

# **Non-Automatic Influence of Foreign Direct Investment (FDI) on Growth: Evidence From African Economies**

**Juma Gambason Makaranga & Xiaoyan Zhou**

## **Abstract:**

The study has been used fixed effect and first difference estimation method in a panel data of 49 African economies to evaluate the position of the quality of institutions, stock of human capital, trade openness and inflation rate on facilitating the influence of foreign direct investment (FDI) on growth for the period between 1990 and 2016. The results showed that FDI was positively and statistically significant and contributing to growth in fixed effect estimation and insignificant in first difference estimation. Human capital showed the positive relationship with growth but statistically insignificant yet inflation rate has statistically significant with negative influence on growth. The results reveal that the contribution of FDI on growth is uplifted by the quality of the institutions, open trade and natural resources. we found strong positive coefficients on the quality of institutions implying that quality of institutions has a vital role in boosting the growth of African economies. Both interaction term between FDI and natural resources (FDI\*Resource Dummy), that of FDI and human capital (FDI\*HC) showed a positive relationship with growth but statistically insignificant, yet the interaction term of FDI and quality of institution (FDI\*QI) reveal a negative relationship with growth. These statistical insignificant coefficients of the interaction terms signify that in order to accelerate their growth African economies should put more emphasis on reforming their institutions in line with improving their human capital in such a way that they can be able to absorb and realize the FDI spillovers into their economies.

**Key words:** Foreign Direct Investment (FDI), quality of institutions, Human capital, trade openness, inflation rate & African Economies

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## **Introduction**

For several years now, developing countries including African economies has been often believed that foreign direct investment (FDI) is an engine that facilitates growth of their economies, simply because it is the most stable and largest set that can secure capital, Technology, knowledge, skills, managerial expertise, innovations, employment creation as well as improve productivity and increase competitiveness of the local firms. Most of the previous studies reveal that FDI contributes positively to the growth of the recipient economies, but the magnitude of such contribution differ from country to country rely on many factors such as quality of the institutions, the stock of human capital, trade openness and inflation rate. Literatures are still inconclusive on the real impact of FDI on growth (among many refer inconclusive results on Gui-Diby, 2016; Sarkar, 2007; Shaikh, 2010).

This debate motivated the author of this study to evaluate the influence of FDI inflows on growth focusing on the position of quality of the institutions, the stock of human capital, trade openness as well as inflation rate on facilitating such influence. Due to the availability of data instead of 54 economies the study is limited to 49 African economies over the last 27 years (between 1990 and 2016).The results show that FDI is positively and statistically significant contributor to growth in a fixed effect estimation and insignificant in first difference estimation. These results reveal that the contribution of FDI on growth is uplifted by the quality of the institutions, open trade and natural resources. I found strong positive coefficients on the quality of institutions implying that quality of institutions have a vital role in boosting the growth of African economies resulted from FDI. Both interaction term between natural resources with FDI (FDI\*Resource Dummy) and that of FDI and human capital (FDI\*HC) show a positive relationship with growth but statistically insignificant, moreover the interaction term of FDI and quality of institution (FDI\*QI) reveal a negative relationship with growth. These statistical insignificant coefficients of the interaction terms signify that African economies should reform their institutions, improve their human capital in such a way that they can be able to absorb the spillovers resulted from FDI in order to enhance their growth.

## **Theoretical literature**

### **Absorptive Capacity Theory**

The concept of absorptive capacity focuses on the recognizing, assimilating and utilizing external knowledge, technology and other spills overs that brought through cross-border trade and mainly FDI. Absorptive capacity covers theories of learning, innovation, managerial cognition, knowledge based view and dynamic capability (Anatoliivna, 2013). Therefore for the recipient country to benefit from FDI their institutions/ organizations should be agile enough to acquire, assimilate, transform and exploit FDI spills overs (knowledge, technology, managerial skills) for their success and hence economic growth of their nation.

Mowery and Oxley (1995) argued that absorptive capacity is the widespread sheet with a set of skills needed to deal with the tacit component of transferred knowledge and the need to modify the acquired knowledge and skills. Absorptive capacity as the systematic arrangement of organizational rules, regulations, routines and processes acquired by a firm, assimilate, transform and exploit knowledge to produce a dynamic organizational capability. Acquire, assimilate/understand, transform and exploit termed as four dimensions of the absorptive capacity that influence organization processes differently but complementarily as a result better outcome of the organization.. Therefore, among others FDI inflows involves the flow of capital, technology, knowledge (managerial expertise and skills) from one country always a developed country to another recipient country.

