The relationship between FDI and economic development in Ghana: an empirical analysis using multiple regression

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ABSTRACT

This study attempts to determine whether and to what extent FDI is positively related to economic growth in Ghana. We use data collected from the World Bank from 2003 to 2018. Multiple regression results indicate that a positive and significant relationship exists between Foreign Direct Investment, Exchange rate and Gross Domestic Product, but a negative relationship exists between Adjusted Gross Savings and GDP.

Keywords: FDI, GDP, Ghana, Exchange Rates, Multiple Regression

INTRODUCTION

The relationship between Foreign Domestic Investment and economic growth has been a subject of considerable research in recent years but the results of the studies are not conclusive. Zhao and Zhang (2010), Wang, (2010), Lipsey, Sjöholm, & Sun, (2013) and Waldkirch, Nunnenkamp, & Bremont, (2009) find a positive relationship between FDI and economic growth, but Kakar and Khilji (2011) find no evidence that FDI is related to an increase in economic growth.

This paper extends this line of research into the country of Ghana. The purpose of this paper is to determine whether and to what extent FDI is related to economic growth in Ghana. The Republic of Ghana is a country located in West Africa. It is a country with many natural resources and a market-based economy. In its ambitious economic plan, known as "Ghana Vision 2020" it hopes to move the country towards a more developed country between 2020 and 2029 and an industrialized country between 2030 and 2039. Gross Domestic Product (GDP) in 2019 was $66.9 billion and GDP per capita was $2,201.12. In its ambitious plan FDI is supposed to play an important role.

This paper proceeds as follows. Section 1 provides a brief review of the literature on FDI and economic growth. Section 2 provides the methodology, data and results. Section 3 summarizes the study and provides a conclusion.

LITERATURE REVIEW

Numerous studies have examined the relationships between FDI and economic development for developed countries; however, the results of the studies has been inconclusive. For instance, Rehman (2016) developed two models that studied the relationship between FDI and economic growth in Pakistan from 1970 to 2012. The first VECM (Vector Error Correction Model) found that FDI is significantly related economic growth, and the second VECM found that not only is FDI significantly related to economic growth, but human capital, and exports as well. Sakyi and Egyir (2017) examined FDI and economic growth in 45 African countries from 1990 to 2014 by using an augmented endogenous growth model with the assistance of a dynamic system generalized method of moment (GMM) technique to test the Bhagwati hypothesis. They find support for the Bhagwati hypothesis, which predicts growth in FDI (Foreign Direct Investment) through the enhancing effects of trade. Raza, Shah, and Arif (2019), study the relationship between foreign direct investment (FDI) and economic growth within the good governance system of the Organization for Economic Co-operation and Development (OECD) countries. Data was collected from 1996-2013 and a fixed effect model and Generalized method of moments (GMM) was estimated. They find a positive relationship between all the variables used in the study. Furthermore, the Granger causality test showed a bidirectional causal relationship existed between the FDI and regulatory quality on economic growth, but they find a unidirectional causal relationship existed amongst the variables of corruption control, political stability, voice accountability, government effectiveness and economic growth. Though these studies reviewed have found a positive relationship between FDI and economic growth, other studies find no relationship between FDI and economic growth. For instance, Ali and Mingque (2018) study the relationship between FDI and economic growth in Asia, Indonesia, India, Malaysia and Bangladesh from 1990 to 2014. They find no significant relationship between FDI and economic growth. Kakar and Khiliji (2011) also study the relationship between FDI and

economic growth in Malaysia and Pakistan. They find no relationship between FDI and economic growth. Zakari (2017) examined the relationship between FDI and exchange rate and the impact of FDI on GDP in Nigeria. The findings from this study indicated that a strong positive relationship between FDI and exchange rate but a weak positive relationship between FDI and GDP.

Findings from the analysis show that there is a strong positive relationship between FDI and exchange rate in Nigeria on one hand and there is a weak positive relationship between FDI and GDP on the other hand. The researcher also found that there was a significant inflow of FDI from 2005-2014 due to rise in exchange rate in the same period. The study concludes that exchange rate, FDI, and GDP are positively correlated. The study recommended that Government of Nigeria should fully liberalized exchange rate regime devoid of fixed multiple exchange rates so as to attract more FDI and contribute to GDP, this is because commercial viability of any FDI is based on exchange rate stability.

