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Foreign Direct Investment-Growth Nexus in BRICS: How Relevant are the Absorption Capacities?

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Abstract: This study examined the impact of foreign direct investment on economic growth in BRICS using fixed effects, dynamic ordinary least squares (DOLS) and fully modified ordinary least squares (FMOLS). Panel data ranging from 1991 to 2019 was used for the purposes of this study. The same study also explored whether financial sector and human capital development are necessary absorption capacities that enhance economic growth in BRICS. To a larger extent, foreign direct investment had a negative impact on economic growth in BRICS, consistent with the dependency theory. Financial development was also found to be the channel through which economic growth is enhanced by foreign direct investment. Although the influence was observed to be non-significantly negative, human capital development improved the influence of foreign direct investment on economic growth. BRICS authorities are therefore urged to implement human capital and financial development enhancement policies to ensure significant foreign direct investment's positive influence on economic growth.

Keywords: foreign direct investment; economic growth; panel data; BRICS.

JEL classification: F21; F43; P2.

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1. INTRODUCTION

Foreign direct investment's influence on economic growth is well documented in the literature (Solow, 1956; Swan, 1956; Romer, 1986; Sanchez-Robles & Bengoa-Calvo, 2002; Adams, 2009; Zhang *et al.*, 2010; Fu *et al.*, 2011). Their argument is that foreign direct investment brings to the host country a whole lot of economic growth enhancing resources, like skills, managerial expertise, physical capital, human capital development, technology, among others. Others like Amin (1974) noted that foreign direct investment retards economic growth of the host country. Others argued for economic growth to be enhanced by foreign direct investment, certain preconditions must exist in the host country. Several empirical researchers on the subject matter also produced results which are divergent, inconsistent, mixed and far from reaching consensus. Some supported the positive foreign direct investment led growth hypothesis, others agree with the negative foreign direct investment led growth rationale whilst few produced results which show that the availability of certain absorption capacities in the host country is necessary if economic growth is to be enhanced by foreign direct investment. These mixed results, lack of consensus and divergent views on the economic growth impact of foreign direct investment prompted the author to carry out this study to contribute to literature and fill in these gaps.

The choice of BRICS as a unit of analysis is based on three reasons. Firstly, BRICS nations are emerging markets which have attracted significant amount of foreign direct investment inflows during the last two decades, consistent with Soumaré and Tchana Tchana (2015). Secondly, BRICS is an economic group of countries which have consistently and uniformly attracted huge amounts of foreign direct investment inflows.

The following four ways in which this study contributed towards literature are discussed. Majority of similar empirical research wrongly assumed that the foreign direct investment-growth nexus is a linear relationship. This study considered the fact that the relationship between economic growth and foreign direct investment is non-linear in nature. This study investigated the absorption capacities (financial development, human capital development) that are necessary for foreign direct investment's significant positive influence on economic growth. Most of the earlier similar empirical research on the subject matter did not focus on the aspect of absorption capacities. Unlike earlier related empirical research work, this study used the most recent panel data (1991-2019). Majority of relevant empirical literature focused on a single country analysis, of which the results are narrow focused. This study filled in that gap by using panel data analysis.

The remaining sections of the study are divided into eight. Section 2 deals with the literature review. Section 3 explains the influence of explanatory variables on the dependent variable. The research methodology is described and explained in Section 4. Main data analysis (correlation analysis, descriptive statistics, panel stationary tests, panel co-integration tests, final data analysis) is in Section 5. Section 6 concludes the study.

2. LITERATURE REVIEW

There are five theories and or theoretical rationales that explains the influence of foreign direct investment on economic growth. These include the endogenous growth theory, modernisation theory, neoclassical theory, dependency theory and the non-linear theoretical rationale.

According to Romer (1986), important ingredients for economic growth such as skills, managerial experience, technology and development of human capital flow alongside foreign direct investment into the host country. The modernisation theory argued that foreign direct investment forces (1) the host country's governments to liberalize both the financial and commodity markets, (2) enables social stability through creating employment opportunities and (3) promotes education of the people thereby stimulating economic growth (Sanchez-Robles & Bengoa-Calvo, 2002).