These opportunities and benefits (capital, technology, knowledge and skills) can't diffuse into recipient country/economy automatically, the recipient country institutions (governmental, non-governmental and business firms and other stakeholders should have the capacity to integrate the benefits from foreign country firms via FDI into the recipient country so as can facilitate the growth of the economy. For this reason, the study done by Nguyen et al (2009) proposed the so-called 'photosynthesis model.' As for the current study biological concept of photosynthesis is the process by which green plants manufacture their own food and oxygen by converting light energy into chemical energy. Before this process, the plants should have stomata and chlorophyll (to absorb carbon dioxide and sunlight from air respectively) and roots that will absorb water from the soil. Thus the plants manufacture their own food and

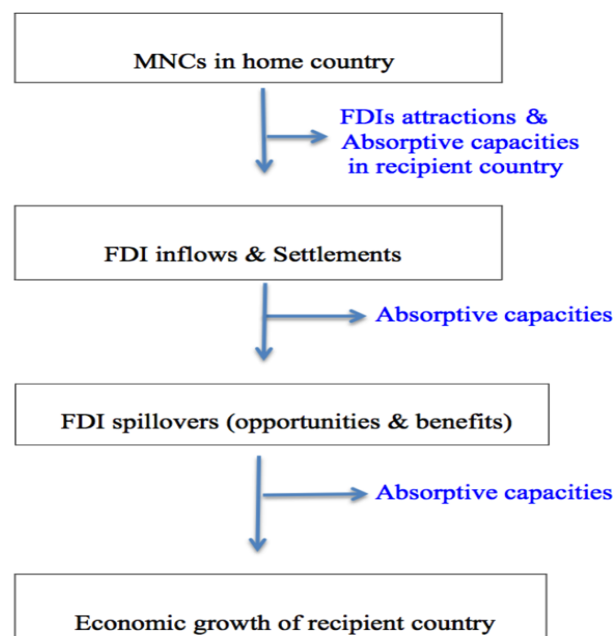
oxygen through the combination of carbon dioxide, water, and sunlight that are influenced by the prior conditions of stomata, chlorophyll, and roots owned by the plant as shown below:

$$\text{Water} + \text{Carbon dioxide} + \text{Sunlight} + (\text{stomata, chlorophylls, roots}) = \text{Food} + \text{Oxygen}$$

Therefore by drawing conclusion from photosynthesis perspective as for the current study, green plants taken as “FDI recipient country”, while water, carbon dioxide and sunlight taken as “FDI inflows” then Stomata, chlorophylls and roots taken as the “necessary prior conditions (that is assumed to be absorptive capacity of a country) like quality institutions, threshold human capital, trade openness and low inflation rate” the FDI recipient country should have prior FDI inflows so as can exploit, integrate and diffuse the benefits of FDI into their economy, moreover food and oxygen assumed to be “economic growth” as shown below (explanations of the above equation):

$$\text{FDI inflows} + \{\text{quality of the institutions, stock of human capital, trade openness, inflation rate}\} = \text{Economic growth.}$$

Consider figure 1 below representing the photosynthesis model in which the recipient economies should adopt in order to maximize the capacity of absorbing the spillovers from FDI.



*Figure 1: Adapted, modified and simplified photosynthesis model*

## **Empirical literature review**

Generally in theoretical underpinning economists agree that FDI inflows lead to an increase of rate of growth Blonigen (2005), a major growth enhancing characteristics of FDI is the advanced technology that often move together with foreign capital investment, domestic investor can adopt this advanced technologies spills overs that is to say, FDI generates positive externalities through technology spills overs at the same time increased foreign capital can help to narrow the saving gap (ratio between domestic saving ratio and desired level of investment ratio). It is presuming that there is a positive nexus between FDI inflows and economic growth but the existing empirical evidence on the same subject still inconclusive.

Apart from following North (1990) who defined “Institutions” as the rules of the game in a society or as the humanly devised constraints that shape human interaction and affect economies over time. In a big picture institutional environment of a country is a set of political, economic, social, and legal conventions that establish the foundational basis for production and exchange (Oxley, 1999; Sobel, 2002). Institutions formulate the constraints and incentive system of a society that structure human interactions, and thus they provide rules and enforcement mechanisms that constrain actors and limit their best-choice options to generally predictable outcomes (North, 1998).

