

## DOES FOREIGN DIRECT INVESTMENT GENERATE LONG-TERM GROWTH IN GHANA?



Arthur Benedict<sup>1\*</sup>

Keyi Baffour Tutu<sup>2</sup>

Afenya Millicent Salase<sup>3</sup>

<sup>1,2</sup>School of Finance, Zhongnan University of Economics and Law, Wuhan, China.

<sup>1</sup>Email: [arthurbenedict77@yahoo.com](mailto:arthurbenedict77@yahoo.com) Tel: +8615623899772

<sup>3</sup>Accounting School, Zhongnan University of Economics and Law, Wuhan, China.



(+ Corresponding author)

### ABSTRACT

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In pursuant to sustainable economic growth on the ticket of FDI-led growth hypothesis, the government of Ghana has instituted a myriad of thoughtful policy reforms to help boost the economy to realize a self-sustaining economic growth. To some extent, the policies might have paid off as the country was named the highest recipient of FDI in West Africa in 2018. However, the supposed upsurge in the inflow of foreign direct investment in the country and its expected long-run spillover benefits have not been tangibly felt in the region as the economy continues to oscillate. Therefore, this study utilized two methods; the autoregressive distributed lag model (ARDL) and the variance decomposition method (VDM) to empirically examine economic growth of Ghana as a function of foreign direct investment (FDI) while controlling for exchange rate, financial development, trade openness and employment rate. The results of the study endorses the FDI-led growth for Ghana by indicating that a positive long run causal impact flows from FDI to economic growth. The findings from the VDM test affirm the results are robust and reliable. Therefore, the study suggests that government should amplify FDI inflow via policies like incentives to draw more foreign investors directly into other sectors other than the conventional sectors gratified by foreign investors.

**Contribution/ Originality:** This study uses new estimation methodology to examine the degree of causal impact of FDI on economic growth in Ghana since the mainstream of empirical studies, particularly on Ghana, merely followed a direct linear production or FDI framework without considering the endogenous nature of this type of models.

## 1. INTRODUCTION

Every country in the world now thrives to either make or maintain a healthy economic environment that would yield vigorous economic growth. As such, policymakers across the globe have at the heart of their policies to achieve sustainable economic growth, which will subsequently result in poverty reduction (Khan & Ssnhadji, 2001). Economic growth is deemed one of the most important indicators of a healthy economy due to its ripple effect on an economy. As a country's economy grows, it tends to be more productive, which leads to an increase in employment, increase in the wealth of the country and the income of the population to invest in their kids by enrolling them in schools. This, in the long run, leads to improvement in human development, which in turn, stimulates economic growth.

Most developing economies, unlike the developed economies, resort to “outward focus” policies in an attempt to accumulate a high level of investment to spark swift economic growth (Wernick, Haar, & Singh, 2009). This is due in part to the low level of national per capita income coupled with a low level of technological innovation and colossal population size. According to Moon and William (1993) external sources of funds have been the primary catalyst behind most of the fastest-growing economies, especially for the less developed countries. Trade openness embedded in globalization has facilitated the transfer and assembling of capital across countries. As such, a ton of preeminence is leveled on foreign direct investment (FDI) over other sources of external funds to an economy due to its relatively numerous spillover benefits on a host country (Lasbrey et al., 2018).

Kumar and Karthika (2010) argue that FDI plays a vital role in the economic development of the receiving country as many countries have been using foreign investments and technology to fuel the economic growth in their country. The need for more FDI to help support domestic resources has been widely accepted in almost every economy in the world as an engine of economic growth and development. Hence, FDI has been considered the most vital element of economic growth in most developing countries. FDI boosts indigenous investment, stimulates technology transfer, and increases employment rates (Alfaro & Johnson, 2012). On that note, foreign firms' contribution in the infrastructural developmental progress in most African countries has been highly welcomed.

Preceding the start of economic reforms and trade liberalization, most developing countries, primarily African countries, upheld policies that kept their economy very deprived, immobile, unproductive, and comparatively isolated from the international economy (Goldberg & Pavcnik, 2007). These trade barriers and socialism dogma were partly due to the fear of recolonization. It is not too long ago since African countries started setting up key measures to make an extensive pleasant business environment to attract more external investors by guaranteeing persistent political and economic stability. Many of those countries have now decreased legislative obstacles and structures to permit outside investors to access all areas of their economies. Privatization projects and genius progressive venture policies, such as 100 percent foreign ownership of a corporation, the opportunity to utilize remote administrative, specialized, and unskilled laborers, have been actualized to help lift outside investors' conviction level (Adams & Opoku, 2015).

Since independence, Ghana governments have tried in many ways to achieve satisfactory rates of growth and development, which is evident from a period of swift industrialization in the 1960s through economic liberalization policies in the mid-1980 to the current redenomination or introduction of two higher denomination of the local currency in 2019. In recent years, the government has committed tireless efforts via economic and institutional reforms to attract foreign direct investment into the country yet, the economy is still dwindling. In 2018, Ghana was adjudged the gargantuan recipient of FDI in West Africa according to the UNCTAD (2019). While this economic and institutional reform programs might probably be one of the best policy options offered to the country, given the current inflows of FDI into the economy, the outcome of the policy (increased FDI inflows) on real sector activities has not been comprehensively subjected to any empirical examination (Quartey, 2010). Thus, an empirical assessment of the causal linkages between FDI and economic growth in Ghana turns out to be imperative. It is in light of this knowledge that the study is engrossed on examining the degree of impact of FDI on economic growth in Ghana.

