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Foreign Direct Investment Drivers, Is Sub-Saharan Africa, a different case? Using the Cointegration Approach

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Abstract

The growth of the economy is fundamental to economic and social well-being. Factors that can be attributed to economic growth include foreign direct investment. Using the Cointegration approach, data from 1991 to 2015 from three major economies in sub-Saharan Africa that represent East Africa, SADc and Eco was regional groupings is used to analyze the major determinants of foreign direct investment. The study only included countries with complete data. The results indicate that countries with well-developed infrastructure are likely to attract foreign investors. Likewise, a higher return on investment is significant in influencing foreign direct investment. Confirming previous studies in developed economics, the results indicate that openness to trade is significant in attracting foreign capital. The research demonstrates the urgent need to improve infrastructure, streamline red tape and reduce the cost of operations, including taxation.

Keywords: FDI; sub-Saharan Africa; growth; infrastructure; investment

Subject classification codes: EO3.

1. Introduction

Africa is tipped to be the frontier of economic growth in the forthcoming years. This is due to the continent's endowment of natural resources. The idea that these abundant natural resources can be the driver of an industrial revolution across the continent is growing. The latest edition of the Economic Report on Africa (ERA, 2013) sets out how the continent's future will be determined according to the design and implementation of policies that promote commodity-based industrialization. Despite this, Africa is classified one of the poorest continents in the world with a worrying degradation of natural resources. While some commentators explain this problem in terms of the resource curse theory (Sachs, 2001), others point to poor governance (Kaufmann 2002).

Also, Sach (2001) related growth in per capita income to the importance of primary products in the country's exports. Controlling for initial income and openness to

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trade, the study indicated a negative effect. On the other hand, after studying six resource-rich countries, Karl (1997) concluded that resource wealth and resource rent windfall could alter the political climate in a host country.

Since some resource-rich countries, such as Botswana and Malaysia, have done well economically, some observers have expressed doubt over statistical evidence supporting the resource curse (Alexeev and Conrad, 2008; Brunnschweiler and Bulte, 2008).Although political structures are paramount to economic development and most countries in sub-Saharan Africa are beginning to stabilize politically, it is important to observe the role of macroeconomic factors and foreign direct investment. This is because the region has seen a broad range of reforms in recent years. In addition, infrastructure initiatives are opening new avenues of commerce and new efforts towards regional integration and strengthened regulatory and legal systems are providing greater levels of transparency and accountability. Despite recent reforms across Africa, FDI flows to the region slumped to $42 billion in 2017, a 21% decline from 2016 (World Investment Report, 2018). In terms sub-Saharan Arica regional grouping, FDI to West Africa fell by 11% to $11.3 billion, due to Nigeria's economy remaining depressed. FDI to Nigeria fell 21% to $3.5 billion. In the Southern Africa, FDI declined by 66% to $3.8 billion. FDI to South Africa fell 41% to $1.3 billion, due to an underperforming commodity sector and political uncertainty. East Africa, the fastest-growing region in Africa, received $7.6 billion in FDI in 2017, a 3% decline on 2016. Ethiopia absorbed nearly half of this amount, with $3.6 billion (down 10%) and is now the second largest recipient of FDI in Africa. Kenya saw FDI increase to $672 million, up 71%, due to strong domestic demand and inflows in information and communication technology sectors.

In addition, Africa's gross domestic product (GDP) continues to grow much faster than the world average. For instance, while the world average GDP grew by 3% in 2012, in Africa it grew by 4.5% in the same period (Africa Economic Outlook, 2014).However recent analysis indicate that the growth in Sub-Saharan Africa is estimated to have rebounded to 2.4 percent in 2017, after slowing sharply to 1.3 percent in 2016. The rise reflects a modest recovery in Nigeria, and South Africa—the region's largest economies. However, in 2017, the region is experienced negative per capita income growth (-0.083), weak investment, and a decline in productivity growth. Regardless of recent rapid developments, the capital market in emerging countries is still at an initial stage, with high barriers for international trade and capital flows and a lack of alternatives for investors to invest and realize a profit from their investments. FDI can be understood as a package of resources that complements financial flows and makes a distinctive contribution to the development process. FDI projects typically involve a transfer of technology, capital and managerial skills and expertise from the source country to the receipt country.

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Solow (1956) attempted to express a growth model as a simple production function and to explore key variables that could provide steady growth rates. In his model, he captured variables that determine FDI in growth rates. On the other hand, within the endogenous growth theory, FDI flows may contribute either directly or indirectly to the economic growth of an economy. Wang (1990) discerned the impact of FDI activity on direct positive home-country effects by stepping up production and transferring knowledge to local suppliers and on indirect effects by upgrading the quality of the workforce. In addition, FDI can assist the economic prospects of Africa in several ways. FDI allows for the transfer of technology—particularly in the form of new varieties of capital inputs—that cannot be achieved through financial investments or via trade in goods and services. FDI can also promote competition in the domestic input market. Further, countries in receipt of FDI often gain employee training during the operation of the new businesses, a factor that contributes to human capital development. In addition, profits generated by FDI contribute to corporate tax revenues in the host country. Furthermore, foreign direct investment promotes exports and, hence, can have a positive impact on the country's balance of payments. It is often argued that FDI is more stable than other types of capital inflows, reducing vulnerability to sudden halts in flows (Lipsey, 2001). However, there are, of course, socioeconomic costs that foreign direct investment projects impose and these must, therefore, be weighed against the benefits. Foreign debt is likely to adversely affect the inflow of FDI because debt overhang signals the possibility of future economic crises. Firm-level studies usually suggest that FDI does not accelerate economic growth[i]. In contrast, many macroeconomic studies identify the positive role of FDI in economic performance, although there are some exceptions, such as Herzer et al. (2008) and Carkovic and Levine (2005) whose findings indicate that foreign inflows do not have a robust influence on economic growth.