Proponents of the neoclassical theory, Solow (1956) and Swan (1956) argued that foreign direct investment's ability to bring along with it and adding physical capital stock not only improves liquidity levels in the host country but stimulates economic growth as well. The dependency theory propounded by Amin (1974) noted that an economy which is not controlled by its own local citizens cannot organically growth and is fragile and prone to instability. Such a scenario causes foreign direct investment to have a deleterious effect on the economy of the host country.

The non-linear theoretical rationale argues that the host country should have certain absorption capacities that enable foreign direct investment to enhance economic growth (Adams, 2009; Zhang *et al.*, 2010; Fu *et al.*, 2011; Tanggapan *et al.*, 2011). Tanggapan *et al.* (2011), Baharumshah and Almasaied (2009) and Shahbaz and Rahman (2010) noted that financial sector and human capital development were the existing preconditions in the host country that enhanced significant economic growth.

Apart from human capital and financial development, other absorption capacities which were observed to improve foreign direct investment's impact on the economy are technological advancement (Bailliu, 2000), smooth regulatory environment (Lean, 2008; Xie & Wang, 2009), favourable macroeconomic business environment (Adams, 2009; Azam & Ahmed, 2014; Pegkas, 2015), infrastructural development (Adams, 2009; Xie & Wang, 2009), excellent corporate governance practices (Adeoye, 2007).

The existing empirical research results falls into four categories. Firstly, is the foreign direct investment inspired positive economic growth view which was supported by Awolusi and Adeyeye (2016), Moudatsou (2003), Tshepo (2014), Chaudhury *et al.* (2020), Ayenew (2022), Gui-Diby (2014), Bekere and Bersisa (2018), Nguyen (2020), Mehdi (2011), Forte and Moura (2013), Gochero and Boopen (2020), Zain (2019) and Gudaro *et al.* (2012), among others.

In the context of Africa, Awolusi and Adeyeye (2016) using the generalised methods of moments (GMM) with panel data spanning from 1980 to 2013 explored the influence of foreign direct investment on the growth of the economy in Africa. Foreign direct investment had an insignificant enhancing influence on economic growth in Africa. Using panel data (1980-1996) analysis, Moudatsou (2003) examined the relationship between foreign direct investment and economic growth in the context of European Union. Economic growth of the European Union bloc of countries was found to have been directly or indirectly enhanced by foreign direct investment inflows. Employing time series data analysis in the context of South Africa, Tshepo (2014) explored the foreign direct investment-growth-employment nexus using data ranging from 1990 to 2013. Both economic growth and employment was found to have been positively influenced by foreign direct investment in the short and long run. Using a multi-regression analysis, Chaudhury *et al.* (2020) examined the impact of foreign direct investment on the growth of the economy in South Asian countries. The foreign direct investment sectoral composition had a huge influence on the way economic growth was affected by foreign direct investment.

Ayenew (2022) examined the influence of foreign direct investment on economic growth using the ARDL approach with data ranging from 1988 to 2019 in Sub-Saharan African nations. The short run shows that economic growth was insignificantly enhanced by foreign direct investment whilst the long run produced results which indicates that foreign direct investment had a significant enhancement effect on economic growth in Sub-Saharan Africa. Gui-Diby (2014) examined the linkage between economic growth and foreign direct investment in Africa using panel data (1980-2009) analysis, the system GMM methodology. A significant positive relationship from foreign direct investment towards economic growth was observed in the context of Africa. Bekere and Bersisa (2018) also examined a similar topic in East Africa using the dynamic GMM with panel data spanning from 1996 to 2015. A significant enhancing influence of foreign direct investment on economic growth was noted in this study.

Using Vietnam's time series annual data from 1997 to 2018, Nguyen (2020) examined the nexus between foreign direct investment, exports, aid and economic growth. The study revealed that foreign direct investment, exports and aid individually had a positive influence on the growth of Vietnam's economy. Using Middle East countries as a unit of analysis, Mehdi (2011) examined the influence of foreign direct investment on economic growth using panel data (1980-2008) analysis. Economic growth was observed to have been indirectly and directly affected by foreign direct investment. Forte and Moura (2013) examined the nexus between economic growth and foreign direct investment using literature analysis approach. Their study noted that economic growth was enhanced by foreign direct investment.