This study adds to the prevailing literature by shedding light on the inconclusive argument on the effect of FDI on economic growth using recent data on Ghana, which is one of the chief recipients of FDI inflow to Sub Saharan Africa. The benefits of FDI inflows have been under great controversy over epochs (Kose, Prasad, Rogoff, & Wei, 2006). The point of controversy is whether FDI is indeed critical for economic growth. In spite of the exigency of FDI for growth amongst various theoretical and empirical views (Begum, Salahuddin, Chowdhury, & Wahid, 2018; Caesar, Chen, Udimal, & Osei, 2018; Pradhan, Arvin, Hall, & Nair, 2016; Simionescu, 2016) there are also copious empirical works that depict negative and unclear influence of FDI on growth (Adams, 2009; Agénor, 1998; Agosin & Machado, 2005; Jilenga, Xu, & Gondje-Dacka, 2016). According to Ahmad, Draz, and Yang (2019)

for example, a significant expansion in capital inflows could wane a host country's financial system by marring maturity and creating currency disparities between the assets and liabilities of financial intermediaries. Similarly, inflows of huge foreign capital could also dwindle the competitiveness of the hosts' countries by catapulting the exchange rate beyond its equilibrium (Agénor, 1998).

This study further contributes to the literature by examining the degree of causal impact of FDI on economic growth in Ghana. Despite the numerous studies, most importantly on the trail of causality between FDI and economic growth, the empirical proof is not clear for nations. For instance, in Ghana, Asafu-Adjaye (2005) examined the relationship between FDI and GDP growth using time series annual data from 1970 - 2007. The study established a positive unidirectional causality running from foreign direct investment to growth. However, Frimpong and Oteng-Abayie (2006) found no causality between FDI and growth in Ghana using the same span of annual data. In addition, Sakyi, Commodore, and Opoku (2015) found in their study a positive long run relationship between FDI inflows and GDP growth while Antwi, Mills, Mills, and Zhao (2013) found only short run positive relationship between FDI and economic growth. The inconsistencies in the results open up for further dialogue on the nexus. Therefore, this study seeks to offer more indication on the nexus by deploying the ARDL framework since the mainstream of empirical studies, particularly on Ghana, merely followed a direct linear production model or FDI function in a bi-variate framework without considering the endogenous nature of this type of model. Therefore, these studies fall short of a systematic analysis of the influence of host nation characteristics as they do not openly include control variables into the empirical model. Consequently, such works may suffer omission and misspecifications prejudices and as such their findings may be disingenuous.

The subsequent section offers the supporting theoretical outline and review of pertinent literature. Section 3 charts the research methodology, comprising the empirical model, data sources, and data sampling. Section 4 covers the analysis of empirical outcomes, and the last section contains the conclusion and recommendation.

## 2. LITERATURE REVIEW

This section covers the main theory underpinning the intuition of this study and also a review of relevant past empirical literature.

### 2.1. Theoretical Framework

#### 2.1.1. The FDI-Led Growth Theory

FDI-led economic growth hypothesis is founded on the endogenous growth theory, which elucidates that FDI related with other indicators such as technology transfer, exports, human capital and capital flows have had significant effects in stimulating economic growth (Borensztein, De Gregorio, & Lee, 1998; Lim & Maisom, 2000). These growth-spurring variables might be presented and cultivated, to inspire economic growth through FDI. Grossman and Helpman (1991) and Romer (1990) established the growth models inside the endogenous growth theory to describe the connection between FDI and growth. These models consider technological advancement to be the main driving force of economic growth. The theories center on the production of technological knowledge and its transmission and view innovation as a significant catalyst for growth. Therefore, these models prioritize human capital development and externalities for growth. In view of this, the growth rate of emerging economies is seen to be dependent on the degree to which these nations can admit and utilize new technologies existing in highly advanced countries. They assert that FDI is the principal channel through which advanced technologies can be extended to developing countries. Emerging economies usually are not able to innovate and produce new technologies. Thus, they have to embrace technologies that are created in advanced economies through the conduit of FDI. Therefore, some current studies posit that the inflow of FDI maybe able to fuel a country's economic development via technology transfer and spill-over efficiency (Herzer, Klasen, & Nowak-Lehmann, 2008; Shakar & Aslam, 2015). Shakar and Aslam (2015) further asserts that spill-over efficiency is assumed to occur when local

firms are proficient of absorbing the physical and intangible assets of international corporations enshrined in FDI. Moreover, FDI augments growth by adding to the recipient country's prevailing knowledge base via human resource training and development. Also, FDI surges competition in the recipient country by incapacitating entry barriers and plummeting the market power of existing companies (Blomström & Kokko, 1996; De Mello, 1999; Dunning, 1993).

All the same, the earlier neo-classical growth models submit that FDI only has a short-run impact on growth because of the diminishing returns to capital and therefore without technological progress, economic growth can't be achieved in the long run. As such, FDI promotes growth by fueling capital formation, which results in the surge of capital stock. In these models, the impact of FDI inflows is precisely identical to domestic capital investments. However, the new growth theory prioritizes variation in technology and asserts that there is a positive correlation between FDI and economic growth in both the short and long terms. This is attributed to the fact that FDI related technological spillovers may offset the effect of diminishing returns to capital, which will, in turn, facilitate continuous growth of the economy even in the long run. Hence, making FDI more fruitful than domestic investment (Herzer et al., 2008). It is against this background that this study is engrossed in investigating the extent to which FDI impact the economic growth of Ghana.

