouraged to expand exports of the country as FDI would bring

along with additional capital, the attendant advantages of technology, managerial know-how, and marketing expertise with access to global, regional and expanding home country markets. Therefore, both developed and developing countries try to get biggest share of the pie by increasing their parts in global trade based on the inward of foreign direct investment. More specifically, as the East Asian experience has shown.

This section is dedicated to the theoretical and empirical background relevant for assessing the growth effects of outward FDI. First, we begin with a discussion of the potential effects of foreign investment activities on the domestic production activities of multinational firms. Next, we consider the possible qualitative impact of outward FDI on the domestic economy as a whole.

1.1 Theoretical literature review

The relationship between outward foreign direct investment (OFDI) and the economic growth of host countries has been the subject of many studies, particularly in industrialized nations. Some argue that when companies shift parts of their production to foreign countries, it leads to a reduction in OFDI, which can then have a negative impact on employment, production, investment, and exports in their home countries.

In contrast, proponents of outward foreign direct investment (OFDI) argue that it allows firms to enter new markets, import lower-cost intermediary goods, and access foreign technology. As a result, this increases the competitiveness of the home country in trade and investment. The conventional theory assumes that firms must choose between investment and

exports, as movements of capital can influence the trading activities of the home country.

In literature, three types of investment are usually distinguished: horizontal FDI, vertical FDI and technology-sourcing FDI. When a firm decides to serve foreign markets through local production rather than exports and starts to produce the same product or service in numerous countries, this is technically termed horizontal or market-seeking FDI (Fayyaz, Ahmad, & Su-Chang, 2016).

International factor price differences serve as the driving force behind vertical foreign direct investment (FDI), as firms fragment their production processes across different countries to achieve the lowest possible production costs. Such relocations also result in reduced levels of home production, similar to horizontal FDI. However, the availability of lower-priced imported intermediate goods and the increased production of final goods stimulates exports, leading to improved efficiency and a stronger competitive position for the home country

The third type is technology sourcing, which occurs when a firm intends to copy or acquire foreign technology by purchasing foreign firms or establishing R&D facilities in 'foreign centres of excellence.' If foreign affiliates acquire new knowledge in terms of technological know-how, management techniques, or knowledge of consumer tastes, this knowledge can be transferred back to the parent company, positively affecting home country productivity and output (Dierk, 2010)

1.2 Empirical Literature Review

Empirical evidence, based on both macro data and firm-level data, provides inconclusive results regarding the impact of outward foreign direct investment (OFDI) on the domestic activity of parent firms. Some studies have observed that OFDI reduces the country's rate of domestic investment, while others find that OFDI stimulates domestic investment. Yet, some other studies have observed no effect.

Peter et al. (2009) attempted to assess the impact of offshoring and in-shoring on the demand for different types of labor in Denmark. They conducted a survey of 1,500 firms located in the eastern part of Denmark to identify overall offshoring and in-shoring trends. Employment impact estimates were based on data from a sub-sample of firms engaged in offshoring and/or in-shoring. Surprisingly, their results showed that between 2002-2005, more jobs were created as a result of in-shoring activities into eastern Denmark from firms outside Denmark than were eliminated due to offshoring from firms within the Danish region. Overall, highly skilled workers benefited from both offshoring and in-shoring, while low-skilled workers faced challenges.

According to Huiqun and Jinyong's (2011) study, outward foreign direct investment (FDI) from China had a positive impact on employment growth in the home country, particularly in the tertiary industry. The researchers used Johansen's cointegration technique and Toda and Yamamoto's Granger causality tests to analyze data from 1982 to 2007.

Another qualitative effect of OFDI on the home country is increased productivity, which was examined by Wen-Chung et

al. (2011) in 15 Taiwanese manufacturing industries from 1991 to 2007. They concluded that OFDI in other countries enhances productivity in Taiwan.

Ludo and Reth (2011) provided evidence on the employment impact of outward foreign direct investment (OFDI). They found that Belgian multinational enterprises with foreign affiliates in higher-wage European countries tend to employ more labor at home as they increase their production in the host country. However, they did not find any evidence of employment reallocation between parents and affiliates operating in lower-wage European countries during the period of 1999-2007.