Gochero and Boopen (2020) investigated the influence of mining foreign direct investment on the growth of the Zimbabwe economy using the ARDL approach with annual time series data spanning from 1988 to 2018. The study noted that in the long run, economic growth was significantly enhanced by mining foreign direct investment. Non-mining foreign direct investment had a lower economic growth impact on the economic growth of Zimbabwe during the period under study. Zain (2019) examined the economic growth influence of foreign direct investment on the economic growth of Pakistan using multi-regression analysis with annual time series data spanning from 2000 to 2016. Economic growth of Pakistan was enhanced by foreign direct investment during the period under study. Employing the multi-regression model with time series data (1981-2010), Gudaro *et al.* (2012) studied the impact of foreign direct investment on Pakistan's economic growth trajectory. Foreign direct investment's impact on Pakistan's economy was observed to be significantly positive.

Secondly, is the foreign direct investment inspired negative economic growth views which was supported by Dinh *et al.* (2019). Using the fully modified ordinary least squares (FMOLS) and vector error correction model with data ranging from 2000 to 2014, Dinh *et al.* (2019) examined the role of foreign direct investment in influencing economic growth in developing countries. Foreign direct investment had a stimulating impact on economic growth in the long run whilst the short run produced results which shows that foreign direct investment had a deleterious effect on economic growth in developing countries.

Thirdly, is the bi-directional view between foreign direct investment and economic growth and this was supported by Makhoba and Zungu (2021), among others. The relationship between economic growth and foreign direct investment was also investigated by Makhoba and Zungu (2021) in the context of South Africa using the vector autoregressive approach with annual time series data spanning from 1960 to 2019. Their study revealed that foreign direct investment and economic growth influenced one another in the context of South Africa.

Fourthly, is the view that certain absorption capacities should exist in the host country before foreign direct investment significantly affect economic growth. The view was supported by Kulu *et al.* (2021), Mahembe and Odhiambo (2014), Baiashvili and Gattini (2020), Mamingi and Martin (2018), Borensztein *et al.* (1998), Koojaroenprasit (2012) and Mboko Ibara (2020), among others. Kulu *et al.* (2021) investigated the influence of institutions in the foreign direct investment-growth nexus in Ghana using the autoregressive distributive lag (ARDL) using secondary data (annual time series) ranging from 1995 to 2019. The complementarity between foreign direct investment and quality institutions had a better positive impact on economic growth compared to their individual influence in both the short and long run. Mahembe and Odhiambo (2014) investigated the economic growth influence of foreign direct investment using a theoretical framework analysis. Their study noted that foreign direct investment enhances economic growth through the technology and knowledge transfer channels. Baiashvili and Gattini (2020) used the GMM approach to find out the influence of foreign direct investment on economic growth in both developing and developed countries. Their study noted that the influence of foreign direct investment on economic growth is in the form of a U-shape. The influence of foreign direct investment on economic growth becomes more pronounced from low to middle-income nations.

Employing the GMM methodology with panel data spanning from 1988 to 2013, Mamingi and Martin (2018) studied the nexus between economic growth and foreign direct investment in the Organisation of Eastern Caribbean States (OECS). Foreign direct investment's positive influence on economic growth was quite minimal in the OECS group of nations. However, the complementarity between infrastructural development and foreign direct investment had a significant positive effect on the growth of the economy in the OECS countries.

In a study of 69 developing nations, Borensztein *et al.* (1998) noted that foreign direct investment enhances economic growth through technology transfer channel. The study also observed that the positive influence of foreign direct investment on economic growth was more pronounced at higher threshold levels of human capital development. Sufficient availability of advanced technology in the host country was also found to be another precondition before economic growth is significantly enhanced by foreign direct investment.

Koojaroenprasit (2012) studied the foreign direct investment's growth effects in South Korea using multiple regression analysis with annual time series data spanning from 1980 to 2009. Foreign direct investment had a strong enhancing effect on the economy of South Korea. On the other hand, the interactions between (1) human capital development and foreign direct investment and (2) exports and foreign direct investment enhanced economic growth in South Korea in a negative manner. The system GMM approach with annual panel data (1970-2019) was used by Mboko Ibara (2020) to examine the economic growth effects of foreign direct investment in the Central African Economic and Monetary Community (CEMAC) region. The study noted that foreign direct investment had a direct influence on economic growth of the CEMAC region. On the other hand, human capital development was found to have enhanced the economic growth influence of foreign direct investment in CEMAC region.