Building on the work of Patrick and Prudence (2013), who examined the macroeconomic factors associated with FDI in Ghana, the main objective of this study is to identify the macroeconomic factors that enhance FDI in sub-Saharan Africa.

The rest of the article is structured as follows: Section two examines the impact of FDI on economic growth and the FDI determinants. Section three is on methodology, measurement of variables, and data set. Section four is on results and analysis and lastly section five concludes.

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2. Impact of FDI and trade on economic growth

Much of the literature has emphasized enhancing growth by improving infrastructure and introducing institutional reforms that influence the macroeconomic background. In addition to their positive contribution to economic performance, these factors may also influence the capacity of countries to attract FDI, as well as their ability to benefit from inward FDI flows. The link between these domestic conditions and growth is then reinforced since they affect economic performance through two channels: directly and indirectly (i.e., facilitating FDI that, in turn, fosters economic growth). In fact, the mixed evidence on an FDI-growth nexus could be related to the omission of some local factors. Some authors even argue that it is the interaction between FDI and this set of local conditions that determines growth outcomes.

The impact of FDI and trade on the economic growth of a country was studied by Serge and Yaoxing (2010). The researchers used the Cointegration approach (Pesaran et al., 2001) and VAR Granger causality to conduct research in Cote d'Ivoire with the aim of assessing the long-term impact of FDI and trade openness on economic growth between 1980 and 2007. The overall results indicated a long-term relationship between FDI, trade openness and output; and the VAR Granger causality/Block Exogeneity Wald Tests revealed unidirectional causal relationships running from foreign direct investment and trade openness to output and from output to foreign direct investment and trade openness. In this research, they stated that increases in foreign direct investment in different parts of the world have boosted the economies of developing countries. They also stated that FDI helps countries to move towards growth and development and increases their trading activities. FDI also helps to provide more opportunities for those organizations that are operating on a smaller scale.

Some microeconomic factors have been identified to fill the gap in knowledge about which factors and aspects increase economic growth in developing countries due to FDI. There are two different types of spillovers: horizontal and vertical. Foreign companies that are investing in developing countries use their qualified and skilled employees to train the domestic labor force (OECD, 2002). Through developmental activities, they train the employees and this helps them to contribute to the growth of the economy.

In a similar way, in vertical spillovers the foreign affiliates train the domestic companies and also permit them to use their resources. This helps them to increase the productivity and efficiency of their businesses, which ultimately results in contributing to economic growth. Domestic companies can use the systems of foreign companies in their own production, thus improving local productivity and helping them to offer a greater quality of products and services in the market. The presence of foreign direct

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investment and international trade in developing countries also stimulates higher levels of development in these countries (Zaman, Shah and Khan, 2012). There is an increase in the development of technology, infrastructure, the education system and an improvement in the quality of the products and services offered by local and domestic companies.

Determinants of FDI

The absorptive capacity of host countries, that is, their ability to respond successfully to the opportunities presented by new entrants, can be related to a set of domestic aspects, such as the quality of human capital, the degree of financial development, openness to trade and the existence of an adequate level of infrastructure. Blomström et al. (2001) argue that FDI contributes to economic growth only when a sufficient level of education is available in the host economy. In contrast, Carkovic and Levine (2005) and Blömstrom et al. (1994) do not find evidence for the critical role of education. Other authors point to financial development as a necessary precondition for growth. The main support for this argument would be that FDI is only able to boost growth when the financial markets of the recipient countries are sufficiently developed to efficiently channel foreign capital in order to finance productive investment. Moreover, knowledge spillovers only occur if local firms are able to invest in absorbing foreign technologies, a factor that may be restricted by underdeveloped local financial markets (Alfaro et al., 2003; Durham, 2004).

Recent empirical research also emphasizes the key role of institutions and institutional reforms are likely to significantly affect economic performance. This is the main conclusion drawn by Acemoglu (2005) and Cavalcanti et al. (2011). Furthermore, Easterly (2005) considered that institutions reflect deep-seated social arrangements like property rights, rule of law, legal traditions, trust between individuals, democratic accountability of governments, and human rights. In addition to its direct contribution to growth, the institutional system also plays a role as a main attractor of FDI. Good institutions engender reduced investment-related transaction costs, which includes corruption. In addition, FDI involves high sunk costs that are affected by insecurity and by the effectiveness of the legal and political systems (Demekas et al., 2007).

Brandolini and Atkinson (2003) stated that the international trade of a country would not receive any favorable advantages unless its investment activities are excellent. FDI has emerged as one of the significant factors in the economic development of developing countries as it helps to increase the country's growth and provides various strategies for engaging in international trade (Marinova and Marinov, 2003). Foreign direct investment increases the economic growth of countries in terms of the productivity, performance and capability of companies that are geared towards the export sector. This directly influences the economic performance of the markets of

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these countries. Trade openness is another factor that demonstrates the existence of the relationship between FDI and international trade. This is also one of the positive signs that indicate its ability to boost the economic growth of a country in terms of international trade. The study conducted by Serge and Yaoxing (2010) evaluated the influence of international trade and foreign direct investment on economic growth and the financial markets of developing countries. The main factor assessed in this study was trade openness and the results show that this enhances economic growth and development. The research also found a positive relationship between FDI and international trade in the markets of the studied countries.

Openness to trade may also act as a conditional factor for a positive FDI-growth nexus (see Alguacil et al., 2002; Balasubramanyam et al., 1996 and Cuadros et al., 2004). The quality of local infrastructures, communication and transportation facilities seem to be additional relevant factors (see Easterly, 2005; Li and Liu, 2005; Kinoshita and Lu, 2006).

