Research Article

THE EFFECT OF FDI ON ECONOMIC GROWTH IN WEST AFRICA COUNTRIES A PANEL DATA APPROACH

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ABSTRACT

This study estimates the effect of foreign direct investment (FDI) on economic growth of nine (9) West Africa countries during the period of 1995 to 2015, using panel data approach. As a result, the FDI is statistically significant and has a positive effect on economic growth in West Africa countries. As well, FDI needs support and directive from the government to have better productive activities in order to avoid its adverse effect on GDP of West Africa countries.

KEYWORDS: Economic growth, FDI, Panel data approach, West Africa countries.

INTRODUCTION

The Foreign Direct Investment (FDI) is defined as “investment made to acquire a lasting interest in or effective control over an enterprise operating outside of the economy of the investor” (International monetary Fund 1993), has increased exponentially in developing countries.

The role of FDI has been known as a growth-enhancing factor in developing countries and it is recognized as a catalyst for output growth, capital accumulation and technological progress. It appears to be a less controversial hypothesis in theory than in practice. In addition to being a major source of long-term capital for investment in infrastructure and other development initiatives. The FDI can be a catalyst for economic diversification, helps these economies to overcome excessive dependence on natural resources.

FDI remains one of the most important forms of cross-border capital flow into developing countries. In 2012, FDI inflow into developing countries amounted to more than US$790 billion, exceeding by a wide margin the size of inward remittance (US$406 billion) and official development aid (US$126 billion) from tradition OECD donors.

Outward FDI from developing countries, including South-South flows, are increasingly prominent. In 2012, US$481.6 billion of FDI flows (US$5 trillion of stock) originated in developing and transition countries. They accounted for about 40 percent of FDI into low-income countries (mainly in Africa) in 2010.

FDI flows into Sub-Saharan Africa have grown nearly sixfold over the past decade. The flows increased from about US$6.3 billion in 2000 to US$35 billion in 2012, while this is still just 2.5 percent of total global flows, it represents an unprecedented size of investment capital in most African countries, much larger than remittances or official aid. Since the financial crisis, inflows into Africa have been volatile than worldwide inflows. In 2012, FDI inflows globally were only about 60% of the pre-crisis level of 2007. Nevertheless, FDI has become an important part of the discourse on development in Africa. Given the enthusiasm with which FDI is being with ten of the world's 15 most dynamic economies, it is not surprising that Africa continues to attract considerable resources FDI flows and this positive trend should continue.
The West Africa is substantial for a significant share of foreign direct investment (FDI) in Sub-Saharan Africa (FDI), attracting an average of 35% of the inflow of FDI into sub-Saharan Africa between 2004 and 2013. Nigeria represents approximately this fraction and is currently the third largest recipient of FDI in Sub-Saharan Africa. While FDI grew more than six-fold between 2004 and 2011 from USD 3 billion to USD 19 billion, it fell sharply from 37 percent in 2011 to USD 13 billion from USD 19 billion to USD 12 billion. A sharp decline in this decline was due to Nigeria's inflow of FDI, although FDI in almost all countries in the region fell between 2011 and 2013 (with the exception of Benin, Burkina Faso, Côte d'Ivoire and Ghana).

The selection of West Africa as the region for consideration in this study is particularly important. Despite the numerous studies on the FDI-growth nexus, there is a significant dearth of literature on FDI focusing solely on Sub-Saharan Africa. A quick search of the Econlit database reveals that few papers which highlight FDI in Africa either examine the determinants of FDI to the region or are case studies of the performance of FDI in particular countries. This shortcoming presents us with the opportunity to explore the effect of FDI on growth in the region as a whole, and to contribute to the small body of existing literature on the region.

To study the effect of FDI on economic growth in Sub-Saharan Africa, we employ ordinary least squares regressions with fixed effects on pooled panel data covering twenty countries over the period 1980-2009. Blongien and Wang (2005) find that the inappropriate pooling of developed and developing country data has caused the estimated impact of FDI on growth and domestic investment to be obscured in many FDI-growth studies, because FDI seems to have a higher effect on growth in developing countries than in developed countries in income terms (World Bank 2012a), we consider polling them in this study to be a valid approach.

This paper is addressed to decision makers, investors and economists in terms of highlighting concept of FDI in West Africa countries and its contributions on economic growth in this part of the world.