These mixed, divergent, diverse and conflicting findings from related empirical literature provides evidence that the nexus between foreign direct investment and economic growth is not yet decided and is still unsettled in the field of finance and economics. Further empirical research can still help to dissect and conclude on the influence of foreign direct investment on economic growth in BRICS. This study used BRICS as a focal point unlike

existing empirical studies which totally ignored the growth-foreign direct investment nexus in such an emerging and important emerging economic grouping.

3. EXPLANATORY VARIABLES

Table no. 1 – Economic growth function – Explanatory variables

Variable (s)	Measure used	Explanation	Expected impact on growth
Financial development (FIN)	Domestic credit to private sector (% of GDP)	The financial sector help in transferring the financial resources from the surplus sector to the deficit sector of the economy (Schumpeter, 1911). McKinnon (1973) and Shaw (1973) also argued that efficient allocation of financial resources in the economy is performed better by a developed financial sector.	+
Human capital development (HCD)	Human capital development index	Highly skilled, educated and healthy workforce is more productive and contributes more towards technological diffusion and innovation in the economy (Pelinescu, 2015).	+
Infrastructural development (INFR)	Individuals using internet (% of population)	Denisia (2010) argued that infrastructural development is one of the locational advantages of foreign direct investment, thereby indirectly enhancing economic growth. One of the ingredients which is necessary for economic growth to take place is the availability of developed infrastructure (Fedderke & Garlick, 2008).	+
Trade openness (OPEN)	Total of exports and imports (% of GDP)	Coe and Helpman (1995) argued that when the level of trade openness of a country is very high, local firms can easily acquire cheaper and efficient inputs and raw materials for their own manufacturing processes from wherever there are. International trade brings in a substantial amount of foreign currency into the country (Hart, 1983). The local industry can be badly affected because its products might not be preferred as compared to foreign products (Baltagi *et al*., 2009).	+/-
Savings (SAV)	Gross domestic savings (% of GDP)	Increased quantity of savings in the economy enhances the general level of investment and economic growth (Romer, 1986; Singh, 2010).	+
Population growth (POP)	Population growth (% annual)	Increased population growth enhances technological progress and economies of scale, which are the ingredients for economic growth (Peter & Bakari, 2018). Population growth negatively affects economic growth because increased number of people contributes to a faster depletion of natural resources, argued Sachs (2008).	+/-
Personal remittances (REMIT)	Personal remittances received (% of GDP)	According to Adarkwa (2015), personal remittances brings in foreign currency into the labour sending country, reduces liquidity constraints in the economy and enables children in remittance receiving households to attend school and acquire skills. Remittances creates overreliance on the support from relatives working outside the country therefore creating laziness among the people who remained behind. Such laziness deletes the positive effects remittances might have been able to bring into the labour sending country's economy, consistent with (Meyer & Shera, 2017).	+/-

Source: author

Net FDI inflows is a measure of foreign direct investment used whilst real gross domestic product (GDP) per capita is the proxy of economic growth employed in this study, consistent with empirical studies done by Gui-Diby (2014), Bekere and Bersisa (2018), Nguyen (2020), Mehdi (2011), Koojaroenprasit (2012), Gochero and Boopen (2020), Forte and Moura (2013), Dinh *et al.* (2019), Zain (2019), Gudaro *et al.* (2012), Pandya and Sisombat (2017) and Mboko Ibara (2020), among others. Alongside data availability considerations, the same empirical studies influenced the selection of proxies used for these variables (dependent and explanatory variables).

4. RESEARCH METHODOLOGY

4.1 Data

Panel data ranging from 1991 to 2019 for BRICS countries was employed in this study. World Development Indicators is the major database that was made use in this study.

4.2 Model descriptions

The general model specification is as follows:

$$GROWTH=f\ (FDI, FIN, HCD, REMIT, INFR, OPEN, SAV) \quad (1)$$

Empirical research which informed the use of explanatory variables in equation (1) includes but are not limited to Kulu *et al.* (2021), Awolusi and Adeyeye (2016), Moudatsou (2003), Tshepo (2014), Mahembe and Odhiambo (2014), Baiashvili and Gattini (2020), Chaudhury *et al.* (2020), Ayenew (2022), Makhoba and Zungu (2021), Mamingi and Martin (2018) and Borensztein *et al.* (1998).

