Determinant of Foreign Direct Investment in Ten African Countries: A Panel Data Analysis

Taiwo Akinlo[1], Rogers Adebayo Akinsokeji[2], Tope Rufus Oziegbe[3]

Department of economics[1]
Adeyemi College of Education, Ondo State, Nigeria

Department of economics[2]
Adeyemi College of Education, Ondo State, Nigeria

Department of economics[3]
Adeyemi College of Education, Ondo State, Nigeria

ABSTRACT— ***Using panel data, this study empirically investigate the determinants of foreign direct investment inflows to ten Africa countries during the period 1995-2011. These ten countries were chosen based on the United Nations Conference on Trade and development (UNCTAD) report released in July 2013 that they are the highest receiver of inflow of FDI in 2012. This study found that the endowment of natural resources, openness, macroeconomic risk factors like inflation and exchange rates are significant determinants of FDI inflow to Africa. Domestic investment and natural resource accounted for the bulk of FDI inflow to Africa as both variables are positive and significant in both estimates adopted.***

Keywords— Foreign direct investment, Natural resources, Panel data

1. INTRODUCTION

The crisis experienced in Asian in 1990s has proved to many nations that foreign direct investment (FDI) is more reliable source of capital than portfolio investment. Some studies have shown e.g Lipsey (1999), that FDI has been the least volatile source of international investment for host countries, with the notable exception of the U.S. He also argues that FDI has been the most dependable source of foreign investment for developing countries. Foreign Direct Investment (FDI) plays an important role in the process of economic growth and development particularly in the capital scarce country, where the domestic base of created assets like technology, skills and entrepreneurship are quite limited. It provides financial resources for investment in a host country and thereby augments domestic saving efforts. It also plays an important role in accelerating the pace of economic growth. FDI provides the much needed foreign exchange to help the bridge the balance of payment or trade deficit. FDI brings complementary assets such as technology, management and organizational competencies and there are spillover effects of these assets on the rest of the economy. FDI is treated as a main engine of economic growth and technological development which provides ample opportunities in accelerating economic development. FDI contributes to exports directly and enhanced export possibility contributes to the growth of the host economies by relaxing demand side constraints on economic growth. FDI according to UNCTAD implies that the investor exerts a significant degree of influence on the management of enterprise resident in the other economy. For a decade's now a lot of study has been done on the determinants of FDI but no consensus view has emerged, in the sense that there is no widely accepted set of explanatory variables that can be regarded as the "true" determinants of FDI. Chakrabarti (2001) attributes the lack of consensus to "the wide differences in perspectives, methodologies, sample-selection and analytical tools". The objective of this study is to examine the main determinants of FDI in ten Africa countries. In the report of UNCTAD released in July 2013, Africa countries were listed according to inflow of FDI, one significant thing about this reports is that some smaller countries are even receiving higher FDI than countries with bigger economies. This discovery is the motivating factor to examine the determinant of FDI on the 10 highest receiver of FDI in Africa. The rest of this paper is organized as follows. In section II we provide brief overview of FDI in Sub-Saharan Africa. In Section III we review some selected literature on determinant of FDI African, the model were presented in Section IV; In Section V we presents data sources, methodology, and empirical findings. We conclude and summarize our findings in section VI.

2. OVERVIEW OF FDI IN AFRICA

Over the past decade there has been a significant increase in domestic investment in Africa both in monetary terms and as a percentage of gross domestic products (GDP). In 2010 domestic investment in Africa was about $353

billion compared to $100 billion in 2000. Furthermore, the share of domestic investment in GDP rose from about 17 per cent in 2000 to 21 per cent in 2010. While the increase in domestic investment in Africa is significant, it is worth noting that the share of investment in GDP in Africa is well below the investment share of other developing regions, in particular developing countries in Asia, where the share was about 35 per cent in 2010. In this regard, there is a need for African countries to increase their investment ratios to the levels observed in rapidly growing emerging developing countries to enhance prospects for sustained economic growth. With regard to trends in FDI inflows, in 2011 Africa received $42.7 billion representing 2.8 per cent of global FDI inflows and 2.3 per cent of Africa's gross domestic product (UNCTAD, 2012). Africa's share of FDI flows to developing countries fell from 9 per cent in 2008 to 6 per cent in 2011.