On the other hand, a more recent study by Saileja and Narayan (2019) attempted to examine the qualitative effect of outward foreign direct investment (FDI) on human capital in BRICS countries during the period of 1985-2017. Their results showed that outward FDI had a positive impact on human capital in the short run, but in the long run, this impact was found to be insignificant. Additionally, the results indicated that outward FDI significantly contributed to the economic growth of BRICS countries, both in the short and long term. Furthermore, panel causality analysis revealed a bidirectional relationship between outward FDI and human capital, indicating that improvements in skilled labor through education could facilitate an increase in outward investment.

Among the studies that investigate The relationship between foreign direct investment and economic growth (FDI-EG) we find: Xinxin Wang, Zeshui Xu, Yong Qin & Marinko Skare (2022) 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.
Among the important studies is what was done by Joo, B. A., & Shawl, S. (2023) in which they examined the impact of foreign direct Investment (FDI) on economic growth in BRICS countries using a dynamic panel autoregressive distributed lag (ARDL) model, The research covers a period between (1987-2018), and investigates both short run and long run relationships between FDI I
inflows and various macroeconomic variables (macroeconomic stability , human capital , financial development , and trade openness), the findings indicate a long run cointegration among these variables and economic growth in BRICS countries.

In the case of small developing economies, there is little empirical evidence for firms that wish to invest abroad, as they face a different business environment with several barriers. These barriers include a small domestic market, which makes it difficult to achieve economies of scale, and a limited supply of specialized resources. In this setting, Ramon and Caroline (2016) examined firm-level strategies and the effects of the home country in a small developing economy, using a research case study of Costa Rican firms investing abroad. They found a positive relationship between external trade and outward foreign direct investment (OFDI) of Costa Rica. Furthermore, the study showed that outward investment is not only for large and mature firms, as medium and small-sized firms are also actively investing abroad.
In the context of India, the home effects of Indian outward

foreign direct investment (OFDI) are generally found to be insignificant, according to a study conducted by Indrajit & Narayanan (2012). However, the impact on turnover appears to be negative for all quartiles. Conversely, the results obtained by Jen-Eem & Shaliza (2012) from a vector error-correction model (VECM) reveal a positive long-run relationship between outward FDI and growth, as well as long-run bi-directional causation between them. However, in the short run, no Granger-causality between outward FDI and growth was found.

Regarding the quantitative home effects of OFDI, Niti & Justin (2016) examined the relationship between OFDI and exports of the home country, using panel data for ten major emerging countries from Asia over the period 1991-2012. They found evidence of long-run causality from exports to OFDI. Furthermore, exports and OFDI were found to be substitutes. However, there was no long-run causality from OFDI to exports, implying that multinational enterprises (MNEs) are not "connecting" with home country firms through backward and forward linkages in the production processes.

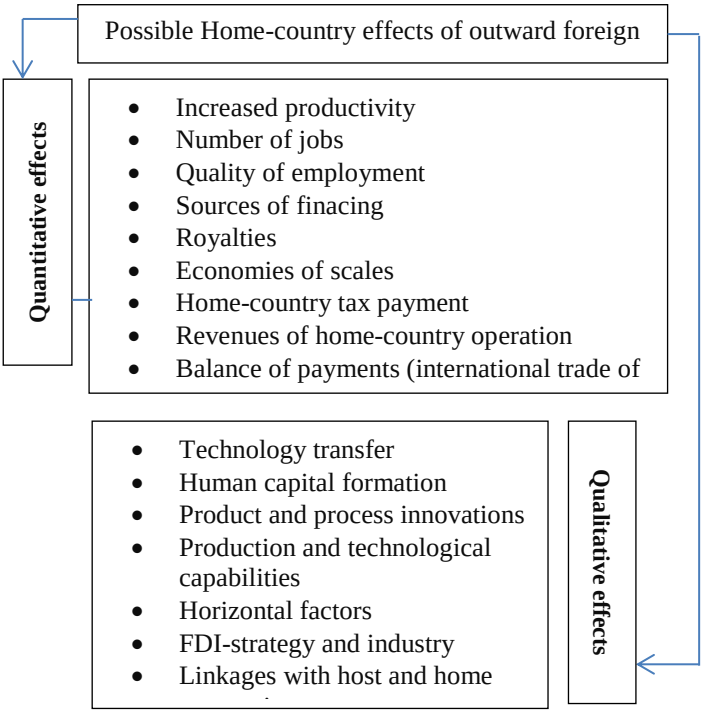
Yan et al. (2012) conducted a study to investigate the impact of outward foreign direct investment (O-FDI) on the competitiveness of home-country exports. They used a six-year dataset from Taiwanese manufacturing data for 15 industries spanning from 1991 to 2007. The study found that O-FDI by Taiwanese firms had a positive association with exports from Taiwan. Additionally, the authors observed that outward FDI complemented home country exports, which is in line with the majority of earlier empirical findings which focus on developed