According to Manca (2010) found that the better institutions adopt faster technologies hence have high productivity growth. Institutional quality is closely associated with political and economic governance as well as interactions among different societal members (North, 1990) for such reason institutions can directly accelerate or decelerate economic development via many ways for instance a quality institution can provide incentive for some activities that has more return socially and the reverse is true. Thus the societies with poor institution have poor economic growth achievement since they cannot capture productivity gains arises from specialization and division of labour (North, 1990; 1994) and he argued that economic growth and performance are critically dependent on the efficacy of institutions. Acemoglu et al. (2005) and Acemoglu and Robinson (2013) suggested that more the quality of institutional

is, open potentially unlimited economic growth by providing individual entrepreneurs and inventors with the protection of their physical and intellectual property so that they invest in disruption of the contemporaneous economic and political system with their new products and /or innovations. Thus through innovations that results from improvement in institutional quality the economic growth of the nation can be uplifted. Countries with high human capital can benefit more from financial development because countries with large number of scientist and researchers may be able to make an efficient use of opportunities, pool resources and start their own firms. Innovation and technology are crucial for growth, can progress faster with greater research and development thus human capital influence growth (Sharma, 2016).

According to (Romer, 1990; Nelson, 1966) suggested that the rate of productivity growth is not influenced by rate of human capital accumulation, the rate of productivity growth is influenced by the level of human capital, this is due to the fact human capital is an input in the production of new ideas, and therefore an important determinant of the pace of innovations. Therefore, economic growth should tend to accelerate as more human capital is employed in R &D.

Nelson and Phelps (1966) pinpoint that a country that have more adaptation of technologies that discovered elsewhere are the country with more stock of human capital. Therefore adequate stock of human capital results to adequate absorption of the new knowledge and technologies, which in turn boost GDP growth through productivity increase. The stock of human capital would also tend to reduce the cost of innovation in leading economies therefore more stock of human capital can speed up the rate of innovation, an effect that raises the growth rate in leading and following economies.(Romer, 1990) suggested that throughout investment of human capital an individual's acquired knowledge and skills can easily transfer to certain goods and services, considering that accumulation of knowledge and skills takes charge of important role for that of human capital, there is wide spread belief that learning is the core factor to increase the human capital. Romer (1999) revealed that human capital is a 'fundamental source of economic productivity'.

The study done by Wijeweera et al. (2010) found that FDI inflows exert a positive impact on economic growth only in the presence of highly skilled labour. Similarly the study conducted

by De Mello (1999) pointed the contribution of FDI to the economic growth depend primarily the characteristics of the host country specifically quantum of skilled labour, as well as Borensztein et al. (1998) in their study in 69 countries found that sufficient human capital of the host country is necessary to influence the impact of FDI to its economic growth. De Mello, (1998 FDI contribution to the economic growth depends primarily on host country characteristics especially the quantum of skilled labour. Borensztein et al. (1998) suggested that although FDI has positive impact on GDP, the magnitude of the effects depends on the level of human capital. Freckleton et al. (2012), the low level of development of human capital reduces spills overs from the advanced technology brought by FDI as the recipient nation, domestic firm will be unable to absorb the new technology

Bakare(2006) studied on the growth implication of human capital investment in Nigeria using the vector autoregressive error corrections mechanism found that there is a significant functional and institutional relationship between the investment in human capital and economic growth in Nigeria, it revealed that 1% fall in human capital investment led to a 48.1% fall in the rate of growth in gross domestic output between 1970 and 2000. Similarly using annual time series data between 1977 and 2007 (Dauda, 2010) examined investment in education and economic growth in Nigeria employs Johansen co-integration technique and error correction methodology and results the found that there is a long-run relationship between investment in education and economic growth.

The number of studies examined the impact of FDI inflows to the economic growth yet they pointing ambiguous and mixed results as Manuchehr & Ericsson (2001a); Reichert & Weinhold (2001) ;Choe (2003) ;Chowdhury & Mavrotas (2006) ; Shaikh (2010) ;Griffiths & Sapsford (2004) ;Chakraborty & Nunnenkamp (2006) ;Al-Iriani (2007); haikh (2010) ;Faras & Ghali (2009); Umoh et al (2012), shows positive results. While De Mello,(1999) shows weak economic impact and Manuchehr & Ericsson (2001) ; Chowdhury & Mavrotas,(2006) ;Chakraborty & Nunnenkamp (2006); Sarkar (2007) confirmed null relationship as well as Shaikh (2010); Khaliq & Noy (2007) suggested negative effect of FDI to economic growth

## Methodology

### Model

The econometric model of the current study based on endogenous growth model, following that of (Borensztein et al., 1998; Ram & Zhang, 2002; Makki&Somwaru, 2004) which reveals that FDI influence growth of the recipient economies either directly or indirectly. That is to say FDI has non-automatic influence on growth of the recipient economies, the influence should be capacitated by some factors such as, quality of institutions, human capital, trade openness, inflation rate, government consumption/ spending, Initial GDP per capita, domestic investment and rate of population growth.