The FDI inflows to Africa in 2011 were decline compared to the 2008 figure of $57.8 billion. In fact since the onset of the global economic and financial crisis in 2008, FDI inflows to Africa have been on the decline (UNCTAD, 2012a). However, when FDI flows are disaggregated by sub-region, important differences emerge between North Africa and sub-Saharan Africa in terms of recent trends in FDI inflows. For example, while FDI inflows into North Africa declined significantly in 2011 because of political instability in Egypt and Libya, inflows into sub-Saharan Africa actually increased from $29 billion in 2010 to $37 billion in 2011. Nevertheless, the increase in inflows into sub-Saharan Africa was not enough to offset the decline in inflows to North Africa resulting in a decrease in inflows into Africa.

In terms of sources of FDI flows to Africa, the United States, France, the United Kingdom, Germany, and Portugal accounted for most flows to the region from 1996 to 2000 Dupasquier et al (2005). Within the same period, the United States is the most important source of FDI flows into the region, accounting for approximately 37% of inflows from developed countries. This represents a marked-shift from the period 1991-1995 in which the United Kingdom and France were the most important sources of FDI flows to the region. Although developed countries account for over 90% of total outward FDI, Asia is becoming a very important source of FDI in developing countries. The share of developing Asia in total outward FDI stock of developing countries rose from 11% in 1980 to 80% in 2003. A large part of developing Asia's outward FDI stock is however concentrated in Asia. For example, in 2000 about 57% of outward FDI stock from Singapore went to Asia. Similarly Asia accounted for 63% of outward FDI stock from Thailand in 2002. African countries have serious difficulties attracting FDI flows from Asia. Japan is the only Asian country among the top 19 sources of FDI flows to Africa over the period 1991-2000. It should be noted however that relative to other developed countries, it is not a major source of FDI flows to Africa. Over the period 1996-2000, its FDI flow to Africa was $340 million compared to $9, 249 and $4, 362 million for the U. S. and France respectively. In 2000, Africa accounted for 0.1% of total outward FDI from Japan. The figure rose to 0.6% in 2001. Since then there has not been any substantial improvements. Japanese investments in Africa are concentrated in two countries: Liberia and South Africa, with the former accounting for most of the investment in the region.

3. LITERATURE REVIEW

Several empirical studies have been conducted to examine the determinant of FDI in Africa though these studies are scanty. In this subsection, we provide a summary of the findings of the few existing studies on the determinant of FDI Africa.

Bende-Nabende (2002) aimed to provide an empirical assessment on the macro location determinants of FDI in SSA through the assessment of co-integration or rather long-run relationships between FDI and its determinants. The study comprises 19 SSA countries over the 1970-2000 period and employs both individual country data and panel data analyses techniques.

Asiedu (2002a) used a comprehensive dataset of 71 developing countries, about half of which are in the poorest region of Africa – SSA – over the 1988-97 period to analyse whether the determinants of FDI to developing countries are equally relevant for SSA. The author focused on three main variables namely, return on investment, infrastructure development and openness to trade and the results imply that Africa is different.

Asiedu (2003) explored whether factors that affect FDI in developing countries affect countries in Sub-Saharan Africa (SSA) differently. Using data for 32 African countries for the period 1970 to 1999, she found that factors that drive FDI to developing countries have a different impact on FDI in SSA. Specifically, infrastructure development and higher return on capital promote FDI to non-SSA countries and not SSA countries. Openness to trade promotes FDI to both SSA and non-SSA countries.