The effect of the macroeconomic background on both economic performance and the attraction of foreign inflows has been intensively studied in the literature (Demekas et al., 2007). Instability at the macro level appears to be unfavorable to capital accumulation and economic growth. High inflation and external debt rate, as well as government deficits, are assumed to increase uncertainty, worsen the business climate and, consequently, reduce growth (Fisher, 1993). However, in addition to their direct contribution to growth, adverse macroeconomic conditions can generate uncertainty that could not only discourage the entrance of foreign capital but could also reduce the productivity effect of FDI (Jallab et al., 2008). In a study of macro determinants of FDI inflows to Japan from 1989 to 2002, Satomi (2007), used pooled, fixed effects and random effects estimates comparatively. The results suggested that FDI into Japan is inversely related to trade flows, such that trade and FDI substitute for each other. Moreover, the results also suggested that FDI increases in response to political and economic stability in the home country. In addition, the authors noted the importance of exchange rates, relative borrowing costs and labour costs in explaining FDI flows. Using econometric specification and estimation approach found a positive relationship between the size of the source country and foreign direct investment because larger economies imply a greater availability of capital resources and intangible assets (technical knowledge and marketing expertise). Several researchers have examined the different types of multinational activities undertaken in a location, the destination of the finished goods or service produced and the sources of intermediate inputs. For instance, Kiyota and Urata (2004) examined the impact on FDI of the changes in the real exchange rate and its volatility. Examining Japan's FDI by industries, they found that the depreciation of the currency of the host country attracted FDI, while the high volatility of the exchange rate discouraged FDI. Appreciation of the home currency

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reduces the cost of capital, enabling firms to more easily invest abroad relative to firms in countries with a depreciated currency (Benassy-Quere et al., 2001). Conversely, when Multinational Enterprises (MNEs) use the local market as an export platform, then FDI and trade will become complementary. Finally, because of the international immobility of labor, wage differentials between the countries may also be a determinant of FDI flows. This is because they may reflect higher production costs.

Therefore, based on the literature, one can hypothesize the following:

H1.FDI and infrastructure are positively cointegrated.
H2.FDI and Trade Openness are positively cointegrated.
H3. FDI and Economic Growth are positively cointegrated
H4. FDI and financial performance of firms are positively cointegrated

3. Empirical methodology, variables, and data set

This paper estimates the causality between FDI and the macroeconomic variables and country characteristics of major sub-Saharan African economies separately from 1991 to 2015. Within East and Central Africa, the study include Kenya as the biggest in terms of GDP as per World bank data (2016). Similarly, in the Southern African Development Community (SADc), South Africa is the largest economy in terms of GDP. Using a similar measure of the GDP, Nigeria is the biggest economy within Economic Community of West African States (Ecowas).

As shown in table 1 below, the variable of economic growth is approximated by the growth of the GDP per capita of country i at a particular time, t. The variable of FDI is approximated as Foreign direct investment, net inflows (% of GDP)in country i at time t.

The data used are annual and they are sourced from the International Monetary Fund (IMF) and PENNTABLES databases.

To identify the main determinants of FDI inflows across the major economies in sub-Saharan Africa, this study estimates the impact of real gross domestic product growth, infrastructure, return on investment and trade openness on foreign direct investment using the vector autoregressive regression (VAR) model, which is specified as follows. First, the order of integration of the GDP and FDI time series is tested using Johansen's approach. After correcting the time series for stationarity[5], the heterogeneous panel (Pedroni, 1997, 1999) Cointegration test is performed for the variables of economic growth and FDI. The Pedroni test allows for cross-sectional independency among different individual effects. Second, to detect the direction of

[5] Stationarity refers to when a variable has a constant mean, constant variance and constant auto covariance.

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causality between the two variables, the error correction model is applied. That is, y is purported to change between t-1 and t because of the changes in the values of the explanatory variables, x between t-1 and t and also, in part, to correct for any disequilibrium that existed in previous periods.

3.1. Heterogeneous panel Cointegration

The Cointegration approach was first coined by Granger (1980). Cointegration implies that a long-term relationship exists between economic variables. The principle of testing for Cointegration is to test whether two or more integrated variables deviate significantly from a particular relationship (Abadir and Taylor, 1999). In other words, if the variables are cointegrated, they move together over time so that short-term disturbances will be corrected in the long-term. This means that if in the long-term, two or more series move closely together, the difference between them is constant. Otherwise, if two series are not cointegrated, they may arbitrarily wander far away from each other (Dickey et al., 1991).

Further, Granger (1981) showed that when the series becomes stationary after only being differenced once, there may be linear combinations that are stationary without differencing. In the literature, such series are referred to as "cointegrated". If integration of order one is implied, the next step is to use Cointegration analysis to establish whether a long-term relationship exists among the set of the integrated variables in question. Earlier tests of Cointegration include the simple two-step test by Engle and Granger (1987) (EG hereafter). However, the EG method suffers from several problems. Alternatively, Engle and Yoo's (1987) (EY hereafter) three-step procedure has been widely recognized as dealing with most of these problems. Nevertheless, a problem remains in that both EG and EY methods cannot deal with a case where more than one cointegrating relationship is possible. Hence, Johansen's vector autoregressive regression (VAR) test of integration (Johansen, 1988) uses a "systems" approach to Cointegration that allows for the determination of up to r linearly independent cointegrating vectors ($r \leq g-1$, where g is the number of variables tested for Cointegration).

This work utilized the two types of the heterogeneous panel Cointegration test developed by Pedroni (1997, 1999), which, in addition to using panel data and thereby overcoming the problem of small samples, allows for different individual cross-section effects by taking heterogeneity into account in the intercepts and slopes of the cointegrating equation.