Econometrically, equation (2) represents the dependent variable (economic growth), independent variable (foreign direct investment) and explanatory variables (financial development, human capital development, personal remittances, infrastructural development, trade openness, savings).

$$GROWTH_{it}= \beta_0 + \beta_1 FDI_{it}+\beta_2 FIN_{it}+\beta_3(FDI_{it}.FIN_{it})+ \beta_4 HCD_{it}+ \beta_5 REMIT_{it}+\beta_6 INFR_{it}+\beta_7 OPEN_{it}+\beta_8 SAV_{it}+ \mu + \varepsilon \quad (2)$$

Table no. 2 – Decomposition of equation 2 components

t	Time
β_0	Intercept
$GROWTH_{it}$	Economic growth in country i at time t
FDI_{it}	Foreign direct investment in country i at time t
FIN_{it}	Financial development in country i at time t
HCD_{it}	Human capital development in country i at time t
$REMIT_{it}$	Personal remittances in country i at time t

β_1 to β_8	Explanatory variables' co-efficients
$INFR_{it}$	Infrastructural development in country i at time t
$OPEN_{it}$	Trade openness in country i at time t
ε	Error
SAV_{it}	Savings in country i at time t
i	Country
μ	Time invariant and unobserved country specific effect

Source: author

Equation (2) also included the complementary variable β_3(FDIit.FINit). This information was used to examine if financial development is a channel through which foreign direct investment enhances economic growth in BRICS. It's also used to investigate the influence of the combination of foreign direct investment and financial development on economic growth in BRICS. This is consistent with earlier research work (Adams, 2009; Baharumshah & Almasaied, 2009; Shahbaz & Rahman, 2010; Zhang *et al.*, 2010; Fu *et al.*, 2011; Tanggapan *et al.*, 2011) which argued certain absorption capacities (human capital development, financial development) are necessary in the host country to enable foreign direct investment to have a significant positive impact on economic growth. Dynamic ordinary least squares (DOLS), fixed effects and fully modified ordinary least squares (FMOLS).

5. MAIN DATA ANALYSIS

Stationarity tests, co-integration tests and main data analysis constitutes this section. Table no. 8 (annex section) shows the existence of a multi-collinearity problem between infrastructural development and economic growth, consistent with Stead (2007) argument. Table no. 9 (annex section) also indicates that there are outliers in the economic growth and financial development data set (range and standard deviation indicators) and that the data for all the variables used is not normally distributed (Jarque-Bera criteria's probabilities)-see Tsaurai and Ngcobo (2018). Consistent with Aye and Edoja (2017) and to address these issues, all the data used had to be converted into natural logarithms before use.

5.1 Panel stationarity investigation

Table no. 3 – Panel stationarity results –Individual intercept

	Levin *et al.* (2002) tests	**Im *et al.* (2003) tests**	**ADF Fisher Chi Square tests**	**PP Fisher Chi Square tests**
Level				
GROWTH	-1.04	0.95	5.26	3.14
FDI	-2.22**	-2.39***	22.29**	35.98***
FIN	-0.53	0.17	8.54	11.15
HCD	-3.45***	-3.03***	27.17***	33.86***
REMIT	-3.46***	-2.86***	25.74***	20.17**
INFR	-6.51***	-4.32***	38.90***	49.19***
OPEN	-1.49**	-1.50*	17.88*	30.58***
SAV	-1.30*	-1.94**	23.03**	12.15

	Levin *et al.* (2002) tests	Im *et al.* (2003) tests	ADF Fisher Chi Square tests	PP Fisher Chi Square tests
First difference				
GROWTH	-5.27***	-4.10***	35.17***	43.19***
FDI	-6.61***	-8.14***	74.78***	112.38***
FIN	-2.39***	-4.74***	43.24***	59.17***
HCD	-9.94***	-9.83***	91.48***	122.92***
REMIT	-6.47***	-6.82***	61.38***	99.06***
INFR	-2.16**	-2.20**	20.09**	23.53***
OPEN	-3.91***	-5.73***	51.46***	90.42***
SAV	-4.02***	-4.50***	40.56***	64.53***

Source: E-Views

The data for all the variables were integrated of order 1 (stationary at first difference) - see Table no. 3. These results are an indication that all the data set were stable and stationary at first difference.