home countries.

"A comprehensive review of the existing literature was conducted, and the potential effects of outward foreign direct investment (OFDI) on home countries were classified into two categories: quantitative (e.g., employment, productivity, and sources of financing) and qualitative (e.g., technology transfer and human resources formation) (Ramon & Caroline, 2016). Additionally, a set of horizontal factors that affect the intensity and characteristics of the potential effects arising from OFDI was identified (see Figure I).

Figure 1. Possible Home-country effects of outward foreign direct investment

Source: Own design based on: Ramon, P.-



Source: Own design based on: Ramon, P.-P. & Caroline, G. N., 2016. Outward FDI from small developing economies Firm level strategies and home-country effects. International Journal of Emerging Markets, 11(4), p 696.

In our work, we contribute to the field of international business by addressing gaps in the existing literature. While prior studies have focused on the determinants and motivations for direct

foreign investment, our study will focus on the qualitative effects on the home economy. Additionally, to the best of our knowledge, no previous studies have been conducted in BRICS countries or in more recent periods, which creates a contextual gap.

2- Data and Methodology

In this study, we utilized autoregressive distributed lag (ARDL) models to analyze the dynamic relationships between outgoing foreign investment, exports, and economic growth. We investigated this dynamic relationship within a time series framework using the newly developed bounds testing (ARDL) approach introduced by Pesaran et al. (2001), which is more appropriate for small sample sizes within the framework of the panel data cointegration methodology.

2.1 Data

We use panel data to analyze the relationship between outward foreign direct investment (OFDI), exports, and GDP for the BRICS countries over a 26-year period from 1992 to 2018. This time period was selected due to a lack of data availability for some of these countries for years prior to 1992. The BRICS countries are typical developing countries, namely Brazil, Russia, India, China, and South Africa. The data for FDI outflows and economic growth, as well as exports, were obtained from the World Bank (World Development Indicators).

The study takes Gross Domestic Product (GDP) as the dependent variable and uses two focused independent variables: exports and Outward Foreign Direct Investment (OFDI). Our hypothesis for the independent variables explaining economic growth is based on a review of theoretical and empirical literature. The values are calculated using data in USD at current prices, which cancels out the effect of prices and makes the data comparable. Foreign Direct Investment (FDI) is defined as net outflows (BoP,

current US$), while exports (EX) represent goods, services, and primary income (BoP, current US$). GDP is proxied by both total and per capita values, represented in current US$.

2.2 Model Specification

Time series data usually requires special attention before analysis since they are often non-stationary in nature. Therefore, it is necessary to check for potential non-stationary problems, such as unit-root, before proceeding with analysis. Ignoring unit-root problems could result in spurious regression. If time series variables are non-stationary, it is recommended to use co-integration techniques or differentiate the data according to the order of integration, and use the differenced data for analysis instead of the original data. Akcay and Demirhan (2005) argued that stationary variables can be modeled in levels, and Granger causality tests can be used. In contrast, for non-stationary variables, co-integration techniques are useful for detecting long-run relationships.

The variables underwent different diagnostic tests to conduct a time series study. Firstly, the augmented Dickey-Fuller (ADF) unit root test was used to determine the order of integration in the data. If a unit root was present, stationarity was achieved by taking the first difference of the data. Once the order of integration was established, the Engle-Granger method was applied to test for co-integration. Finally, the Autoregressive Distributed Lag (ARDL) was used to assess both the long-run and short-run relationship between the variables.