The rest of the paper is organized as follows: we present the objectives of the study, and review some precious works done by searchers, then we describe the methodology and discuss the empirical results. We finally conclude.

**OBJECTIVES OF THE STUDY**

The main objective of the study is to measure the effect of foreign direct investment on economic growth in West Africa countries.

Specifically, the study aims to: (i) analyze the share of FDI on economic growth in West Africa; (ii) examine whether FDI has a positive or negative effect on economic growth; (iii) determine other variable that influence on economic growth in ECOWAS.

**LITERATURE REVIEW**

Alsan et al (2006) used OLS and reset 19 to investigate the population health as a determinant factor of FDI in 74 countries during 1980 – 2000. The variables used were the FDI, the population, the GDP, the income, the trade barriers, the literacy ratio and the health status. The study concluded that total FDI are positively and significantly related to the health status.

Hansen and Rand (2006) used Fixed Effect and a VAR 21 model in 31 countries during 1970 –2000 taking into account the FDI, the host country’s characteristics and time dummies. There has been observed bidirectional causality between FDI and GDP. Moreover, FDI have long – run impact on GDP and thus they contribute to economic growth.

Azman – Saini et al (2010) applied PTR 26 to study the interaction between local financial markets and FDI in 91 countries during 1975 – 2005. The variables studied were the GDP, the income, the population, the FDI, the human capital, the government expenditure and the financial markets. It is observed that there is a threshold level beyond which FDI has positive impacts on economic growth. Kashcheeva (2013) used OLS, GMM and FE to investigate the relationship between FDI and IPR in 103 countries between 1970 – 2009. He used the stage of development, the FDI, the IPR, the human capital, the government expenditure, the trade openness, the inflation and the market distortions as variables. The study concluded that both FDI and IPR have a positive impact on economic development.

Masron and Nor (2013) applied panel data analysis to investigate the impact of institutional quality on FDI in 8 ASEAN during 2002 – 2010. The variables studied were the GDP, the institutional quality, the educational expenditure, the trade openness and the wage rate. It is observed that the countries that improved the institutional quality and the corruption controls attracted larger amounts of FDI.

Samargandi et al (2015) applied PCA and ARDL 34 to study the interaction between FDI and economic growth in 52 countries during 1980 – 2008. The variables used were the trade openness, the FDI, the population, the government expenditure and the gross fixed capital formation. It is argued that FDI contribute to economic growth since they improve productivity, technology transfer and adoption of new processes and skills.

**METHODOLOGY**

The study has used the panel data method, through which we will use the following three models: Pooled regression model (PRM), fixed effect model (FEM) and random effect model (REM). To know the best models to use in the analysis, two tests will be applied: the first test (LM test) Lagrange multiplier proposal from Preusch and Pagan in (1980). This test is used to choose between (PRM), (FEM) or (REM), the second test is Hausman test (1978), to choose between (FEM), (REM). Using a variety of studies applied to different models in the estimation of FDI on economic growth in addition to the use of different methodologies, accordingly, the standard model in this study, the general equation is as follows:

$$GDP = (FDI, TRD, GFC, INF)$$

Thus, our growth function becomes:

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$$GDP = (FDI, TRD, GFC, INF)$$

Thus, our growth function becomes:
\[ GDP_i = \beta_0 + \beta_1 FDI_i + \beta_2 TRD_i + \beta_3 GFC_i + \beta_4 INF_i + \epsilon_i \]  
(1)

where \( GDP_i \) : gross domestic product in period \( t \), \( FDI_i \) : foreign direct investment in period \( t \), \( TRD_i \) : openness trade as sum of export and import, \( GFC_i \) : government final consumption, \( INF_i \) : Inflation in period \( t \).

By taking to the logarithm of GDP, the equation becomes:

\[ \ln GDP_i = \beta_0 + \beta_1 FDI_i + \beta_2 TRD_i + \beta_3 GFC_i + \beta_4 INF_i + \epsilon_i \]  
(2)

The Pooled OLS regression model

It can clarify the compound regression model as follows:

Suppose pooled regression model homogeneity of variances random error between the countries under study limits (\( \sigma_i^2 = \sigma^2 \)), together with zero covariance between countries \( \text{Cov}(\epsilon_i, \epsilon_j) = 0 \) for \( i \neq j \). The model also assumes the formation fixed limit transactions (\( \alpha_{i,t} \)) and slope coefficients (\( \beta_i \)) for all countries.