5.2 Panel co-integration tests

Table no. 4 – Johansen Fisher Panel Co-integration test

Hypothesised No. of CE(s)	Fisher Statistic (from max-eigen test)	Probability	Fisher Statistic (from trace test)	Probability
None	599.8	0.0000	164.7	0.0000
At most 1	255.3	0.0000	212.1	0.0000
At most 2	227.8	0.0000	110.6	0.0000
At most 3	124.7	0.0000	54.81	0.0000
At most 4	79.57	0.0000	37.67	0.0000
At most 5	49.63	0.0000	28.75	0.0014
At most 6	31.94	0.0004	26.06	0.0037
At most 7	23.14	0.0102	23.14	0.0102

Source: author's compilation from E-Views

According to Table no. 4 results, at most 7 co-integrating relationships were established. The results support the view that the variables used in this study have got a long run relationship, consistent with Tsaurai and Ngcobo (2018).

5.3 Main data analysis

Fixed effects and FMOLS shows that foreign direct investment had a significant negative influence on economic growth across all the three models (model 1, 2 and 3). DOLS produced results which indicates a non-significant negative relationship running from foreign direct investment towards economic growth in model 1 and 3 whilst model 2 shows the economic growth was negatively affected by foreign direct investment in a significant manner in BRICS. These results show that foreign direct investment has a deleterious influence on economic growth in BRICS, consistent with the dependency theory which argued that an economy which is not controlled by its own local citizens cannot organically growth and is fragile and prone to instability (Amin, 1974).

Table no. 5 – FDI and growth in BRICS –Fixed Effects

	Economic growth		
	(1)	**(2)**	**(3)**
FDI	-0.13***	-0.87***	-0.17*
FIN	0.42***	0.44***	0.41***
HCD	0.56	1.10**	0.47
REMIT	-0.09	-0.09*	-0.09
INFR	0.24***	0.25***	0.24***
OPEN	-0.65***	-0.62***	-0.67***
SAV	1.47***	1.43***	1.45***
FDI*FIN		0.18***	
FDI*HCD			-0.09
Number of countries	5	5	5
Adjusted R-squared	0.89	0.86	0.90
F-statistic	115	121	105
Prob(F-statistic)	0.00	0.00	0.00

Note: ***/**/* indicate 1%, 5% and 10% significance levels respectively
Source: E-Views

FMOLS and fixed effects shows a significant positive correlation running from foreign direct investment towards economic growth across all the models, results which also agrees with DOLS, model 2 and 3 in BRICS. Model 1 under DOLS shows that foreign direct investment had an insignificant positive effect on economic growth in BRICS. These results indicate that financial development enhanced economic growth in BRICS, consistent with McKinnon (1973) and (Shaw, 1973) whose studies noted that a developed financial sector enhances the efficient allocation of financial resources in the economy.

An insignificant positive influence of foreign direct investment on economic growth in BRICS was observed under the fixed effects (model 1 and 3), FMOLS (model 1, 2 and 3) and DOLS (model 2 and 3) whilst model 2 under fixed effects shows that economic growth was enhanced by foreign direct investment in a significant manner in BRICS. The results indicate that human capital development in BRICS is of paramount importance in as far as economic growth is concerned, in line with Pelinescu (2015) whose study argued that highly skilled, educated and healthy workforce is more productive and contributes more towards technological diffusion and innovation in the economy. Contrary to the available literature, model 1 under the DOLS approach noted that negative foreign direct investment's effect on economic growth was non-significant in BRICS.

Table no. 6 – FDI and growth in BRICS –Fully Modified Ordinary Least Squares (FMOLS)

	Economic growth		
	(1)	**(2)**	**(3)**
FDI	-0.16***	-0.82***	-0.21*
FIN	0.32**	0.35***	0.31**
HCD	0.35	0.98	0.46
REMIT	-0.08	-0.07	-0.08
INFR	0.27***	0.26***	0.27***
OPEN	-0.88***	-0.85***	-0.88***
SAV	1.86***	1.84***	1.84***
FDI*FIN		0.16**	

FDI*HCD			-0.16
Number of countries	5	5	5
Adjusted R-squared	0.89	0.91	0.89
Prob(F-statistic)	0.00	0.00	0.00

Note: ***/**/* indicate 1%, 5% and 10% significance levels respectively
Source: E-Views

Table no. 7 – FDI and growth in BRICS –Dynamic Ordinary Least Squares (DOLS)