## 2.2. Empirical Review

FDI, as an instrument of growth, has gone global among development economists. Silajdzic and Mehic (2015) examined the impact of FDI on economic growth in some selected transition economies in East and Central European country. The study showed that FDI impacts the economy by directly contributing to the fixed capital formation and indirectly through knowledge stock. More specifically, in the classical framework, FDI supplements domestic investments and considered as a significant complement for capital and investment shortages. Further analysis by the researchers led to the conclusion that FDI impacts positively on economic growth through knowledge spillovers in transition economies; innovative and technological efforts are implied to be a vital foundation for growth performance. Similarly, Nistor (2014) studies on how FDI impacts on economic growth found a positive influence, exhibiting differently based on the sector and region of the foreign investment; its influence relies mainly on the quality and quantity of the inflow. However, the study fail to examine the long run impact of FDI on growth. Fadhil and Almsafir (2015) gives more credence to the above as they also conclude that FDI coupled with human capital development contributes strongly to the host country's economic growth.

Also, Dinh, Vo, and Nguyen (2019) scrutinized the connection between FDI and economic growth in both the short-run and long-run periods with some chosen developing economies with the focus of exploring the effect of FDI on growth during the period of economic mayhem. The study recruiting varied empirical test namely Johansen cointegration test, vector error correction model (VECM), and fully modified OLS (FMOLS) found that FDI aids to kindle economic growth in the long-run, though it has a negative influence on economic growth in the short-run period for the selected or underlying nations in this study.

Sakyi et al. (2015) examined the relationship long term impact of FDI and trade openness on economic growth. The authors using ARDL to analyze time series data from 1997 to 2011. They found a positive relationship between FDI inflows and GDP growth in the long run. An increase in FDI inflows will result in an increase in GDP as a confirmation of the hypothesis that FDI acts as a vehicle of international technology transfer. Also, Antwi et al. (2013) used annual time series data from Ghana for the period 1980 to 2010. They used simple ordinary least square (OLS) regressions to confirm a positive and statistically notable relationship between FDI and growth. However, the study failed to examine directional causality in either the short run or long run relationship between the two variables.

It is imperative to mention (Sunde, 2017) who also investigated the impact of FDI on EG in South Africa. It utilized Bound estimation technique and the sample period from 1990–2014. The tests stipulated that both FDI

inflows and exports lead to economic growth in the long run. Again, another study by [Ridzuan, Ismail, and Che Hamat \(2017\)](#) employed autoregressive distributed lag (ARDL) with sample size 1970–2013 to investigate the influence of FDI on economic growth in Singapore. The estimated long-run elasticity indicated that FDI inflows lead to higher EG in Singapore.

[Rao, Sethi, Dash, and Bhujabal \(2020\)](#) studied the interaction between foreign aid, FDI and economic growth in South Asia and South-East Asia from 1980 – 2016. The results showed a negative relationship between foreign aid and FDI and growth but FDI positively impacted economic growth. Also, [Sokang \(2019\)](#) employed correlation matrix and multiple regression to analyze time-series data from 2006 – 2016 on the effect of FDI on Cambodia economy. The study fail to analyze the long run connection between the variable, however, the analysis showed a positive impact of FDI and economic growth. This conclusion further led to the recommendation that the Cambodian government should implement reforms which will attract more FDI.

A study was conducted by [Gherghina, Simionescu, and Hudea \(2019\)](#) on eleven Central and Eastern European countries. The researchers used panel data regression models to analyze a sample from 2003 to 2016. The findings of the panel vector error-correction model Granger causalities showed evidence of a short-term one-way causal association running from foreign direct investment to economic growth and a long-term two-way causal relationship between growth and FDI. Similarly, using Johansen cointegration test on time-series data from 1981 to 2013 to examine association between FDI, export volume and GDP in the Indonesia. [Mahadika, Kalayci, and Altun \(2017\)](#) found a long-run positive association between FDI, export volume and GDP.

Notwithstanding, there are other several studies that also empirically submit contrary views on the FDI led Growth hypothesis. [Agosin and Machado \(2005\)](#) visited the FDI led growth hypothesis using the generalized method of moment (GMM) for 12 nations with data spanning from 1971–2000. Examining the influence of FDI on economic growth, they found a negative relationship between foreign direct investment and economic growth. This relationship implies that an increase in FDI inflows leads to a drop in the growth of the economy. Similarly, [Herzer et al. \(2008\)](#) examined the FDI led growth theory for 28 developing countries. They utilized the Engle-Granger cointegration and error correction model and revealed that there is no causality among FDI and economic growth in both the short and long run. Hence, FDI inflows that not necessarily cause an improvement in the growth of the various economies studied.