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Pedroni's method includes several different statistics for the test of the null of no-Cointegration in heterogeneous panels.[6] The first group of tests is termed "within dimension". This includes the panel-v, panel rho(r), which is similar to the Phillips and Perron test (1988), the panel non-parametric (pp) and the panel parametric (adf) statistics. The panel non-parametric statistic and the panel parametric statistic are analogous to the single-equation ADF-test. The other group of tests is called "between dimensions". This is comparable to the group mean panel tests of Im et al. (2003). The "between dimensions" tests include four tests: group-rho, group-pp and group-adf statistics. Pedroni's seven tests are based on the estimated residuals from the following long-run model:

$$y_{it} = \alpha_i + \sum_{j=1}^{m} \beta_{ji} x_{jit} + \varepsilon_{it}$$

where $\varepsilon_{it} = \rho_i \varepsilon_{i(t-1)} + w_{it}$ is the estimated residuals from the panel regression.

3.2. Causality test

Pedroni's heterogeneous panel Cointegration method only tests for the existence of long-run relationships. The tests indicate the presence or absence of long-run links between the variables but do not indicate the direction of causality when the variables are cointegrated. Having detected the number of cointegrated equations (Johansen's procedure) we used an error correction model (ECM) for a country-by-country analysis. (Cointegration necessitates that the variables to be integrated are of the same order). If the variables in the model contain unit roots, the ECM is used to examine the long-run or cointegrating relationships between the time series as well as the existence and the direction of causality between the variables.

The estimated bi-variate ECM for each country takes the following form:

$$\Delta G_{it} = a_0 + \sum a_{1i} \Delta G_{it-1} + \sum a_{2i} \Delta FD_{it-1} + \varphi ECT_{it-1} + u_{1it} \quad (1)$$
$(i=1\ldots n_1)$ $(i=1\ldots n_2)$

$$\Delta FD_{it} = b_0 + \sum b_{1i} \Delta FD_{it-1} + \sum b_{2i} \Delta G_{it-1} + \varphi ECT_{it-1} + u_{2it} \quad (2)$$
$(i=1\ldots n_1)$ $(i=1\ldots n_2)$

where Δ is the difference operator, G_t is the GDP per capita, FD_t is the FDI as a percentage of gross fixed capital formation, ECT_{it-1} is the error correction term derived from the long-run cointegrating relationship, u_{1t} and u_{2t} are the white noise error terms, t denotes the years and n_1, n_2 are the lag orders of a's and b's, respectively. The VEC

[6] Interested readers may refer to Pedroni (2004) for details and for mathematical representations of the tests.

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model results distinguish between short-run and long-run Granger causality. The coefficients of the lagged error correction term show that there is a long-run causal relationship between economic growth and FDI. It also indicates that FDI and economic growth are adjusting to their long-run equilibrium relationships. The coefficients (and the magnitudes) of the ECM indicate the speed of adjustment to the long-run equilibrium relationship. If φ is statistically significant in the first equation but not significant in the second, then we say that FDI Granger causes GDP. If the opposite happens, we say that GDP Granger causes FDI. If φ is significant in both equations, we say that there is a bi-directional relationship.

Table 1: Measurement of Variables summary

Variable	Proxy	Measurement
Foreign Direct Investment	FDI	Foreign direct investment, net inflows (% of GDP)
Economic Growth	RGDP per capita	GDP per capita is gross domestic product divided by midyear population. GDP is after taking account of inflation
Infrastructure		Number of telephone calls per 1000.
Profitability	ROI	inverse of per capital income.
Trade openness	Openness	(imports+ exports)/GDP

4. Results and analysis

Descriptive statistics

As shown in the descriptive statistics in Appendix 8, the mean for infrastructure is higher (70.811) compared with other countries. For instance, the infrastructure in South Africa is almost four times that of Kenya. Similarly, the GDP per capital real is 5100 for South Africa compared with 521 that of Kenya and 34 for Nigeria. Furthermore, South Africa has largest FDI inflow (3461) compared with other countries for example Nigeria (1413).

Unit root test

Using the augmented Dickey-Fuller (ADF) test, the most fundamental step in any analysis is to assess the presence of a unit root in all series. The ADF test adjusts the Dickey-Fuller test to take account of possible serial correlation in the error term by adding the lagged difference terms of the regress. The lag length of each variable is chosen automatically by computer and is based on the minimum values of Schwarz Information Criterion (SIO) statistics; the maximum lag is 11. The test equations include the constant. The results are presented in Table 2 below.

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Table 2: Unit root test

		Intercept				Intercept plus Trend			
		Level		First difference		Level		First difference	
Country	Variable	ADF test stat	5% critical value	ADF test stat	5% critical value	ADF test stat	5% critical value	ADF critical value	5% critical value
Kenya	FDI	-3.614*	-3.012	-4.890**	-3.130	-5.046**	-3.644	-4.849	-3.691
	RGDP	-3.459*	-3.010	-3.420	-3.010	0.006	-3.690	-4.071*	-3.690
	infra	-2.791	-3.027	0.257	-3.044	0.584	-3.710	-1.383	-3.733
	open	-1.625	-3.488	-4.580	-3.100	-1.890	-3.644	-4.476	-3.658
	ROI	-0.059	-3.041	5.516***	-3.141	-7.27***	-3.673	-4.715	-3.690
Nig	FDI	-2.146	-3.153	-2.110	-3.100	-3.747*	-3.710	-4.674**	-3.673
	RGDP	3.741	-3.030	-5.080**	-3.1010	2.550	-3.690	-6.888***	-3.658
	Infra	-0.484	-3.024	-3.160*	-3.061	0.054	-3.644	-4.327*	-3.733
	Open	-3.264*	-3.012	-6.271***	-3.0010	-3.217	-3.644	-4.199*	-3.733
	ROI	-2.554	-3.010	-4.282**	-3.020	-3.666*	-3.644	-4.471*	-3.710
SA	FDI	-3.153*	-3.002	-2.210	-3.065	-5.013**	-3.644	-2.364	-3.733
	RGDP	0.175	-3.011	-3.478*	-3.029	-1.295	-3.644	-3.781*	-3.673
	Infra	2.174	-3.022	-3.514*	-3.020	-1.494	-3.644	-3.875*	-3.658
	Open	-1.761	-3.011	-5.361***	-3.065	-2.978	-3.690	-7.166***	-3.733
	ROI	-0.670	-3.010	-3.396*	-3.020	-1.536	-3.644	-3.399*	-3.658

FDI (Foreign direct investment); RGDP per capita real (gross domestic product real); Infrastructure; ROI (Return on Investment); Openness (trade openness).