To start (following Ram & Zhang, 2002) with a simple aggregate production function of the following formulation:

$$Y=f(L,K,FDI) \dots\dots\dots(1)$$

Where, Y is aggregate real output, while L and K are aggregate input of labour and capital respectively and FDI is the FDI inflows and assumed to be “quasi-input” since its efficiency and productivity may be increases (which actually in turn may increases the aggregate output) based on the given level of labour and capital. Then by taking the derivatives, manipulation the expression and addition of the constant term and random disturbance error, the growth equation may be written as:

$$Y=b_0+b_1L+b_2K+b_3FDI+\varepsilon \dots\dots\dots(2)$$

Therefore, in order to reduce multicollianity between capital stock and FDI, the variable capital stock (K) is dropped from the equation, and since the labour force is not the variable of interest of the researcher also dropped and replaced by explanatory variables such as quality of the institutions, stock of the human capital, trade openness and inflation rate and the model equation will be re-written as:

$$Y_{it}= b_0 + b_1FDI_{it} + b_2QI_{it} + b_3HC_{it} + b_4TO_{it} + b_5IR_{it} + \varepsilon_{it} \dots\dots\dots(3)$$

In order to increase the robustness of the results as well as to reduce some endogeneity between variables, the study included some control variables such as population growth rate



(POP), domestic investment (DI), initial GDP per capita (IGDP), government spending/consumption (GC) and labour force; the model equation will be:

$$Y_{it}=b_0+b_1FDI_{it}+b_2QI_{it}+ b_3HC_{it}+ b_4TO_{it} +b_5IR_{it} +b_6POP_{it}+b_7DI_{it}+b_8IGDP_{it}+b_9GC_{it}+b_{10}L_{it}+\varepsilon_{it}$$

..... (4)

Furthermore, the robustness of the results uplifted by introducing the dummy variable called Resource Dummy in equation (5) below focusing on specific natural resources of diamond, gold, copper, oil and gas. Therefore the economies with one of the mentioned resources will carry the value of one (1) and zero (0) for those without. This is a common treatment of dummy variables as done by other researchers like (Busse&Hefeker, 2007: Pegkas, 2015). Ever since the main objective of this study is to evaluate the non-independent influence of FDI on growth concentrating on the effect of quality of the institutions, stock of human capital, trade openness and inflation rate on growth, therefore by extending the work of (Makki&Somwaru, 2004) the model equation (5) includes the interaction term between FDI and the quality of institutions (FDI\*QI), FDI and Resource Dummy (FDI\*Resource Dummy) on addition of that of FDI and human capital (FDI\*HC). Therefore the mode equation will be:

$$Y_{it} = b_0 + b_1FDI_{it} + b_2QI_{it} + b_3HC_{it} + b_4TO_{it} + b_5IR_{it} + b_6POP_{it} + b_7DI_{it} + b_8IGDP_{it} + b_9GC_{it} + b_{10}L_{it} + b_{11} ResourceDummy + c_1(FDI*QI)_{it} + c_2(FDI*HC)_{it} + c_3(FDI*Resource dummy)_{it} + \varepsilon_{it} \dots\dots\dots (5)$$

Remember that all variables are in natural logarithm form and their measurements are: Y(Per capita GDP growth rate), FDI(FDI net inflows to GDP ratio), QI(economic freedom index), HC(human development index), TO(exports plus imports to GDP ratio), IR(annual percent of consumer price index), DI(domestic investment to GDP ratio), POP(annual percent of population growth rate), IGDP(per capital GDP growth rate), GC(government financial consumption expenditure to GDP ratio), L(employment to population ratio, aged 15-24),  $b_0$  is the constant term, but  $b_1, b_2, b_3, b_4, b_5, b_6, b_7, b_8, b_9, b_{10}, b_{11}, c_1, c_2$  and  $c_3$  are the coefficients to be estimated,  $\varepsilon_{it}$  is the error term.