[Farrell, Gaston, and Sturm \(2004\)](#), utilized a sample of OECD and non-OECD economies throughout 1970 and 1990 to test the impact of FDI on growth in those economies. In the non-OECD sample, they exhibited no causation from FDI to growth based on constant effects regressions and negative short-term influence of FDI on GDP, demonstrating that growth benefits may be constrained to higher-income countries. Similarly, [Adams \(2009\)](#) reviewed the impact of foreign direct investment and domestic investment on economic growth of 42 Sub-Saharan nations from the period of 1990 to 2003. Using the ordinary least squares estimation, Adams found out that foreign direct investment is negatively correlated with domestic investment and negatively affect domestic growth. He interpreted as a net crowding out effect. Similar research was conducted by [Jilenga et al. \(2016\)](#) to investigate the influence of foreign direct investment and external debt on economic growth in Tanzania from 1971 to 2011 using the ARDL model and Bounds test approach. The researchers found out that in the long-run foreign direct investment has a negative impact on economic growth. Whereas in the short run, the outcomes point out that there is no directional causality between foreign direct investment and economic growth in Tanzania. In the same vein, [Saibu, Nwosa, and Agbeluyi \(2011\)](#) in his study in Nigeria concluded that foreign direct investment did not influence Nigeria's economic growth.

[Frimpong and Oteng-Abayie \(2006\)](#) investigated the impact of foreign direct investment on economic growth of Ghana. They employed the [Toda and Yamamoto \(1995\)](#) causality test in examining the FDI led growth hypothesis using yearly data from 1970 to 2002. The results discovered that there are no directional causality linkages between FDI and economic growth for the total sample period and the pre structural adjustment period.



The researchers fail to examine the long run relationship between the variables. Yalta (2013) conducted a parallel study in China reexamining the foreign direct investment catalyst growth assumption. He utilized the simulation-based interpretation to review the causal connection between foreign direct investment and gross domestic product in China for the period 1982–2008 with both bivariate and a multivariate system. His empirical result proves that a statistically significant connection between FDI and GDP growth is not present. Thus, he settles that FDI does not necessarily bring about higher economic growth at the collective level, and there is no indication of a change in the connection owing to the contingency effect.

Feeny, Iamsiraroj, and McGillivray (2014) applying OLS and GMM approach on Pacific Island 1971–2010 data examined the association between FDI and EG found a feeble impact of foreign direct investment inflow on the growth of the economy. The result further showed that the impact of foreign direct investment in Pacific nations falls between 0.1 and 0.4 per cent, and this was attributed to the fact that FDI inflows crowd out domestic investment in the region. Likewise, Belloumi (2014) examined the nexus amongst foreign direct investment, trade, and economic growth in Tunisia using the autoregressive distributed lag approach. To test for cointegration, the author employed the bound test over yearly data from 1970 - 2008. The findings of the study showed that there is no causality amid foreign direct investment and economic growth in Tunisia in the both the short and long run period of study. Hence, the result of the study contradicts with the widespread hypothesis that FDI can produce positive spillover benefits for the host country.

The literature review offers diverse outcomes on the associations between FDI and growth. The analysis from the available empirical literature points out that FDI can impact a host economic either positively or negatively. Also, both the theoretical and empirical review signpost that the impact of FDI on economic growth can either last only in the short run or both in the long run and short run. Hence, this stand to reason that the issue is fundamentally hinge on the kind and nature of an economy being measured.

### 3. RESEARCH METHODOLOGY

#### 3.1. Data and Study Variables

The study employs annual time series data of Ghana over the period 1980-2019. The data were extracted from the database of the World Bank (2020a), Economist Intelligence Unit (EIU) and Ghana Statistical Service (GSS). Economic growth was measured by real gross domestic product growth rate (GDP). Foreign direct investment (FDI) is the inward foreign direct investment capital by non-locals into the country, as a percentage of gross fixed investment. Exchange rate (ER) is measured by the real exchange rate index indicator. Trade openness (TO) is estimated by the summation of import and export scaled by GDP. Financial development (FD) is proxy by domestic credit to the private sector. Employment is measured by the employment rate (L). The sources of the data are as follows: FDI, GDP and ER were obtained from Economist Intelligence Unit. TO and FD were obtained from World development indicator whiles L was draw from Ghana statistical service.

#### 3.2. The Empirical Strategy and Model

Following the FDI-led Groth hypotheses, the study deployed the Autoregressive Distributed Lag ARDL bound cointegration model to scrutinize the long run impact of FDI on the economic growth of Ghana. The empirical model expansively address the main objective of the study. According to Pesaran, Shin, and Smith (2001), there are three outstanding advantages of ARDL method compared to other single procedures. Firstly, there is no need to pre-test for unit roots if the variables involved are purely  $I(0)$ , purely  $I(1)$  or fractionally integrated. Secondly, endogenous problems and the inability to test hypotheses in long-term estimated coefficients identified to the Engle and Granger (1987) method are overcome. Thirdly, the short and long-run parameters of the mentioned model are estimated simultaneously. Lastly, the efficient small sample properties fit to bounds testing approach is

preferred to that of other multivariate co-integration. The empirical estimation of the ARDL bounds test technique between the main variables are expressed in Equation 1 as follows:

$$\Delta \ln GDP_t = \alpha_{01} + b_1 \ln GDP_{t-1} + b_2 \ln FDI_{t-1} + \sum_{i=1}^p \alpha_{1j} \Delta \ln GDP_{t-i} + \sum_{i=1}^{q1} \alpha_{2j} \Delta \ln FDI_{t-i} + e_{1t} \quad (1)$$