At the next and final stage, a Vector Error Correction (VEC) estimation was conducted on the paired time series to observe the long-run adjustment coefficients on the co-integrated equation of the model. Since the VEC model is a special type of

restricted Vector Autoregression (VAR), the unrestricted cointegration test and VEC pairwise Granger causality test were also conducted reasonably for the model (Wahid & Janek, 2013).

3- Empirical Results and Discussion

3.1. Preliminary Analysis

3.1.1. Panel unit root tests at the level

Macroeconomic data often contain unit roots, making it crucial to test for stationarity in panel data, as non-stationarity can invalidate empirical results and analyses. In recent years, econometricians such as Kao (1999), Levin, Lin, and Chu (LLC) (2002), Im-Pesaran-Shin (IPS) (1997), Hadri (2000), Maddala and Wu (1999), and Nyblom and Harvey (2000) have developed panel unit root tests similar to those used for single series. They argue that panel unit root tests correct issues such as size distortions and low power of single time series. This paper utilizes the LL, Ipshin, Hadri's Lagrange multiplier (LM) test, and Maddala and Wu (1999) procedures to test for the presence of a unit root (Bokpin, 2010).

The study employs five different types of panel unit root tests that have been identified in econometric literature. The purpose of these tests is to determine whether the data is stationary or not. Specifically, the study uses the Augmented Dickey-Fuller (ADF) test, the Phillips-Perron (PP) test, the Fisher Chi-Square test of Maddala and Wu (1999), as well as the Levin et al. (2002) and Im et al. (2003) tests. Additionally, four cross-sectional

dependent tests are employed: the ADF and PP Z-tests of Choi (2001), the tests of Breitung (2000), and the stationarity test of Hadri (2000). All of these tests are based on the traditional Dickey-Fuller-type regression.

The results of the panel unit root are represented in Table 1. The first part of the table contains of data showing the value of tested individual non-stationary time series at their values, and the second part of the table records data indicating common non-stationary of time series at their values.

Table 1. Results of Panel unit root tests at the level

Variable	*Individual Panel unit root tests*						*common Panel unit root tests*			
	IPS test	*ADF - Fisher Chi-square*			*PP - Fisher Chi-square*		*LLC test*		*Breitung t-stat*	
	Statistic	**Prob.****	**Statistic**	**Prob.****	**Statistic**	**Prob.****	**Statistic**	**Prob.****	**Statistic**	**Prob.****
FDI	//	//	**16.8022**	**0.0789**	**31.9254**	**0.0004**	**-0.77626**	**0.2188**	//	//
GDP	**2.11807**	**0.9829**	**10.2397**	**0.4197**	**5.09957**	**0.8844**	**0.64958**	**0.7420**	**1.95242**	**0.9746**
EX	**2.28228**	**0.9888**	**4.26889**	**0.9344**	**6.42158**	**0.7787**	**0.79232**	**0.7859**	//	//

Source: Author's estimation in E-views

Table 1 displays the results of panel unit root tests conducted on the relevant variables. At the 5% significance level, it is evident that the majority of the tests do not reject the unit root for almost all the variables in their level form. Hence, these test results confirm that all the variables used in the panel VEC model are non-stationary when analyzed in their level form.

3.1.2. Panel unit root tests at the first difference

Based on its potential, we proceeded with our analysis by conducting unit root tests on the first difference in the panel. We utilized five tests that rely on the traditional Dickey-Fuller-type regression, namely LLC, Breitung, IPS, ADF-Fisher chi-square, and PP-Fisher chi-square tests. The results are presented in Table 2 below.