The fixed effect models

The fixed effect model is simply a linear regression model in which the intercept terms vary according to the individual units \( i \).

\[ Y_{it} = \alpha_i \delta_{1it} + \alpha_i \delta_{2it} + \cdots + X_{it} \beta + \epsilon_{it} \]  
(3)

Where it is usually assumed that all \( X_{it} \) are independent of all \( \epsilon_{it} \), we can write this in the usual regression framework by including a dummy variable for each unit \( i \) in the model:

\[ Y_{it} = \sum_{j=1}^{N} \alpha_j d_{ij} + X_{it} \beta + \epsilon_{it} \]  
(4)

Where \( d_{ij} = 1 \) if \( i = j \) and 0 elsewhere. We therefore have a set of \( N \) dummy variable in the model. The parameters \( \alpha_1 \ldots \alpha_N \) and \( \beta \) can be estimated by ordinary least squares in equation (3). The implied estimator for \( \beta \) is referred to as the Least Squared Dummy Variable (LSDV) estimator. It may however, be numerically unattractive to have a regression model with so many regressors.

The Random effect models

It is generally assumed in regression analysis that all factors that affects the dependent variable, but which have not been included as regressors can be appropriately summarized by a random error term. In our case, this conduct is to the assumption that \( \alpha_i \) are random factors, independently and identically distributed over individuals. Thus, we write the random effect model as:

\[ Y_{it} = \mu + X_{it} \beta + \alpha_i + \epsilon_{it}, \text{ } \epsilon_{it} \sim \text{IID}(0, \sigma^2) \]  
(5)

Where \( \alpha_i + \epsilon_{it} \) is processed as an error term composed of two components: an individual specific component, that will not vary over time, and a remainder component, that is assumed to be uncorrected over time, this is all correlation of the error terms over time is attributed to the individual effects. It is assumed that \( \alpha_i \) and \( \epsilon_{it} \) are mutually independent and are independent of \( X_{it} \) for all \( i \) and \( s \). this implies that the OLS estimator for \( \mu \) and \( \beta \) from (5) is unbiased and consistent. The error components structure implies that the composite error term \( \alpha_i + \epsilon_{it} \) exhibits a particular form of autocorrelation (unless \( \sigma_{\epsilon}^2 = 0 \)).

The Hausman test

The Hausman test allows choosing between the fixed effect model and the random effect model. The null hypothesis is that the preferred model is the random effect model vs the alternative which is the fixed effect model. It essentially tests whether the unique errors (\( \mu_i \)) are correlated with the regressions; the null hypothesis is that they are not.

DATA AND SOURCE

The data for this study are extracted from World Bank website. The dataset used of consists of 189 observations of annually for the West African Countries from 1990 to 2015. The countries studied were Benin, Burkina Faso, Ivory Coast, Ghana, Liberia, Nigeria, Senegal, Sierra Leone and Togo. A number of countries which could have been part of the sample were omitted due to lack of sufficient data on some of the variables under investigation. This choice was not arbitrary; as the data coming from a single international source makes it possible to overcome the problems associated with methods and approaches to compelling data bases.

The variables used for empirical analysis in this study are as follows: Dependent variable: Gross Domestic Product (GDP). Independent variables: Foreign Direct Investment (FDI), Openness trade (sum of export and import) (TRD), Government final consumption (GFC), Inflation (INF).

RESULTS AND DISCUSSIONS

Pooled OLS regression model

Here, we pool the 189 observations together and realize the regression model, neglecting the nature of cross-sectional data and time series.
Table 1: Pooled OLS regression output

| Ln GDP | Coef.     | Std.Err  | t      | P>|t|   |
|--------|-----------|----------|--------|--------|
| FDI    | -.0940226 | .0746438 | -1.26  | 0.209  |
| TRD    | .1776634  | .0755767 | 2.35   | 0.020  |
| GFC    | .0460149  | .0738298 | 0.62   | 0.534  |
| INF    | -.0103427 | .0731733 | 0.14   | 0.888  |
| Cons   | 81.70016  | 15.37847 | 5.31   | 0.000  |

Number of Obs. = 189
F (4,184) =1.57
Prob. >F= 0.1850
R-squared= 0.0329
Adj. R-squared= 0.0119
Root MSE= 54.377

Source: Author’s calculation

Form table 1, we see that the p-value of the TRD is less than 5%, meaning the variable can explain the GDP at level of 0.05. While, the variables FDI, GFC and INF are not statically significant at 5% level. But for the time being, we shall not accept the result of this pooled regression model. For we see that the thirteen countries are not same. Then now, we shall develop Fixed Effect model and we are assuming that our thirteen countries have different intercept.