The basic model was then expanded assuming varied control variables including exchange rate, financial development, trade openness and employment. The changes in exchange rate is a vital factor for FDI movements as well as economic growth. The upsurge and drop of the exchange rate generate concerns for both economic growth and FDI. Therefore, appreciation of the local currency may have negative or positive impacts on FDI and economic growth. Financial development augments the capacity of an economy to utilize technological developments to kindle economic growth and stimulate international trade; additionally, it helps in increasing capital formation in an economy (Wurgler, 2000). Trade openness also contribute to economic development through a variety of channels such as scale economies, comparative advantage, technology transfers and by exploiting innovations from advanced countries to develop local production and managerial abilities (Yanikkaya, 2003). The increase in employment can stem productivity which consequently results in improve economic development. The extent to which economic progression is linked with and determined by a productive transformation is of key significance to the sustainability of economic growth in the medium and long term. Hence, the expanded empirical model is expressed in Equation 2 as follows:

$$\begin{aligned} \Delta \ln GDP_t = & \alpha_{01} + b_1 \ln GDP_{t-1} + b_2 \ln FDI_{t-1} + b_3 \ln ER_{t-1} + b_4 \ln FD_{t-1} + b_5 \ln TO_{t-1} + b_6 \ln L_{t-1} + \\ & \sum_{i=1}^p \alpha_{1j} \Delta \ln GDP_{t-i} + \sum_{i=1}^{q1} \alpha_{2j} \Delta \ln FDI_{t-i} + \sum_{i=1}^{q1} \alpha_{3j} \Delta \ln ER_{t-i} + \sum_{i=1}^{q1} \alpha_{4j} \Delta \ln FD_{t-i} + \\ & \sum_{i=1}^{q1} \alpha_{5j} \Delta \ln TO_{t-i} + \sum_{i=1}^{q1} \alpha_{6j} \Delta \ln L_{t-i} + e_{1t} \end{aligned} \quad (2)$$

Where p and q are the lag orders for the dependent variables and the independent variables respectively.  $e_t$  is the random disturbance.  $\alpha$  and b are the parameters to be estimated and  $\Delta$  denotes the first difference operator. Equation 2 simply captures the variables of interest elucidated by their past values. The optimal lag lengths are proven by using either the minimum AIC or SIC.

### 3.3. Estimation Procedure

Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP), are employed first to establish the integration order of the variables in the model. The ADF and PP tests are carried out via Equation 3 to determine the coefficient;

$$\Delta Y_t = \beta_0 + \beta_1 t + \beta_2 Y_{t-1} + \sum_{i=1}^k \varphi \Delta Y_{t-i} + \xi_t \quad (3)$$

Where  $\Delta$  denotes the difference operator;  $Y_t$  represents variable Y at time t;  $\beta_0$   $\beta_1$   $\beta_2$  and  $\varphi$  are coefficients to be calculated, k denotes number of the augmenting lags and  $\xi_t$  the white noise term. Given the above equation 3, the subsequent hypothesis is then tested for:

$$H_0: \rho = 1 \text{ (} Y_t \text{ is non-stationary)} \quad H_1: \rho < 1 \text{ (} Y_t \text{ is stationary)}$$

Following the unit-root tests, the bound test is carried out on the ARDL model to initiate the long-run relationship among the lagged variables for the intersection significance by using the F-test at the first stage. This is followed by an examination of long- and short-run relationships of the variables using the linear ARDL model as expressed by Equation 2. Thereafter, the existence of cointegration is verified by calculating the F-statistic value for the joint lagged levels of the variables and matched with the critical bounds values. This is reached by testing the following bound test hypothesis:

$$H_0 = b_{1i} = b_{2i} = b_{3i} = 0 \text{ (No co-integration)} \quad H_1 = b_{1i} = b_{2i} = b_{3i} \neq 0 \text{ (co-integrated)}$$

The calculated F-statistic figure is matched against the critical values produced by Pesaran et al. (2001). If the estimated F- statistic figure is less than the figure of the lower critical-bound, then we accept the null hypothesis and establish that cointegration do not exist between the variables. Inversely, if the calculated F- statistic figure surpasses the value of the upper critical-bound figure, then we reject the null hypothesis and declare that long-run equilibrium link is present between the variables under review. However, if the calculated F- statistic figure lies in between the figures of the lower and upper critical-bound, then the result for the cointegration test is inconclusive.

The presence of co-integration implies that there is the long run relationship in the series. Therefore, once the co-integration is established, the Error Correction Model (ECM) is then estimated by substituting the short run terms with zero to derive the model or Equation 4;

$$\begin{aligned} \Delta \ln GDP_t = & \alpha_{01} + \sum_{i=1}^p \alpha_{1j} \Delta \ln GDP_{t-i} + \sum_{i=1}^{q1} \alpha_{2j} \Delta \ln FDI_{t-1} + \sum_{i=1}^{q1} \alpha_{3j} \Delta \ln ER_{t-1} \\ & + \sum_{i=1}^{q1} \alpha_{4j} \Delta \ln FD_{t-1} + \sum_{i=1}^{q1} \alpha_{5j} \Delta \ln TO_{t-1} + \sum_{i=1}^{q1} \alpha_{6j} \Delta \ln L_{t-1} + \lambda ECT_{t-1} + \end{aligned} \quad (4)$$

where  $\lambda = (1 - \sum_{i=1}^p \delta_i)$  is the speed of adjustment coefficient with a negative sign,  $ECT_{t-1}$  is the one lag period error correction term.  $a_{1i}, a_{2i}, a_{3i}$  are the short-run dynamic coefficient of the model's adjustment long-run equilibrium. The presence of a significant association in first differences of the variables offers proof on the direction of short run causality while long run causality is revealed by a significant t-statistic relating to the error correction term (ECMt-1).