Table 2: Results of Panel unit root tests at the first difference

	Individual Panel unit root tests						*Common Panel unit root tests*			
	IPS test		*ADF - Fisher Chi-square*		*PP - Fisher Chi-square*		*LLC test*		*Breitung t-stat*	
	Statistic	*Prob. ***	*Statistic*	*Prob. ***	*Statistic*	*Prob. ***	*Statistic*	*Prob. ***	*Stat*	*Prob. ***
FDI	//	//	*137.835*	*0.0000*	*366.602*	*0.0000*	*-13.18*	*0.0000*	//	//
GDP	*-2.35*	*0.0092*	*20.1372*	*0.0280*	*19.2852*	*0.0368*	*-4.72*	*0.0000*	*-3.17*	*0.0007*
EX	*-10.86*	*0.0000*	*97.2730*	*0.0000*	*109.222*	*0.0000*	*-9.16*	*0.0000*	//	//

***Source**: Author's estimation in Eviews 10*

Overall, the results suggest that the variables are non-stationary when measured at the level of the original data. However, after running tests on the first differences of the data, it becomes apparent that they are all stationary. This implies that all variables exhibit first difference stationarity (I (1)). As a result, the assumption for further testing and researching long-term relationships between the specified variables for all panels of countries is met since stationary time series have been confirmed in the first differences. These tests have soundly suggested that all variables are I (1) across all panels of countries. Accordingly, we will proceed to conduct panel co-integration tests as suggested by Pedroni (1999) and Fisher's panel co-integration

test developed by Larsson et al. (2001).

3-2. Estimation Results

3.1. Johansen Fisher Panel Co Integration Test

If two series are both integrated of order one, then the next step in our analysis is to test for cointegration. The extensive interest in and the availability of panel data has led to an emphasis on extending various statistical tests to panel data.

Recent literature has focused on tests of cointegration in a panel setting. The most popular panel cointegration tests are: Pedroni (1999), Pedroni (2004), Kao (1999) and a Fisher-type test using an underlying Johansen methodology (Maddala and Wu 1999). The Pedroni and Kao Tests are based on Engle-Granger (1987) two-step (residual-based) cointegration tests. The Fisher test is a combined Johansen test. In our analysis, we employ three kinds of panel Cointegration tests: Pedroni's (2004), Kao's (1999), and Johansen's (1988) Fisher panel Cointegration test (Anagnostou , et al., 2016).

Although, this study employs Johansen Fisher panel cointegration test in order to provide evidence for the existence of a long run relationship among variables namely; OFDI, export and GDP as well across BRICS countries.

Maddala and Wu (1999) propose an alternative approach for testing cointegration in panel data by using a Fisher-type test. They combine tests from individual cross-sections to obtain a test statistic for the full panel. Based on their results, this study applies the Johansen Fisher Panel Cointegration test by combining individual Johansen's cointegration trace tests and maximum eigenvalue tests. In Johansen's multivariate cointegration technique, the Trace Statistic tests for at most r

cointegrating vectors among a system of N > r time series, while the Maximal Eigenvalue Statistic tests for exactly r cointegrating vectors against the alternative hypothesis of r+1 cointegrating vectors (KUTLU, 2009).

The Fisher panel Cointegration test uses the number of cointegrating vectors, denoted by "k," to determine the presence of cointegration. The trace test is calculated under the null hypothesis of "k" cointegrating vectors and the alternative hypothesis of "k+1" cointegrating vectors. The maximum eigenvalue test is calculated under the null hypothesis of "k" cointegrating vectors and the alternative hypothesis of "k+1" cointegrating vectors. For each dataset in the panel, the null hypothesis is tested using the observed trace statistic and the max-eigen statistic. If the null hypothesis is rejected, then the alternative hypothesis is examined. (KUTLU, 2009). Additionally, Table 3 below shows the results of the JF cointegration test.

Table 3: Results of Johansen Fisher Panel Co integration

Johansen Fisher Panel Co integration Test					
Hypothesized No. of CE(s)	*Fisher Stat.* (From trace test)*	*Prob.*	*Hypothesized No. of CE(s)*	*Fisher Stat.* (From max-eigen test)*	*Prob.*
None	*37.47*	*0.0000*	*None*	*31.58*	*0.0000*
At most 1	*11.24*	*0.0240*	*At most 1*	*9.311*	*0.0538*
At most 2	*5.987*	*0.2001*	*At most 2*	*5.987*	*0.2001*
Trace test indicates 2 cointegrating eqn(s) at the 0.05 level ** denotes rejection of the hypothesis at the 0.05 level*					

Source: Author's estimation in EViews 10

The results indicate that the trace statistic and the max-eigen statistic of the null hypothesis are statistically significant for all sets of variables. For OFDI from BRICS countries, the trace value of 5.987 for export and GDP is well above the critical value of 11.24 at the 5% level. Therefore, we accept the null hypothesis H0 (co-integration vectors equal to two at most 2) and reject the alternative hypothesis H1 (that there are a number of co-integration vectors greater than two). Similarly, the max value for BRICS countries is 5.987, which is well above the critical value of 9.311 at the 5% significance level. Hence, we reject the null hypothesis and accept the null hypothesis. The conclusion is that there are two cointegrating vectors.