### Data

For the purpose of the current study was to utilize panel data for all 54 African economies for the duration of 30 years (from 1986 to 2016) but due to the availability of the data the study

limited to 49 economies for 27 years (starting from 1990 to 2016). All data are sourced from World Bank (WB) through World Development Indicators (WDI) database except quality of the institutions are sourced from the co-published data by CATO institute and Fraser institute in Canada.

### **Unit root test**

The unit root test following Levin-Lin-Chu (2002) is introduced in the data to see if the variables are cointegrated with each other. This type of unit root test assumes the homogeneity in the dynamics of the autoregressive (AR) coefficients for all panel members. The results shown that all variables are stationary in levels.

### **Discussion of the Results**

After employing Hausman test, the Fixed Effect (FE) model was chosen before Random Effect (RE). Therefore (FE) model will be used to run multiple regressions to analyze the non-automatic influence of FDI on growth (refer table 1). The results of the estimations in the table 1 shows that, column (1) represents the regression of explanatory variables, column (2) is the regression results after adding control variables, column (3) is the regression results after introducing the dummy variable, column (4) and (5) are the regressions results after adding the interaction terms and applying first difference respectively.

The results from all columns (1,2,3,4 and 5) reveals that FDI has positive influence on growth while its coefficients are statistically significant only in column 1, 2 and 3. The coefficients of column 4 and 5 though have positive relationship with growth yet are statistically insignificant (after introducing the interaction term as well as first difference in the regressions). The quality of the institutions reveal the positive relationship with growth and statistically significance to all columns (1,2,3,4 and 5), its coefficients displays high positive relationship with growth than the rest of the variables in all columns, this indicates that quality of the institutions of the African economies is a backbone and a vital engine for the actualization of FDI spillovers to stick into their economies.

The coefficient of human capital is positive in column 2,3 and 4 indicating that human capital contribute positively to the growth while in column 1 and 5 shows negative contribution yet in both cases are statistically insignificant. This is the evidence that the stock of human capital for African economies is inadequate, that is to say is not fulfilling the minimum level required (threshold level) for efficient and effective absorption and realization of spillovers from FDI. Both trade openness and inflation rate have positive and negative relationship with growth respectively but the coefficients of trade openness is statistically significant only in column 1 while the coefficients of inflation rate are statistically significant in all cases (column 1,2,3,4 and 5). This implying that, lowering inflation rate will help boosting growth rate and the reverse is true.

In the case of initial GDP, Domestic investment and population growth rate, their coefficients are positively contributing to the growth and statistically significant in all cases (column 2,3,4 and 5). The coefficients of government consumption indicates negative relationship with growth though are statistically significant (refer column 2,3,4 and 5) this reveal that each 1% increase of government consumption decreases the growth between 21%-23%, this can be manipulated that lowering of government consumption can help the government to put more money in investments which in turn would boost growth. Moreover the coefficient of labour is positively contributing to the growth though are statistically insignificant (column 2,3,4 and 5).

**Table 1. Econometric Results: Dependent variable Log Real GDP Per Capital Growth Rate**

	(1)	(2)	(3)	(4)	(5)
<u>Independent variables</u>					
Constant	0.161	0.094	0.288	0.346	0.239
lnFDI	0.083 (0.023)***	0.077 (0.023)***	0.088 (0.023)***	0.103 (0.156)	
lnTO	0.207 (0.079)***	0.149 (0.081)	0.140 (0.078)	0.132 (0.079)	
lnQI	0.713 (0.184)***	0.575 (0.186)***	0.509 (0.175)***	0.529 (0.190)***	
lnHC	-0.005 (0.135)	0.118 (0.137)	0.021 (0.105)	0.006 (0.110)	
lnIR	-0.043 (0.022)***	-0.051 (0.022)***	-0.052 (0.022)***	-0.051 (0.022)***	
lnIGDP		0.053 (0.026)***	0.062 (0.026)***	0.062 (0.026)***	
lnGC		-0.226 (0.068)***	-0.236 (0.066)***	-0.237 (0.066)***	
lnDI		0.101 (0.031)***	0.092 (0.031)***	0.092 (0.031)***	
lnPOP		0.226 (0.061)***	0.252 (0.058)***	0.252 (0.058)***	
lnL		0.088 (0.169)	0.101 (0.133)	0.098 (0.134)	
Resource Dummy			0.202 (0.184)	0.154 (0.191)	
lnFDI*lnQI				-0.036 (0.091)	
lnFDI*lnHC				0.019 (0.031)	
lnFDI*Resource Dummy				0.034 (0.042)	
L. lnFDI					0.067 (0.159)
L. lnTO					0.113 (0.081)
L. lnQI					0.617 (0.195)***
L. lnHC					-0.010 (0.117)
L. lnR					-0.045 (0.022)***
L. lnIGDP					0.063 (0.027)***
L. lnGC					-0.219 (0.068)***
L. lnDI					0.090 (0.032)***
L. lnPOP					0.261 (0.060)***
L. lnL					0.099 (0.137)
L. Resource Dummy					0.155 (0.191)
L. (lnFDI*lnQI)					-0.012 (0.093)
L. (lnFDI*lnHC)					0.013 (0.032)
L. (lnFDI*Resource Dummy)					0.044 (0.043)
R <sup>2</sup>	0.074	0.103	0.102	0.103	0.103
Observations	1323	1323	1323	1323	1274