Lastly, the validity and the reliability of coefficients or results are verified following several diagnostic tests including serial correlation, Ramsey RESET, CUSUM and CUSUMSQ statistics.

## 4. RESULTS AND DISCUSSION

### 4.1. Unit Root Test

To ensure that the pre-requisite condition for estimating an ARDL model is met, the stationary features of the variables were tested with the Augmented Dickey-Fuller (ADF) test, and double checked with the Phillips-Perron (PP) test. The results are presented in Table 1.

These tests were undertaken concurrently to make sure the variables enter their corresponding frameworks in a non-explosive nature and are robust. The outcome from the unit root test indicates the presence of unit roots in the variables in their level form in the exception of the lnL and FD. However, upon first difference, the rest of the variables (lnER, lnGDP, lnFDI, lnTO) became stationary per their probability values less than 5%. Hence, the



variables are found to be integrated of order zero and one at either 1% or 5% level of significance which satisfies the prerequisite for the ARDL model estimation.

**Table-1.** Result for unit root test in the variables.

Variable	Augmented Dickey-Fuller (ADF)		Phillips-Perron (PP)		Decision
	T-statistic	P-value	Adj. T-statistic	P-value	
lnGDP	-2.854102	0.1572	-2.951328	0.1585	Not stationary
lnFDI	-0.441077	0.5168	-0.556103	0.4698	Not stationary
lnL	-2.396955**	0.0178	-2.515547**	0.0132	Stationary
lnFD	-3.751259***	0.0072	-2.563807**	0.0117	Stationary
lnTO	-0.084732	0.6480	-0.364673	0.5468	Not stationary
lnER	-0.634039	0.4362	-0.651337	0.4286	Not stationary
D(lnGDP)	-7.621470***	0.0000	-7.620550***	0.0000	Stationary
D(FDI)	-4.138361***	0.0001	-4.079336***	0.0029	Stationary
D(TO)	-9.054253***	0.0000	-9.295257***	0.0000	Stationary
D(ER)	-5.841609***	0.0000	-5.762775***	0.0000	Stationary

Note: \*\*\* and \*\* indicates significant levels of 1% and 5%. D indicates the first-order difference of the variables.

#### 4.2. Tests for Cointegration

Upon satisfying the prerequisite condition for estimating an ARDL model, the bound test or cointegration test was estimated. This was done to ascertain whether long run associations exist between the main variables under consideration where GDP is held as the dependent variable in line with the FDI –led growth hypothesis. The results of the Bounds test or cointegration is accessible in Table 2.

**Table-2.** ARDL Bound Test for Cointegration.

Dependent Variable	Optimal lag length	F-statistic Value	Significance Level	Critical Value Bounds	
				I(0)	I(1)
(LnGDP)	2, 2, 1, 0, 2	11.89321	10%	3.26	4.35
			5%	3.62	4.79
			2.5%	4.96	5.18
			1%	5.41	6.68

The lag length is decided by AIC criteria. The Pesaran et al. (2001) critical values were utilized because these values are suitable for large samples. The results from the bound test or cointegration test shows that the estimated F-statistic values (11.89321) is greater than upper bounds at 1%, 5% and 10%. Therefore, the null hypothesis of no cointegration is rejected. This suggest that these variables are cointegrated and do have a long-run relationship. Meaning, these variables meet in the long run equilibrium path when they deviate from the short-run equilibrium. As the results of the Bound tests indicate the presence of cointegration between the variables or the presence of long-run relationship, the study estimated both the long-run and short-run relationship (Error Correction Model). The long-run connection between the variables signposts that there is Granger-causality at least uni- directional which is proven by the F-statistic and the error-correction lagged term. The short-run causal effect is epitomized by the F-statistic on the independent variables whereas the t-statistic on the coefficient of the error correction lagged term signifies the long-run causal relationship (Narayan & Smyth, 2006; Odhiambo, 2009).

#### 4.3. Regression Results

Table 3 presents the error correction model results which captures both the short run relationship and the long run relationship between the variables. The upper segment of the results in Table 3 presents the long run coefficient which happens to be the main focus of the study whiles the lower segment provides the coefficients for the short run.

Table-3. Regression results.

Long Run Relationship					
	Variable	Coefficient	Std. Error	t-Statistic	Prob.
Long Run Coefficients	lnFDI	0.899314	0.333869	2.693613	0.0185**
	lnTO	0.030836	0.012315	2.503938	0.0351**
	lnFD	0.056431	0.028550	1.976567	0.0855*
	lnEX	-0.044115	0.014639	-3.013525	0.0042***
	lnL	0.027953	0.008733	3.200989	0.0037***
	C	22.870624	1.378221	16.594306	0.0000***
Error Correction Model					
	Variable	Coefficient	Std. Error	t-Statistic	Prob.
Short Run Coefficients	D(lnFDI)	0.61013	0.15332	3.979454	0.0021***
	D(lnTO)	0.013813	0.007525	1.835719	0.0763*
	D(lnFD)	0.021185	0.010858	1.951071	0.0904*
	D(EX)	-0.019376	0.007883	-2.45807	0.0212**
	D(lnL)	0.018265	0.215426	1.184039	0.0892*
speed of adjustment	Ecm(-1)	-0.695355	0.172972	-4.02004	0.0004***

Note: \* p < 0.05, \*\* p < 0.01, \*\*\* p < 0.001 level of significance.