The results shown in Table 2 above suggest that the null hypothesis of a unit test in the time series cannot be rejected at variable levels in a logarithm form. However, all of the variables are stationary in their first differences. Therefore, all the variables are of integrated order one, I(1). The focus of this paper is to assess how, in the long-run, FDI reacts to macroeconomic variables and country characteristics. Therefore, Cointegration tests were run for three countries, as shown below in Tables 2(a) to 4(b).

Table 2 (a): Cointegration test for South Africa

Trend assumption: Linear deterministic trend
Series: FDI GDP_PER_CAPITA_REAL INFRASTRUCTURE OPENNESS_TO_TRADE ROI
Lags interval (in first differences): 1 to 1Unrestricted Cointegration Rank Test (Trace)

(1) Hypothesized	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob**
None *	0.996959	219.7024	95.75366	0.0000
At most 1 *	0.904182	103.7939	69.81889	0.0000
At most 2 *	0.753026	56.88774	47.85613	0.0057
At most 3	0.570641	28.91833	29.79707	0.0629
At most 4	0.450333	12.00909	15.49471	0.1565
At most 5	0.002010	0.040233	3.841466	0.8410

Trace test indicates 3 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

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As shown in the table 2 (a) above, the results for the λ trace and λ max statistically respectively. The statistics of 219.7024 considerably exceed the critical value (of 95) and so the null cointegrating vectors are rejected. Likewise checking on at most 1, the test statistic is 103.7939 exceeds the critical value and so likewise the null hypothesis of at most 1 cointegrating vector is rejected. Similarly, table 2 (b) below the Maximum Eigen value also indicate that there are three cointegrating vectors in regards to the South Africa panel data.

Table 2(b): Unrestricted Cointegration Rank Test (Maximum Eigen value)

Hypothesized No. of CE(s)	**Eigenvalue**	**Max-Eigen Statistic**	**0.05 Critical Value**	**Prob,****
None *	0.996959	115.9085	40.07757	0.0000
At most 1 *	0.904182	46.90614	33.87687	0.0008
At most 2 *	0.753026	27.96941	27.58434	0.0446
At most 3	0.570641	16.90924	21.13162	0.1763
At most 4	0.450333	11.96886	14.26460	0.1118
At most 5	0.002010	0.040233	3.841466	0.8410

Max-eigenvalue test indicates 3 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Table 3 (a): Cointegration test for Kenya

Trend assumption: Linear deterministic trend
Series: FDI GDP_PER_CAPITAL_REAL INFRASTRUCTURE OPENNESS_TO_TRADE ROI
Lags interval (in first differences): 1 to 1
Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.998	280.378	95.753	***
At most 1 *	0.971	154.259	69.818	***
At most 2 *	0.865	82.991	47.856	***
At most 3 *	0.788	42.937	29.797	**
At most 4	0.425	11.831	15.494	-
At most 5	0.036	0.752	3.841	-

Trace test indicates 4 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

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Table 3 (b): Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.998	126.118	40.077	***
At most 1 *	0.971	71.268	33.876	***
At most 2 *	0.865	40.053	27.584	***
At most 3 *	0.788	31.106	21.131	**
At most 4	0.425	11.078	14.264	-
At most 5	0.036	0.752	3.841	-

Max-eigenvalue test indicates 4 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Nigeria

Table 4 (a): Cointegration test for Nigeria

Trend assumption: Linear deterministic trend
Series: FDI GDP_PER_CAPITAL_REAL INFRASTRUCTURE OPENNESS_TO_TRADE ROI
Lags interval (in first differences): 1 to 1
Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.983	157.237	95.753	***
At most 1 *	0.809	75.712	69.818	*
At most 2*	0.683	48.526	47.856	-
At most 3	0.425	19.528	29.797	-
At most 4	0.235	8.427	15.494	-
At most 5	0.141	3.048	3.841	-

Trace test indicates 3 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Table 4 (b): Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.983	81.525	40.077	***
At most 1*	0.809	34.186	33.876	*
At most 2*	0.683	27.997	27.584	-
At most 3	0.425	11.100	21.131	-
At most 4	0.235	5.379	14.264	-
At most 5	0.141	3.048	3.841	-

Max-eigenvalue test indicates 3 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

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The VEC has Cointegration relations built into the specification so that it restricts the long-run behaviour of the endogenous variables from converging with their cointegrating relationships while allowing for short-run adjustment dynamics. The long-run equilibrium is gradually corrected through a series of partial short-run adjustments. Assuming a two-variable model, the VEC model can be expressed as:

$$_{\Delta}\gamma_{1,t} = \alpha_1(\gamma_{2,t-1} - \beta_{\gamma 1,t-1}) + \varepsilon_{1,t}$$

$$_{\Delta}\gamma_{2,t} = \alpha_2(\gamma_{2,t-1} - \beta_{\gamma 1,t-1}) + \varepsilon_{2,t}$$

where the right-hand side of the equation is the error correction term. In the long-run, the term will be zero. However, if $\gamma_1 and \gamma_2$ deviate from the long-run equilibrium, the error correction term will be nonzero and each variable adjusts to partially restore the equilibrium relationship. The coefficient α_i measures the speed of adjustment of the *i-th* endogenous variable towards the equilibrium.