	Economic growth		
	(1)	**(2)**	**(3)**
FDI	-0.16	-0.87***	-0.17
FIN	0.32	0.44***	0.41**
HCD	-0.33	1.10	0.47
REMIT	-0.75**	-0.09	-0.09
INFR	0.33***	0.25***	0.24***
OPEN	-0.24	-0.62**	-0.67**
SAV	1.49*	1.43***	1.45***
FDI*FIN		0.18**	
FDI*HCD			-0.09
Number of countries	5	5	5
Adjusted R-squared	0.96	0.91	0.90
Prob(F-statistic)	0.00	0.00	0.00

Note: ***/**/* indicate 1%, 5% and 10% significance levels respectively
Source: E-Views

Across all the three econometric estimation methods, the complementarity between foreign direct investment and financial development significantly enhanced economic growth in BRICS, consistent with Fu *et al.* (2011), Shahbaz and Rahman (2010) and Zhang *et al.* (2010) whose studies noted that absorption capacities such as human capital and financial development facilitates better influence of foreign direct investment on economic growth. A non-significant negative influence of foreign direct investment on economic growth in BRICS was observed under the fixed effects, DOLS and FMOLS. Although the overall impact of the complementarity variable is negative, it is however clear across all the three econometric methods that human capital development managed to reduce the size of the negative influence of foreign direct investment on the growth of BRICS countries. Such a result also resonates with Shahbaz and Rahman (2010), Fu *et al.* (2011) and Zhang *et al.* (2010) whose studies observed that absorption capacities are a necessary ingredient which improves the economic growth influence of foreign direct investment.

To a greater extent, it is observed that infrastructural development and savings' positive impact on economic growth in BRICS was significant. The results agree with the available literature (see Table no. 1). Trade openness had a significant negative effect on economic growth whereas economic growth was negatively affected by personal remittances in an insignificant manner in BRICS. The results generally are supported by existing literature, for example Baltagi *et al.* (2009) on trade openness-growth relationship and Meyer and Shera (2017) with regards to personal remittances-growth nexus.

6. CONCLUSION

This study added to the growing list of recent empirical researchers that produced results on the influence of foreign direct investment on the economy. Foreign direct investment negatively affected economic growth of BRICS countries during the period under study. The results are supported by the dependency theory explained by Amin (1974). Financial development was found to have significantly improved foreign direct investment's positive effect on economic growth in BRICS. In a non-significant manner, human capital development enhanced foreign direct investment's influence on the BRICS' economic fortunes. Further research investigating the minimum threshold levels of financial sector and human capital development that enhances significant positive effects of foreign direct investment on economic growth needs to be undertaken.

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ANNEX

Table no. 8 – Correlation analysis

	GROWTH	FDI	FIN	HCD	REMIT	INFR	OPEN	SAV
GROWTH	1.00							
FDI	0.17**	1.00						
FIN	0.25***	-0.02	1.00					
HCD	0.52***	0.19**	-0.03	1.00				
REMIT	-0.43***	-0.22***	-0.30***	-0.63***	1.00			
INFR	0.84***	0.16*	0.24***	0.39***	-0.24***	1.00		
OPEN	0.05	-0.02	0.12	0.18**	-0.05	0.10	1.00	
SAV	-0.18**	0.28***	-0.20**	0.03	0.06	-0.02	0.38***	1.00

Note: ***/**/* indicate 1%, 5% and 10% significance levels respectively
Source: E-Views

Table no. 9 – Descriptive statistics

	GROWTH	FDI	FIN	HCD	REMIT	INFR	OPEN	SAV
Mean	4 670	2.09	61.54	0.70	0.74	20.62	41.26	28.17
Median	3 480	1.81	51.89	0.72	0.24	8.07	42.30	25.76
Maximum	15 975	6.19	142.42	0.83	4.17	82.64	110.58	51.09
Minimum	301.16	0.01	11.76	0.44	0.03	0.01	15.64	15.09
Standard. deviation	3 827	1.48	35.30	0.09	1.08	24.49	14.96	10.15
Skewness	0.87	0.58	0.64	-0.90	1.77	0.97	0.54	0.60
Kurtosis	2.94	2.51	2.27	3.33	4.58	2.53	4.66	2.28
Jarque-Bera	18.21	9.67	13.28	20.21	90.78	24.13	23.74	11.82
Probability	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Observations	145	145	145	145	145	145	145	145

Source: E-Views