However, as noted above, the results of the two tests (Trace and Max-eigen) closely match, which suggests the presence of three long-run relations among the three variables at the 5% significance level. Thus, we can conclude from these panel cointegration tests that there is a panel long-run relationship among OFDI, GDP, and long-term export, and they move together in the long run. Since the series is cointegrated, the next step is to apply the error correction model (ECM), which we do using the vector error correction.

3.2. Vector Error Correction Estimates

After knowing the status of co-integration, the next step is to examine the direction of causal linkage among variables used in this study. The panel causality test, based on the panel VEC model, is used for this purpose. The results of panel short run and long-run causality of both the models are presented

iappendix 1.

3.2.1 Long Run Causality

Appendix 2 shows the results of estimating for the long-term error correction model; we find the error correction threshold statistically significant at 5% significant level with a negative sign (-0.000156). Thus, there is a long-term causal relationship from FDI and exports to GDP as a dependent variable, where the error correction speed is approximately 6 years as the equation below reported;

$$\boldsymbol{GDP} = \beta_1 \times (\boldsymbol{GDP}(-1) + 134.31 \times \boldsymbol{OFDI}2(-1) - 2.76e - 09 \times \boldsymbol{EX}(-1) + 66396222.59) + \beta_2 \times D(\boldsymbol{GDP}(-1) + \beta_3 \times D(\boldsymbol{GDP}(-2)) + \beta_4 \times D(\boldsymbol{FDI}2(-1)) + \beta_5 \times D(\boldsymbol{FDI2}(-2)) + \beta_6 \times D(\boldsymbol{EX}(-1)) + \beta_7 \times D(\boldsymbol{EX}(-2)) + \beta_8,$$

3.2.2 Short Run Causality

"On the other hand, Appendix 3 demonstrates the results of the Wald test, which reveal the short-term causal relationship between exports and GDP. The Fischer probability value is 0.5011 and the Chi-square probability value is 0.4989. Based on these results, both values exceed the 5% significant level, leading to the acceptance of the null hypothesis. Therefore, there is no short-term causal relationship between exports and GDP.

On the other hand, Appendix 4 shows a short-term causal relationship between OFDI and GDP, as evidenced by the Fischer probability value (F-statistic = 0.0000) and the probability value of Chi-square (Chi-square = 0.0000). Neither value exceeded the 5% significance level, leading us to reject the null hypothesis.

3.3. DISCUSSION

The primary question raised in this paper is the relationship between outward foreign direct investment, exports, and economic growth, specifically new evidence from the analysis of foreign direct investment in the BRICS countries. The most important finding of this paper is that there is a long-term causal relationship between foreign direct investment, exports, and GDP, where the error correction speed is about 6 years. This supports the long-term equilibrium hypothesis and provides evidence for the validity of the policy adopted by these countries. The empirical results reveal the presence of a panel long-run and short-run relationship between OFDI and GDP, while long-term exports and GDP move together in the long run. In contrast, there is an absence of a short-term causal relationship between exports and GDP. This result reinforces the positive role of foreign direct investment in supporting exports in the BRICS countries.

The statistical analysis of this paper concluded that foreign direct investment stimulates economic growth in BRICS countries, which requires them to adopt economic policies that enhance capital flows, create jobs, transfer technology, diversify the economy, and support sustainable development in general.

CONCLUSION

The aim of this study was to investigate the empirical relationship between outward foreign direct investment (OFDI) and the exports of the home country over both the short and long run periods in five BRICS countries - Brazil, Russia, India, China

and South Africa - for the period 1992-2018. The study adds to the existing literature on the home country effects of outward FDI. Previous studies have mainly focused on analyzing the determinants of outward FDI, whereas this study deals with the effects of OFDI on home economic growth. To the best of our knowledge, this study is the first to examine the impact of outward FDI on economic growth among emergent economies, particularly BRICS countries.