The findings from the long run analysis show that a positive relationship exist between FDI economic growth and is strongly significant. That is, foreign direct investment has a strong positive impact on GDP growth at a significance level of 1 percent. Therefore, a percentage increase in FDI may expand GDP by 0.899314 percent in the long run. This result is in line with the work of [Antwi et al. \(2013\)](#); [Kareem et al. \(2012\)](#); [Sackey and Nkrumah \(2012\)](#) and [Dinh et al. \(2019\)](#) who discovered that FDI positively related to growth. However, the findings contradict with the work of [Agosin and Machado \(2005\)](#) who found a negative relationship between FDI and Growth.

Also, the impact of exchange rate depreciation is found to be positive on growth. This can be elucidated by the notion that depreciation of the domestic currency increases the exports of home countries, and exports unavoidably increase local production, which in turn affects the total level of local production. Furthermore, from the long run results, a positive trade openness also improves the level of local growth due to the weighty contribution of local capital: the provision of credit to the private sector helps to lift small enterprises and upsurge the scale of production, and this local boom generates demand for labour and increases the employment level. Hence, financial development, exchange rate, employment level and trade openness are significant factors in the examination of development nexus as evidenced by the results in [Table 3](#).

In addition, the short run outcomes for our main independent variable(FDI) is also consistent with the priori FDI-led growth assumptions since it shows that foreign direct investment significantly and positively impact economic growth. For the control variables, in the exception of exchange rate which was significant at 5 percent level of significance, the rest of the control variables employment rate, trade openness and financial development were significant at 10 percent level.

Moreover, as anticipated, the sign of the estimated error correction lagged term, (Ecm<sub>t-1</sub>) is negative and empirically significant at 1 percent level of significance. This endorses the long run connection between the variables recognized earlier. The estimated coefficient of the error correction term is -0.69 indicating that the speed of adjustment to equilibrium upon a shock is high. Therefore, previous year shock of LNGDP adjusts towards its long run equilibrium at the rate of 69 percent in the current year. Hence, in both the long run and short run the main variable of interest, FDI including the control variables granger cause GDP. This endorses the FDI-led growth hypotheses in the longrun implying that foreign direct investment generates long run economic growth in Ghana. Again, the result denotes that causality runs interactively through the error-correction term from FDI, L,

FD, TO and EX to GDP. This outcome is bolstered by the results from the variance decomposition method presented in Table 5.

4.4. Diagnostic Test

To certify the validity of the ARDL model estimated, the study subjected the model to all the required diagnostic test ranging from autoregressive conditional heteroskedasticity test, Jarque–Bera normality test, white heteroskedasticity, LM serial correlation test, to CUSUM stability test. . The results are shown in Table 4.

Table-4. Diagnostic test results.

Test	Type	Statistic value		Probability value
Goodness of fit	R-square	0.884356		
	Adjusted z-square	0.873247		
Joint significance	F-statistics	11.082686		0.000002***
Autocorrelation:	Breusch-Godfrey LM Test	Obs*R-squared	4.485689	0.1062
Heteroskedasticity:	Breusch-Pagan-Godfrey Test	Chi-square	5.079695	0.9553
	White's test	Chi-square	39.00	0.4246
Normality	JB test	Jarque-Bera	2.388993	0.269170

The diagnostic tests for the ARDL model shows that the residuals are normally distributed and they are not serially correlated. The test results also shows the absence of heteroscedasticity problem and misspecification model. The high R-square or the low standard errors of the model shows that the model are efficient and that the results can be trusted. Lastly the CUSUM and CUSULM square graphs confirms the stability and the accuracy of long-run and short-run parameters estimated since the blue lines lies between the critical boundaries at 5 percent level of significance for both CUSUM and CUSUM squared in Figure 1a and 1b respectively.

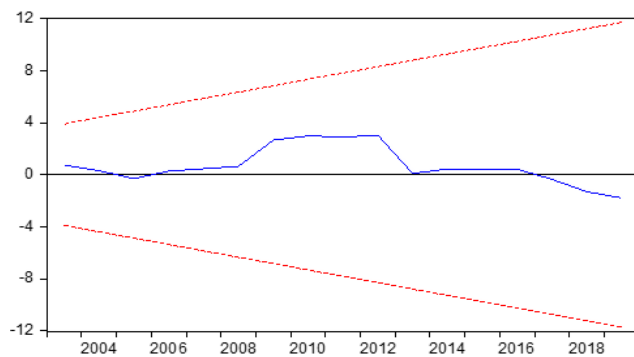


Figure-1(a). Cusum test.

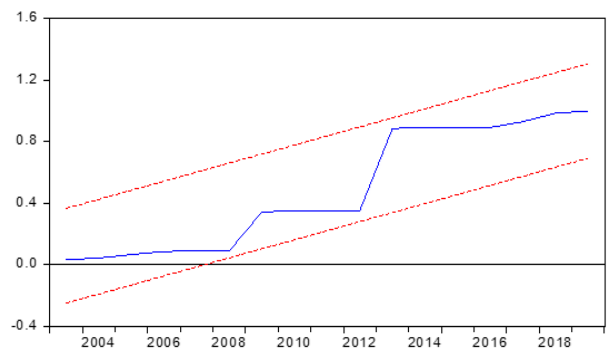


Figure-1(b). Cusum square test.