Suliman and Mollick (2009) used a panel data regression data fixed effect model to identify the determinants of foreign direct investment (FDI) for a large sample of 29 Sub-Saharan African countries from 1980 to 2003. They test whether human capital development defined by either literacy rates or economic freedom, and the incident of war affect FDI flows to these countries. Combining these explanatory variables to several widely used control variables, it was found that the literacy rate (human capital); freedom (political rights and civil rights) and the incident of war are important FDI determinants. The results confirm their expected signs; FDI inflows respond positively to the literacy rate and to improvements in political rights and civil liberties; war event, by contrast, exerts strong negative effects on FDI.

Rogoff and Reinhart (2003) constructed the probability of war for three regions of Africa, Asia and Western Hemisphere (excluding Canada and the United States) over the period 1960-2001 and found that there is a statistical significant negative correlation between FDI and conflicts in Africa.

Neumayer and Spess (2005) focused on the signalling effect of BITs and found positive effect of BITs on FDI inflow across various model specifications. On the role of BITs operating as substitutes to institutional quality they found limited evidence. They argue that by concluding BITs with developed countries, particularly those that are major FDI exporters, developing countries give up some of their domestic policy autonomy by binding themselves to foreign investment protection, but could expect to receive more FDI in exchange. Their conclusion was that the effect is possibly more evident in countries with weak domestic institutions, especially in countries for which the confidence and credibility inspiring signal to foreign investors following the signing of BITs was most important.

4. METHODOLOGY

From the examination of empirical literature review, aimed to study the determinant of FDI, we specify the model of our study. The econometric model of this study is based upon study undertaken by Sahni (2012). It is as follows:

FDI= f (GDP, INV, OPEN, REXC, NAT, INF) …… 1

where FDI, represents foreign direct investment, GDP is the real GDP per capita. INV *is* the domestic owned investments. OPEN represents trade openness, REXC is the real exchange rate volatility, NAT is the natural resources and INF represents inflation.

The logarithmic transformation of estimated model is stated in eq (2)

$$\text{In FDI} = b_0 + b_1 \text{ In GDP} + b_2 \text{ln INV} + b_3 \text{OPEN} + . b_4 \text{In REXC} + b_5 \text{ In NAT} + b_6 \text{In INF} + e_t \ldots\ldots 2$$

4.1 Measurement of variables and data source

Panel data will be used for the empirical analysis. This data is from Africa countries and covered the period of sixteen years (1995-2011). These countries are the ten largest receiver of FDI in 2012. They include Nigeria, Mozambique, South Africa, Congo democratic, Ghana, Morocco, Egypt, Congo, Sudan and Equatorial Guinea. The following variables were used for the regression. FDI - is the Real Inward Foreign Direct Investment; the size of this variable is a good indicator of the relative attractiveness of an economy to foreign investment. It is also a vehicle for the economic growth of developing countries. It was calculated by dividing the Inward FDI at current prices by the GDP, GDP - for consistency, we use real GDP measured in constant 2005 US dollars across the sample, INV- Domestic investment is measured by gross fixed capital formation as a percentage of GDP, Openness is measured as imports plus exports as a percentage of GDP, REXC - This volatility variable is generated using the Generalized Autoregressive Conditional Heteroskedasticity (GARCH) methodology, NAT- This is measured by mining and quarrying, INF - This is the log difference of composite consumer price indices. Unless otherwise stated, data on all variables is obtained from United Nations Conference on Trade and Development (UNCTAD) Statistics, a database maintained by the United Nations Conference on Trade and Development.

5. EMPIRICAL RESULTS

To investigate the determinant of FDI on the ten highest receivers of FDI in African countries, our empirical analysis begins with descriptive statistics. Descriptive statistics of data series provides information about sample statistics such as mean, median, minimum value, maximum value and distribution of the sample measured by the skewness, kurtosis and the Jarque-Bera statistic. Table 1 reports some descriptive statistics of variables for a period 1995 to 2011.