Note: Figure in parentheses are standard errors

\*\*\* shows the statistical significance at 5% level

Even though the coefficients of Resource Dummy (column 3,4 and 5) are statistical insignificant but the mentioned natural resources (diamond, gold, copper, oil and gas) postulate the positive contribution to growth of the African economies. Again both the

coefficients of the interaction term between FDI\*HC as well as that FDI\*Resource Dummy reveals positive contribution to growth, means that the interaction between FDI and human capital and mineral resources as specified has positive relationship with GDP growth rate of African economies although the coefficients are statistically insignificant (refer column 4 and 5). The interaction term between (FDI\*QI) brought negative relationship and statistically not significant with GDP growth (column 4 and 5), yet FDI and QI by themselves generally have positive contribution to GDP growth and are statistically significant (refer column 1,2,3 and 4). This area need further study.

## **Conclusion**

The study analyzed the effect of quality of the institutions, stock of human capital, trade openness and inflation rate on moderating the influence of FDI inflows on growth applying endogenous growth model on panel data of 49 African economies over the most recently 27 years. Generally, the results reveal the positive influence of FDI on growth (table 1). In all regressions (table 1) the coefficients of quality of the institutions show strongest positive value, that is to say, FDI inflows would be greatly contributing to growth when the recipient economies have quality institutions. This implying that African economies should strongly focus on reforming their institutions in such a way that can be able to absorb the spillovers resulted from FDI inflows into their economies, this is evidenced by the negative and statistically insignificant coefficients value of the interaction term between FDI and quality of the institutions (FDI\*QI) as shown in table1. Manca (2010) found similar results that the better institutions adopt faster technologies hence have high productivity growth that would facilitate GDP growth. Again Acemoglu et al. (2005) , Acemoglu and Robinson (2013) suggested that the more the quality of institutional is, open potentially unlimited economic growth by providing individual entrepreneurs and inventors with the protection of their physical and intellectual property so that they invest in disruption of the contemporaneous economic and political system with their new products and /or innovations. Thus through innovations that result from an improvement in institutional quality the economic growth of the nation can be uplifted.

Furthermore, the results in table 1 shows that African economies should invest more in educating and improving the quality of their human capital, the people that can have the capacity to learn and acquire new knowledge very easily and quickly, which in turn would facilitate the acquisition of the new technologies that will increase innovations and productivity hence growth. This is due to the low positive coefficients and statistically insignificant value of human capital by themselves as well as that of the interaction between FDI and stock of human capital (FDI\*HC) as shown in column 2,3 and 4. In a similar manner (Borensztein et al., 1998) found that sufficient human capital of the host country is necessary to influence the impact of FDI to its economic growth, although FDI has a positive impact on GDP but the magnitude of the effects depends on the level of human capital. Freckleton et al. (2012) shows that the low level of development of human capital reduces spillovers from the advanced technology brought by FDI since they will be unable to absorb the new technologies. The positive coefficient of the Resource Dummy by themselves as well as that of the interaction term between (FDI\*Resource Dummy) indicates that the specified natural resources (diamond, gold, copper, oil and gas) contribute to GDP growth of African economies their statistically insignificant could be due to the various factors such as inadequate stock of human capital and poor quality institutions that led to inadequate capacity of absorbing the spillovers from FDI inflows.

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