Johansen's Cointegration tests for the three countries indicate that the variables are cointegrated. That is, there is a long-term or equilibrium relationship between the variables. It is important to understand the long-run relationship between the variables.

Vector Error Correction Estimates

Table 5: Vector Error Correction Estimates Nigeria
Date: 01/16/17 Time: 08:51
Sample (adjusted): 4 28
Included observations: 25 after adjustments
Standard errors in ( ) & t-statistics in [ ]

Cointegrating Eq:	**CointEq1**	**CointEq2**	**CointEq3**		
FDI(-1)	1.000	0.000	0.000		
INFRA(-1)	0.000	1.000	0.000		
GDP_CapR(-1)	0.0000	0.000	1.000		
OTT(-1)	59.234 (148.403) [0.399]	-3.982 (0.717) [-5.550]	-69.099 (10.386) [-6.652]		
ROI(-1)	-1508009. (1237836) [-1.218]	-27009.93 (5984.04) [-4.513]	-440112.9 (86632.2) [-5.080]		
C	-2319.023	308.0471	4817.638		
Error Correction:	**D(FDI)**	**D(INFRA)**	**D(GDP_CapR)**	**D(OTT)**	**D(ROI)**
CointEq1	-0.429 (0.149) [-2.879]	-0.001 (0.001) [-4.529]	0.026 (0.038) [0.689]	-0.004 (0.002) [-1.807]	3.481 (3.3001) [1.066]

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CointEq2	-337.703 (182.035) [-1.855]	-2.335 (0.424) [-5.507]	-0.330 (46.828) [-0.007]	-2.984 (3.305) [-0.902]	0.001 (0.001) [0.663]
CointEq3	18.778 (10.750) [1.746]	0.138 (0.025) [5.526]	0.083 (2.765) [0.030]	0.203 (0.195) [1.040]	-1.410 (2.400) [-0.597]
D(FDI(-1))	-0.534 (0.224) [-2.383]	0.0004 (0.0005) [0.954]	0.048 (0.057) [0.844]	-0.002 (0.004) [-0.618]	-2.280 (4.910) [-0.465]
D(FDI(-2))	-0.351 (0.293) [-1.201]	0.0011 (0.0006) [1.714]	-0.013 (0.075) [-0.173]	-0.009 (0.005) [-1.773]	2.001 (6.412) [0.311]
D(INFRA(-1))	445.900 (84.451) [5.279]	1.0007 (0.196) [5.086]	-59.510 (21.720) [-2.739]	-0.505 (1.533) [-0.329]	-0.059 (0.001) [-0.861]
D(INFRA(-2))	358.828 (169.874) [2.112]	0.536 (0.395) [1.354]	61.937 (43.700) [1.417]	0.158 (3.084) [0.051]	-0.002 (0.001) [-1.082]
D(GDP_CapR(-1))	18.125 (10.650) [-1.701]	0.139 (0.024) [-5.623]	-0.542 (2.739) [-0.197]	-0.215 (0.193) [-1.114]	1.030 (2.31) [0.439]
D(GDP_CapR(-2))	11.972 (8.838) [-1.354]	-0.105 (0.020) [-5.101]	-0.315 (2.273) [-0.138]	-0.209 (0.160) [-1.303]	7.810 (1.900) [0.403]
D(OTT(-1))	16.111 (50.999) [-0.315]	0.280 (0.118) [2.359]	-4.402 (13.119) [-0.335]	1.614 (0.926) [1.743]	4.180 (0.001) [0.374]
D(OTT(-2))	22.832 (22.599) [-1.010]	0.077 (0.052) [1.470]	-4.962 (5.813) [-0.853]	0.912 (0.410) [2.224]	1.410 (4.900) [0.285]
D(ROI(-1))	10.004. (4.296) [-2.433]	543.918 (10.314) [-4.403]	70.186 (11.952) [-0.029]	56.487 (80.429) [-0.628]	1.043 (0.969) [1.075]
D(ROI(-2))	10.112. (32.559) [-3.323]	361.350 (75.509) [-5.749]	55.06 (83.758) [-0.149]	32.650 (59.117) [0.056]	0.318 (0.712) [0.446]
C	992.561 (1685.03) [0.589]	18.778 (3.925) [4.783]	160.720 (433.474) [0.370]	40.537 (30.595) [1.324]	-0.001 (0.003) [-0.064]
R-squared	0.915	0.962	0.897	0.757	0.2517
Adj. R-squared	0.815	0.919	0.776	0.470	-0.632
F-statistic	9.183	21.966	7.404	2.643	0.284
Log likelihood	-179.565	-28.014	-145.622	-79.348	146.236
Akaike AIC	15.485	3.361	12.769	7.467	-10.578
Schwarz SC	16.167	4.043	13.452	8.150	-9.896
S.D. dependent	1119.244	3.932	261.137	11.986	0.001

FDI (Foreign Direct Investment), INFRA (Infrastructure), GDP_CapR (Gross Domestic Product per capital Real), OTT (Openness to Trade and ROI (Return on Investment)

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Table 6: Vector Error Correction Estimates South Africa

Date: 01/16/17 Time: 08:57
Sample (adjusted): 4 27
Included observations: 24 after adjustments
Standard errors in () & t-statistics in []