Table 1 shows that all the series display a high level of consistency as their mean and median values are perpetually within the minimum and maximum values of these series. For example, FDI has experienced low growth rate with average growth rate standing at 9.7%. The disparity in the inflow of FDI to the countries ranged from -5.0095 minimum to maximum value of 22.90277. Moreover, the standard deviation (S.D) which measures the level of variation or degree of dispersion of the variables from their mean is relatively low for most of the series indicate that the deviations of actual data from their mean values are very small. The standard deviation values reveals that inflow of FDI is relatively unstable compare to other variables while the most stable variable is the INF with standard deviation of 1.1654.

Table 1: Descriptive Statistics

	FDI	GDP	INF	REXC	INV	OPEN	NAT
MEAN	9.718589	23.1753	2.225358	6.450830	10.4742	5.98071	21.1968
MEDIAN	4.045738	22.9534	2.142804	6.917023	4.34945	4.57862	21.2000
MAXIMUM	22.90277	26.1118	6.242042	13.24021	22.2030	13.2403	24.8155
MINIMUM	-5.009530	20.9255	-0.988146	-3.618665	0.74193	1.48119	15.5627
STD.DEV	9.277577	1.46180	1.165460	4.163016	8.02974	2.94875	2.13596
SKEWNESS	0.081925	0.24594	0.554387	-0.566589	0.27067	0.53931	-0.73228
KURTOSIS	1.180713	1.77559	5.317061	2.323764	1.24228	2.04247	3.11465
JARQUE-BERA	18.62965	9.72131	36.83968	9.722749	18.8863	11.6149	12.0495
PROBABILITY	0.000090	0.00774	0.000000	0.007740	0.00007	0.00300	0.00241
SUM	1302.291	3105.50	298.1979	864.4112	1403.55	801.415	2840.38
SUM SQ DEV	11447.77	284.204	180.6535	2304.983	8575.41	1156.45	606.793
OBSERVATION	134	134	134	134	134	134	134

Sources: Authors

In order to examine the possible degree of association among the variables we obtained the correlation matrix of the dependent and independent variables. Table 2 below reports the sample correlation matrix of the variables employed in the study. The correlation table gives a preliminary idea of direction of relationship between the selected variables. In general, the results in table 2 shows that in terms of magnitude, the correlation coefficient is generally high while some have positive correlation others are negative.

Table 2: Correlation Matrix

	FDI	GDP	INF	INV	NAT	OPEN	VOL
FDI	1.000000						
GDP	-0.425 203	1.000000					
INF	0.283318	-0.123592	1.000000				
INV	0.917221	-0.451622	0.261028	1.000000			
NAT	-0.201419	0.400202	-0.153486	-0.201642	1.000000		
OPEN	-0.568960	0.098496	-0.007602	-0.531907	-0.064003	1.000000	
VOL	-0.165636	0.184713	-0.020898	-0.312408	0.330971	0.637032	1.000000

Sources: Authors

The result in table 2 shows that it is only Inflation and domestic investment has positive relationship with FDI. Other variables such as GDP, natural resource, openness, and real exchange rate volatility have negative relationship with FDI. The results also show that real exchange rate volatility is positively correlated with GDP while inflation has negative relationship with GDP. Natural resource is positively correlated with GDP. The correlation matrix has shown interesting results on relationship between dependent variable and independent variables.

However, care must be exercised while interpreting the correlation matrix. This is because they cannot provide a reliable indicator of association in a manner which controls for additional explanatory variables. That is why we move further to use panel data. The results of OLS panel data are presented in table 3 below.