DATA

The data used in this study was retrieved from the World Bank Open Data database and covers the period from 2003 to 2018. The times series annual data consists of the following variables: GDP (Gross Domestic Product), FDI (Foreign Direct Investment), Exchange Rate and Adjusted Savings All variables used in this study are measured in U.S. dollars. The data is transformed using logs to ensure that the independent variables are linearly related to the dependent variable.

METHODOLOGY

We use multiple regression to examine whether GDP as the dependent variable, and FDI, Exchange rate and Adjusted Savings as the independent variables can, collectively explain economic growth in Ghana. In order to use multiple regression, we must make some assumptions about the data. First, we must assume that the relationship between the dependent variables and independent variables is linear. Second, we must assume that for each combination of values of the independent variables, the distribution of the dependent variable is normal with a constant variance. Third, the observations are independent, and fourth, for each value of the independent variable, there is a normal distribution of values of the dependent variable (Norusis, 2008). The model is specified below:

$$GDP = \alpha + b_1\ ER + b_2\ FDI + b_3\ AGS + \mu$$

Where,

GDP = Gross Domestic Product
ER = Exchange Rate
FDI = Private Foreign Domestic Investment
AGS = Adjusted Gross Savings
u = Stochastic error term

RESULTS

Table 1 presents the descriptive statistics for GDP, Exchange Rate, Adjusted Gross Savings, and Foreign Direct Investment from 2003 to 2018. The annual mean GDP over our sample period is 35.566 with a standard deviation of 10867. The exchange rate over our sample period is 2.77 with a standard deviation of 1.35. The adjusted gross savings over our sample period is 5.56 with a standard deviation of 1297.30 and FDI over our sample period is 2257.12 with a standard deviation of 1297.30. There are 64 observations in our sample.

Table1: Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
GDP	16	21001.000	53828.000	35566.37500	10867.539530
EXR	16	.87	4.59	2.0744	1.35055
AGS	16	-999.00000	926.00000	5.5625000	549.38680590
FDI	16	137.00000	3485.0000	2257.1250000	1297.30766700
Valid N (listwise)	16				

To ensure the multinomial normality of the independent variables, we also conduct diagnostics on the model. Figure 1 indicates that the histogram of the residuals appears normal. Figure 2 displays the Q-Q plot. The Q-Q plot of the residuals also appears normal. Based on the histogram in figure 1 and the Q-Q plot in figure 2, it appears the assumption of normality is met.