Cointegrating Eq:	**CointEq1**	**CointEq2**	**CointEq3**		
FDI(-1)	1.000	0.000	0.000		
INFRA(-1)	0.000	1.000	0.000		
GDP_CapR(-1)	0.000	0.000	1.000		
OTT(-1)	58.869 (8.514) [6.913]	-1.827 (0.220) [-8.281]	22.682 (5.527) [4.103]		
ROI(-1)	7380272. (960561.) [7.683]	121720.4 (24901.6) [4.88805]	13611701 (623592.) [21.827]		
C	-7154.897	27.344	-8900.585		
Error Correction:	**D(FDI)**	**D(INFRA)**	**D(GDP_CapR)**	**D(OTT)**	**D(ROI)**
CointEq1	-4.073 (0.281) [-14.477]	0.001532 (0.00074) [2.07983]	-0.516 (0.177) [-2.910]	0.003 (0.001) [2.814]	3.850 (2.001) [1.921]
CointEq2	-455.437 (37.856) [-12.030]	-0.226915 (0.09909) [-2.28988]	-55.569 (23.856) [-2.329]	0.401 (0.166) [2.418]	4.191 (2.701) [1.554]
CointEq3	21.295 (1.436) [14.825]	0.006643 (0.00376) [1.76660]	2.883 (0.905) [3.185]	-0.026 (0.006) [-4.261]	-1.7707 (1.010) [-1.726]
D(FDI(-1))	1.699 (0.281) [6.029]	-0.001413 (0.00074) [-1.91469]	0.232 (0.177) [1.309]	-0.001 (0.001) [-0.867]	-1.481 (2.001) [-0.734]
D(FDI(-2))	0.798 (0.207) [3.845]	-0.001105 (0.00054) [-2.03261]	0.095 (0.130) [0.730]	-0.0005 (0.0009) [-0.586]	-1.141 (1.501) [-0.768]
D(INFRA(-1))	376.590 (84.153) [4.475]	0.093232 (0.22029) [0.42323]	62.238 (53.033) [1.173]	-0.103 (0.369) [-0.280]	-5.181 (6.001) [-0.863]
D(INFRA(-2))	351.441 (38.578) [9.109]	0.183754 (0.10099) [1.81958]	31.240 (24.312) [1.284]	0.134 (0.169) [0.797]	-1.541 (2.710) [-0.559]
D(GDP_CapR(-1))	11.392 (2.511) [-4.535]	0.006037 (0.00658) [0.91806]	-0.902 (1.583) [-0.570]	0.0275 (0.011) [2.501]	-5.810 (1.800) [-0.324]
D(GDP_CapR(-2))	0.079 (1.598) [0.049]	-0.010833 (0.00418) [-2.58928]	-0.967 (1.007) [-0.960]	0.001 (0.007) [0.200]	3.541 (1.100) [0.310]
D(OTT(-1))	1337.356 (96.613) [-13.842]	0.318782 (0.25290) [-1.26050]	183.075 (60.885) [-3.006]	0.979 (0.424) [2.310]	1.181 (6.900) [1.720]

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D(OTT(-2))	674.765 (92.139) [-7.323]	0.663231 (0.24119) [-2.74982]	61.521 (58.066) [-1.059]	0.771 (0.404) [1.907]	-1.310 (6.600) [-0.200]
D(ROI(-1))	92.968 (23.046) [-4.033]	78.40169 (60.3291) [0.12996]	155.682 (1.510) [-1.071]	32.817 (10.114) [3.244]	-0.054 (1.642) [-0.033]
D(ROI(-2))	17.405 (18.070) [0.963]	15.40484 (47.3034) [-3.25660]	53.920. (11.211) [-0.473]	47.845 (79.308) [-0.060]	-0.266 (1.287) [-0.206]
C	-791.959 (436.526) [-1.814]	5.437040 (1.14268) [4.75814]	-3.593 (275.098) [-0.013]	-3.046 (1.915) [-1.590]	2.820 (3.100) [0.905]
R-squared	0.988	0.981805	0.805	0.917	0.491
Adj. R-squared	0.973	0.958151	0.552	0.810	-0.169
F-statistic	64.990	41.50736	3.185	8.552	0.744
Log likelihood	-174.904	-32.21308	-163.823	-44.615	220.063
Akaike AIC	15.742	3.851090	14.818	4.884	-17.171
Schwarz SC	16.429	4.538288	15.505	5.571	-16.484
S.D. dependent	3341.607	7.013605	516.452	5.521	3.610

FDI (Foreign Direct Investment), INFRA (Infrastructure), GDP_CapR (Gross Domestic Product per capital Real), OTT (Openness to Trade and ROI (Return on Investment)

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Table 7: Vector Error Correction Estimates Kenya

Date: 01/16/17 Time: 09:06
Sample (adjusted): 4 37
Included observations: 34 after adjustments
Standard errors in ( ) & t-statistics in [ ]