In order to examine the determinants of foreign direct investment two functional forms of estimation techniques were used; the pooled ordinary least squares (OLS) and the fixed effect model (FEM) estimation. The analysis of pooled OLS results reveals the series of coefficients that are significant and those that are not significant. The results show that investment has positive relationship with FDI. The coefficient of investment is 0.8421 which is significance at 1%. This means that domestic investment is one of the major factors that determine the inflow of FDI in Africa. The fact that there is positive and significance relationship between domestic investment shows that FDI is a complement to domestic investment rather than a substitute for it, and efforts to attract foreign investment must not overshadow those aimed at boosting domestic investment through public sector interventions and higher domestic savings. Indeed, the primary objective of Governments should be to develop a vibrant and growing domestic enterprise sector supported by domestic investment. In the long-term, this process by itself is the best strategy for attracting FDI, as foreign investment tends to be strongly attracted to countries that have achieved sustained rates of economic growth and where the domestic private sector is sophisticated and large enough to supply quality products and become an effective partner to foreign enterprises. Natural resource is negative and statistically significance at 1%. This is contrary to the study of Sichei et al (2012). Openness on the other hand has negative relationship with FDI but statistically significant at 1%. This result is

consistence with the results of Cheng and Kwan (2000), Asiedu (2003) and Onyeiwu and Shrestha (2004). The results also show that real exchange volatility and inflation has positive relationship with FDI and both are statistically significant at 1%.

Table 3: Panel data estimates

Variables	**Pool OLS effect**	**Fixed effect**
C	27.0854*** (6.1141)	13.2214 (1.2215)
inv	0.8421*** (23.1413)	0.6876*** (3.0113)
gdp	-0.2655 (-1.5688)	-1.0449** (-2.4260)
open	-1.4694*** (12.5815)	0.1497 (0.4875)
rexc	0.9706*** (13.0368)	-0.2985 (-1.6542)
nat	-0.8780*** (-7.2409)	0.6943*** (4.6515)
inf	0.4967*** (2.6871)	-0.0789 (-0.5617)
R^2	0.94	0.993
Adjusted R^2	0.93	0.991
F-Statistics	322.190	468.593
D-Watson stat	0.2920	1.49
J-Statistics		
No of Observation	134	134
Cross section Included	10	10

*****denote significant at 1%, ** significant at 5 %**

The results of fixed effect show that investment and natural resources has positive sign and statistically significant at 1 %. The coefficient of domestic investment is 0.6876 while that of natural resource is 4.6515.This implies that Countries with natural resources tend to attract resource-seeking FDI than those without. The rationale for this is that a number of resource abundant countries in Africa neither have the large amounts of capital typically required for resource extraction nor the technical skills needed to extract or sell the raw materials in the world markets. Additionally, the infrastructure facilities for getting the raw materials out of the host country to the final destination need to be created calling for FDI. Real exchange rate volatility and GDP has negative relationship with FDI but GDP is statistically significant while real exchange rate volatility is statistically insignificant at. Openness and inflation on the other hand has negative relationship with FDI but both are statistically insignificant.

6. CONCLUSION

Though the environment across all African countries has become more conducive to FDI since 2000 through the various reforms put in place by various Africa leaders to attract FDI within their respective countries, yet Africa is the least receiver of FDI among all the regions all over the world. This study examined some key determinants of FDI to Africa from the period of 1995 to 2011. Dynamic panel data framework was used. The analysis shows that FDI inflows to Africa depend on domestic investment, existence of natural resources, real GDP growth, and real exchange rate among others. Some specific results are noteworthy. First, investment is one of the most significant determinants of FDI inflows to Africa. This result is robust as it significance at 1% in the two techniques used. Second, the existence of natural resources is a major attraction of FDI to Africa. Real GDP growth and real exchange rate volatility also positively influences the location of FDI. The empirical results of this study have some policy implication on efforts to attract FDI in Africa. The results show that the inflow of FDI to Africa is not solely driven by natural resource endowment and that there is a role for the conscious efforts by national and international institutions in promoting investments to Africa. We therefore recommend that Africa leaders should focused on rebuilding the image of the region through political stability, macroeconomic stability, and the protection of property rights as well as the rule of law. Africa leaders should also put in place domestic regulatory reforms that will favour investors, and marketing of investment opportunities.

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