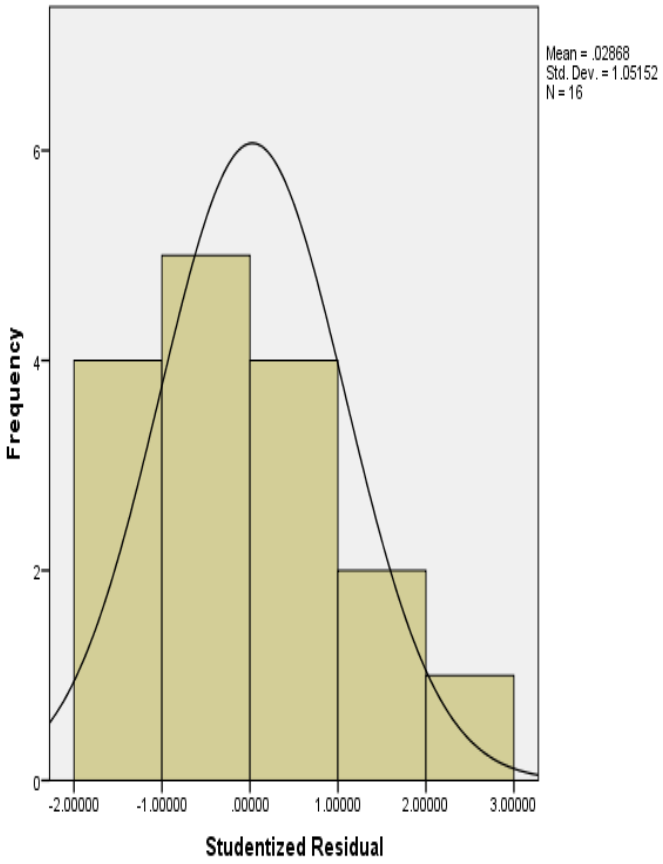

Figure 1

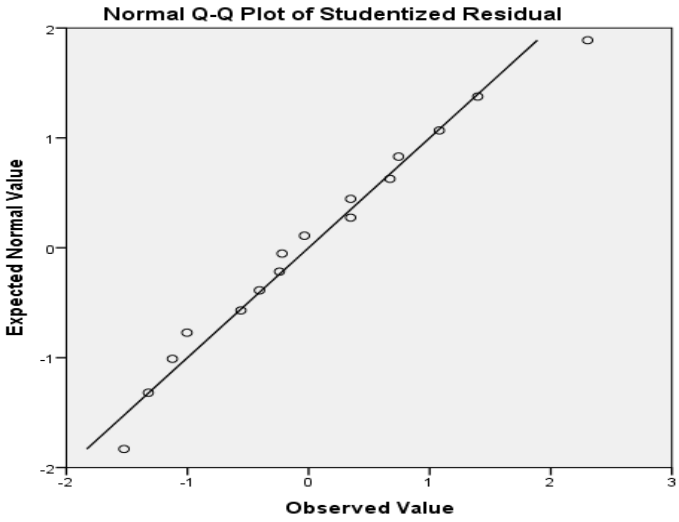

Figure 2

Table 2 depicts the results from the analysis of variance. The analysis-of-variance is used to test the hypothesis that there is no linear relationship between the dependent variable and the independent variables used in the study. The ratio of the two mean squares, labeled F is 100.23.

Since the significance value is observed to less than .0005, we reject the null hypothesis that there is no linear relationship between GDP and the four independent variables.

Table 2 ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1703592933.000	3	567864311.100	100.273	.000[b]
	Residual	67958298.350	12	5663191.529		
	Total	1771551232.000	15			

a. Dependent Variable: GDP
b. Predictors: (Constant), AGS, EXR, FDI

Table 3 depicts the model summary. The entry labeled R Square tells that 96.2% of the observed variability in GDP is explained by the three independent variables. R is the correlation coefficient between the dependent variable and the predicted value based on the regression model. The R-value in the model summary is .98, which is large and infers that the regression model predicts well.

Table 3 Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.981[a]	.962	.952	2379.746106

a. Predictors: (Constant), AGS, EXR, FDI
b. Dependent Variable: GDP

Table 4 depicts the estimates of the regression model. The coefficients for the independent variables are listed in column B and are used to write the estimated regression equation as

$$Y = 16938.12 + 5447.178\ x\ Exchange\ Rate + \ 3.248\ x\ FDI - \ .356\ x\ AGS$$

Where y is the predicted GDP, and the regression coefficients tells us how much the value of the dependent variable changes with 1 unit change in the independent variable while holding the other independent variables constant. A positive coefficient variable tells us that the predicted dependent variable increases when the independent variable increases and vice versa, while a negative coefficient tells us that the predicted dependent variable decreases when the value of the independent variable increases. Our model indicates that there is a positive and significant relationship between the exchange rate and GDP. Thus, the implication is that monetary policy could be used to manage the exchange rate with caution as to not hurt GDP. An appreciation in the exchange rate could cause a slowdown in the export sector of the economy. Our model also indicates a positive relationship exists between FDI and GDP. Thus, the implication is that Ghana should continue to follow policies that promote FDI. Finally, our model indicates that a negative relationship exists between AGS and GDP. The implication is that savings acts a leakage from spending and causes GDP to decline. Therefore, Ghana policy makers should design policies that limit the leakages from GDP and increase capital investments. Theoretically, the relationship between economic growth and savings should be positive because savings should stimulate economic growth through capital investments. Overall, our findings are consistent with prior studies that suggest that FDI and Economic growth are positively related.

Table 4 Coefficients

Model		Unstandardized Coefficients B	Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	16938.119	1357.916		12.474	.000
	EXR	5447.178	942.242	.677	5.781	.000
	FDI	3.248	1.083	.388	2.998	.011
	AGS	-.356	1.939	-.018	-.184	.857

a. Dependent Variable: GDP

CONCLUSION

This study attempts to determine whether and to what extent FDI is positively related economic growth in Ghana. We use data collected from the World Bank from 2003 to 2018 and develop a multiple regression model. Our results indicate that the GDP is positively and significantly related to Foreign Direct Investment and exchange rate but a negatively related to Adjusted Gross Savings. The implications from our study suggest that if Ghana policy makers can ensure stability of the exchange rate, it may both attract more FDI and enhance the positive impact of FDI on its economic growth.

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