Fixed effect or LSDV Model

The fixed effect or LSDV model allows a heterogeneity or an individuality among thirteen countries by letting them have their own intercept values.

Table 2: LSDV results.

| Ln GDP | Coef.     | Std.Err  | t      | P>|t|   |
|--------|-----------|----------|--------|--------|
| FDI    | .1763189  | .0386979 | 4.56   | 0.000  |
| TRD    | .0436535  | .0403254 | 1.01   | 0.312  |
| GFC    | .0641279  | .0367891 | 1.74   | 0.083  |
| INF    | .0016605  | .033169  | 0.05   | 0.960  |
| Cons   | 87.65273  | 7.316146 | 9.27   | 0.000  |

Number of Obs. = 189
Number of group= 9
Obs. per group: min = 21
Avg= 21.0
Max=21
F (4,176) =6.91
Prob. >F= 0.0000

Source: Author’s calculation

We can easily say our model is acceptable and fitted, also all coefficients of the model are equal to zero, because our Prob >F = 0.0000 less than 0.05. The probability of FDI variable is 0.000 less than 5%, FDI is statically significant. The p-values of TRD (0.312), GFC (0.083) and INF (0.960) are all big than 5%, meaning not significant to explain the variable GDP.

Random effect model

Table 3: Random effect results.

| Ln GDP | Coef.     | Std.Err  | t      | P>|t|   |
|--------|-----------|----------|--------|--------|
| FDI    | .1734191  | .0384876 | 4.51   | 0.000  |
| TRD    | .0453731  | .042755  | 1.06   | 0.288  |
| GFC    | .0636753  | .036589  | 1.74   | 0.082  |
| INF    | -.0017754 | .0329957 | 0.05   | 0.957  |
| Cons   | 67.99693  | 20.9543  | 3.24   | 0.001  |

Number of Obs. = 189
Number of group= 9
Obs. per group: min = 21
Avg= 21.0
Max=21
F (4,176) =6.91
Prob. >F= 0.0000

Source: Author’s calculation

The outcomes of the random effect show that the probability value of the F-statistic is equal to 0.0000 less than 0.05, meaning our model is well fitted and acceptable. We find also that the variable FDI is statically significant. However, TRD (0.288), GFC (0.082) and INF are not significant to explain to GDP.

Hausman Test

Here our thirteen countries that have common mean value for the intercept. Now we shall apply Hausman Test to check which model is the best (Fixed Effect or Random Effect).

Null Hypothesis: Fixed-effect model is appropriate

Alternative Hypothesis: Random-effect model is appropriate
The study aimed to estimate the effect FDI on economic growth in West Africa countries during the period of 1995 to 2015, through a form of panel data which includes economic growth measured by lnGDP as the dependent variable, and a number of independent variables, which included Foreign Direct investment (FDI), Openness trade (TRD), Government final Consumption (GFC), and Inflation (INF) in nine (9) West Africa countries. The study finds that foreign direct investment in West Africa countries does influence economic growth positively. An increase in FDI is positively correlated with an increase of economic growth in West Africa countries. The governments for ECOWAS countries need to manage and give direction to FDI to productive activities in order to avoid the adverse effect of FDI on GDP. They should develop their economies faster by fighting against corruption and giving more incentive to investors. Thus, efforts should be directed towards policies that will improve economic growth, such as business environment, and openness, in order to have a greater impact on imports, which plays a strengthen role in economic growth.

CONCLUSION

The above equation shows that influence of FDI as predicated is positive and significant at 5% level of significance. The results of the "log-log" model should be treated as elasticity – one percentage change in independent variable leads to $\beta_i$ percentage change in the dependent variable. In this case, an increase in FDI by 1% is related to 0.176% increase in a specific region’s growth, which means that FDI positively influence economic growth in West Africa countries’ economies. These results are consistent with Pelinescu et al. (2009).

Furthermore, trade openness and government final consumption are also positively correlated with economic growth but not significant to explain to it.

REFERENCES