To examine the relationship among the variables, we employed the autoregressive distributed lag (ARDL) model, the Vector Error Correction Model (VECM) framework, and Wald tests. As a precondition for the test of cointegration, we also tested each return series for stationarity, and the results indicated that all the countries' return series indicated stationarity after first differencing.

Overall, the findings indicate that the Johansen's Fisher panel cointegration tests support the existence of a panel long-run relationship (unidirectional) among OFDI, economic growth with respect to exports, whereas over the short run, the home effects of the BRICS countries' OFDI are found to be insignificant. In essence, the VECM reveals that the increase of OFDI from BRICS countries is a consequence of their home economic growth. Our study can be useful for policy makers in encouraging more investment abroad due to its positive impacts on the home economy as a whole, as well as for academia and researchers in understanding the dynamics of OFDI and its impact on the home-country effects in the BRICS countries.

Finally, the results of this paper support the correctness of the general economic policies in these countries, which give great importance to outward foreign direct investment to support exports and economic growth in general. For a thorough study of these equilibrium relations, country and industry-specific effects should be taken into account in order to better understand the impact of outward FDI on exports and economic growth.

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7. APPENDICES

Appendix 1. Vector Error Correction Model

Cointegrating Eq	*Coint Eq1*		
GDP(-1)	*1.000000*		
FDI2(-1)	*134.3194*		
	(117.590)		
	[1.142361]		
EX(-1)	*-2.77E-09*		
	(5.6E-10)		
	[-4.96829]		
C	*66396223*		
Error correction	***D(GDP)***	***D(FDI2)***	***D(EX)***
Coint Eq1	*-0.000159*	*-0.000374*	*2.88E+8*
	(8.2E-05)	*(8.4E-05)*	*(5.7E+07)*
	[-1.92919]	*[-4.47508]*	*[5.03531]*

Source: Author's estimation in Eviews 10

Appendix 2. Vector Error Correction Estimates long run causality

$$D(\boldsymbol{GDP}) = \beta_1 * (\boldsymbol{GDP}(-1) + 134.319446759 * \boldsymbol{OFDI}2(-1) - 2.76652686807e - 09 * \boldsymbol{EX}(-1) + 66396222.5997) + \beta_2 * D(\boldsymbol{GDP}(-1) + \beta_3 * D(\boldsymbol{GDP}(-2)) + \beta_4 * D(\boldsymbol{FDI}2(-1)) + \beta_5 * D(\boldsymbol{FDI2}(-2)) + \beta_6 * D(\boldsymbol{EX}(-1)) + \beta_7 * D(\boldsymbol{EX}(-2)) + \beta_8,$$

	coefficient	*Std Error*	*t-statistic*	*prob*
$\boldsymbol{\beta_1}$	***-0.000156***	***8.27E-05***	***-1.890797***	***0.0613***

β_2	0.856080	0.084335	10.15099	0.0000
β_3	0.098904	0.087995	1.123967	0.2635
β_4	0.452692	0.099482	4.550477	0.0000
β_5	-0.687079	0.125254	-5.485492	0.0000
β_6	-2.17E-13	2.53E-13	-0.856593	0.3936
β_7	-2.39E-13	2.04E-13	-1.170815	0.2443
β_8	14803.32	7182.486	2.061031	0.0417

Source: Author's estimation in E-views 10

Appendix 3. Wald Test: short run causality from export to GDP

Wald test
Equation: unititled

Test statistic	value	df	Probability
F-statistic	0.695420	(2 , 108)	0.5011
Chi-square	1.390839	2	0.4989
Null Hypothesis:	$\beta_6 = \beta_7 = 0$		

Source: Author's estimation in Eviews 10

Appendix 4. Wald Test: short run causality

Wald test
Equation: unititled

Test statistic	value	df	Probability
F-statistic	19.63970	(2 , 108)	0.0000
Chi-square	93.27939	2	0.0000
Null Hypothesis:	$\beta_4 = \beta_5 = 0$		

Source: Author's estimation in Eviews 10