4.5. Variance Decomposition Forecast Error Method

The granger causality test cannot offer the relative strength of the causal connections between the variables beyond the selected time span and therefore makes reliability of the results under VECM uncertain (Shahbaz & Mafizur Rahman, 2014; Wolde-Rufael, 2009). Therefore, the study employed variance decomposition forecast error method to assess the magnitude and confirm the certainty of the long run causal relationships between the main variables. The variance decomposition point out the proportion of contribution in each variable that can be credited to innovations in other variables over the period (Enders, 1995). The stated results within a 15-year horizon are offered in Table 5.

The decomposition of the economic growth discloses that over 90% variation in GDP is influenced by the shocks of its own innovation in the short run whereas about 81% and 7% variation of economic growth in the long run is explained by GDP and FDI respectively. The significant impact of FDI on economic growth (GDP)

substantiates the close link between the variables, therefore endorsing the findings from the error correction model analysis, which also point out that a long run causal connection exist between the GDP and FDI of Ghana. The outcome of this results signpost that foreign direct investment inflow generates long run economic growth in Ghana and therefore FDI inflow is imperative for growth in Ghana.

**Table-5.** Variance Decomposition percentage of error results.

Period	lnGDP	lnFDI	lnER	lnL	lnFD	lnTO
1	94.2202	2.00223	3.13760	0.00000	0.24947	0.39047
2	91.3991	3.05158	3.76318	0.40015	0.90846	0.35324
3	89.9721	4.38278	3.62047	0.39687	0.87539	0.58595
4	87.5542	6.15158	3.72609	0.44708	0.99859	0.72963
5	86.1734	6.37894	4.11725	0.77875	1.05216	0.72665
6	85.8416	6.37857	4.34358	0.82104	1.07891	0.72715
7	85.3704	6.34407	4.78875	0.88037	1.08378	0.72751
8	84.7082	6.33956	5.23083	1.12080	1.07885	0.72179
9	84.2011	6.43833	5.51182	1.24162	1.08943	0.71794
10	83.7117	6.56018	5.78624	1.31453	1.10551	0.71551
11	83.2025	6.69185	5.99182	1.45740	1.13590	0.71322
12	82.7332	6.84452	6.10696	1.60524	1.17261	0.72699
13	82.3066	6.99998	6.19004	1.73916	1.20571	0.74441
14	81.8795	7.14318	6.23581	1.91227	1.23896	0.77682
15	81.4480	7.28314	6.24005	2.11109	1.26991	0.83627

The contribution of the control variables to variations in economic growth is negligible in the short run but they increase and consequently grasp a more significant level in the long run than they were in the short run. The influence of exchange rate, employment rate, financial development and trade openness on economic growth value are about 6.2%, 2.1%, 1.2% and 0.8% respectively. The contribution of exchange rate on the variation on economic growth is larger than rest of the control variables in the study. The fact that all the control variables progressively become significant in explaining the variation of economic growth, serves to endorse the significant long run link between the variables established by the ECM test.

To sum up, the results of the variance decomposition forecast error method approve the long run causal relationship between conomic growth and FDI, and validates the results of the ECM granger causality inferences as robust and reliable. Furthermore, the significance of the control variables including exchange rate, financial development, trade openness, and employment rate also bolster the results.

## 5. CONCLUSION AND RECOMMENDATIONS

This study scrutinized the long run causal impact of the FDI led economic growth hypothesis in Ghana while controlling for exchange rate, financial development, trade openness and employment rate using annual data from 1980 to 2019. To realize this objective, the study utilized two econometric models; Autoregressive distributed lag model and variance decomposition forecast error model. The empirical analysis of the results disclose that a significant causal long run connection flows from foreign direct investment to economic growth in Ghana. Most importantly, the causal long run relationship between economic growth and foreign direct investment is positive. Meaning, an increase in foreign direct investment leads to a corresponding increase in economic growth. The outcome confirms the FDI-led growth hypothesis in Ghana. Hence, FDI generates a long run growth in Ghana.

Also, the results revealed that exchange rate, financial development, trade openness and employment are very essential factors to be considered in the nexus between GDP and FDI. Depreciation of exchange rate was found to have a positive impact on economic growth. Trade penness and employment were also found to promote economic growth. Furthermore, availability of credit via financial developed institutions was found to boost economic growth by supporting the financing requirements of domestic producers which int turn lifts their aggregate production.

Consequently, given the outcomes of this present study, it is recommended that Ghana government should endeavour to hasten the attraction of foreign direct investment since foreign direct investment stimulates long run economic growth in Ghana. As such, government can offer tax holiday incentives, increase the numbers of skilled labors via training and education, reduce crime rate and industrial sector restrictions. These measures will help augment FDI flow in the country and most importantly draw more foreign investors indirectly into other sectors other than the conventional sectors gratified by foreign investors. Secondly, for government to quickly realize its self-sustaining economic growth dream, it maybe suggested that she pays much attention on the development of financial institutions, strengthen trade openness, improve employment level and ensure a competitive exchange rate since these variables exert long run impact on the growth of the Ghanaian economy.

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