Cointegrating Eq:	**CointEq1**	**CointEq2**	**CointEq3**		
FDI(-1)	1.000	0.000	0.000		
INFRA(-1)	0.000	1.000	0.000		
GDP_CapR(-1)	0.000	0.000	1.000		
OTT(-1)	-7.667 (0.594) [-12.896]	-1.726 (0.180) [-9.580]	-8.548 (0.893) [-9.567]		
ROI(-1)	71714.58 (7566.51) [9.477]	26267.51 (2293.11) [11.454]	261801.2 (11371.8) [23.021]		
C	211.111	29.754	-576.902		
Error Correction:	**D(FDI)**	**D(INFRA)**	**D(GDP_CapR)**	**D(OTT)**	**D(ROI)**
CointEq1	-4.126 (0.575) [-7.174]	0.007 (0.012) [0.626]	-0.444 (0.320) [-1.387]	0.027 (0.022) [1.236]	8.860 (1.300) [0.656]
CointEq2	-22.628 (6.927) [-3.266]	-0.503 (0.147) [-3.416]	-1.102 (3.860) [-0.285]	0.322 (0.269) [1.197]	-5.230 (1.600) [-0.321]
CointEq3	3.633 (1.476) [2.461]	0.065 (0.031) [2.076]	0.550 (0.822) [0.668]	-0.099 (0.057) [-1.737]	-3.260 (3.500) [-0.939]
D(FDI(-1))	2.142 (0.429) [4.986]	-0.007 (0.009) [-0.822]	0.386 (0.239) [1.612]	-0.017 (0.016) [-1.068]	-7.620 (1.000) [-0.755]
D(FDI(-2))	0.978 (0.252) [3.878]	-0.017 (0.005) [-3.351]	0.124 (0.140) [0.887]	-0.021 (0.009) [-2.145]	-2.410 (5.900) [-0.040]
D(INFRA(-1))	3.744 (5.653) [0.662]	0.335 (0.120) [2.793]	1.528 (3.150) [0.485]	-0.170 (0.220) [-0.775]	-4.260 (1.300) [-3.210]
D(INFRA(-2))	36.247 (11.171) [3.244]	0.599 (0.237) [2.524]	4.738 (6.225) [0.761]	-0.208 (0.434) [-0.479]	3.390 (2.600) [1.293]
D(GDP_CapR(-1))	0.762 (0.852) [-0.894]	0.034 (0.018) [1.901]	-0.421 (0.474) [-0.888]	0.105 (0.033) [3.186]	3.590 (2.000) [1.792]
D(GDP_CapR(-2))	0.990 (0.758) [-1.305]	0.029 (0.016) [-1.860]	0.0004 (0.422) [0.001]	-0.0001 (0.029) [-0.004]	-2.020 (1.800) [-1.132]
D(OTT(-1))	25.857 (5.692) [-4.541]	0.309 (0.121) [2.560]	4.112 (3.172) [1.296]	-0.163 (0.221) [-0.739]	-3.780 (1.300) [-2.832]
D(OTT(-2))	5.330 (4.188) [-1.272]	-0.153 (0.089) [-1.722]	4.734 (2.334) [2.028]	-0.550 (0.163) [-3.376]	-3.520 (9.800) [-3.576]

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D(ROI(-1))	51.806 (12.292) [4.214]	24.081 (26.132) [0.921]	616.738 (68.498) [-0.900]	12.676 (4.785) [2.649]	1.062 (0.288) [3.684]
D(ROI(-2))	78.048 (122267.) [0.638]	286.024 (2599.33) [-0.110]	86052.56 (68133.2) [-1.263]	14757.07 (4759.67) [3.100]	0.476 (0.286) [1.659]
C	-22.811 (18.416) [-1.238]	0.190 (0.391) [0.486]	-2.956 (10.262) [-0.288]	0.985 (0.716) [1.374]	4.030 (4.300) [0.933]
R-squared	0.861	0.922	0.604	0.790	0.843
Adj. R-squared	0.770	0.872	0.347	0.654	0.7417
F-statistic	9.538	18.362	2.354	5.800	8.273
Log likelihood	-188.454	-57.521	-168.572	-78.088	252.267
Akaike AIC	11.909	4.207	10.739	5.416	-14.015
Schwarz SC	12.537	4.835	11.368	6.045	-13.387
Mean dependent	4.655	1.620	12.280	0.322	-3.4000

FDI (Foreign Direct Investment), INFRA (Infrastructure), GDP_CapR (Gross Domestic Product per capital Real), OTT (Openness to Trade and ROI (Return on Investment)

Tables 5 to 7 show the three cointegrating equations for each country. As shown above, there are at least three cointegrating equations. Therefore, the variables are cointegrated. For brevity, the focus is on how the variables influence the FDI. Although Tables 5 to 7 show how the variables influence FDI, the results do not show whether the influence is significant and, if significant, at what level. Consequently, using least squares estimates, Appendices 1 to 3 show the level of significance. Table 8, below, summarizes the combined results shown in Tables 5 to 7 and those in Appendices 1 to 3.

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Table 8: Cointegration and significance level using least square estimates (Gauss-Newton / Marquardt steps)

	Nigeria	**South Africa**	**Kenya**
C(1) FDI(-1)	-0.429* (0.149)	-4.073**** (0.281)	-.4.126*** (0.575)
C(2) Infrastructure (-1)	337.703** (182.035)	455.437**** (37.855)	22.628*** (6.927)
C(3) GDP real (-1)	0.778** (10.750)	21.295**** (1.436)	3.633* (1.476)
C(4) D(FDI) (-1)	-0.534* (0.224)	1.699**** (0.281)	2.142** (0.429)
C(5) D(FDI) (-2)	-0.351 (0.293)	0.798** (0.207)	0.978*** (0.252)
C(6) D(Infrastructure (-1))	445.900*** (84.450)	376.590** (84.153)	3.744 (5.656)
C(7) D(Infrastructure (-2))	358.828* (169.874)	351.441**** (38.578)	36.247** (11.178)
C(8) D(GDP real (-1))	18.125 (10.650)	11.392** (2.511)	0.762 (0.852)
C(9) D(GDP real (-2)	11.972 (8.838)	0.079 (1.598)	0.990 (0.758)
C(10) D(Openness to trade(-1)	16.111** (50.999)	1337.356**** (96.613)	25.857**** (5.692)
C(11) D(Openness to trade (-2))	22.832** (22.599)	674.765**** (92.139)	5.330 (4.188)
C(12) D(ROI(-1))	10.004** (4.429)	92.968** (23.046)	51.806*** (12.292)
C(13) D(ROI(-2))	10.112** (3.255)	17.405 (18.070)	78.048 (12.226)
C(14)	992.561 (1.685)	-791.959* (436.526)	-22.811 (18.416)
R squared	0.915	0.988	0.861
Adjusted R squared	0.815	0.973	0.770
F statistic	9.183****	64.990***	9.538***
DW	2.136	2.245	1.972

FDI (Foreign direct investment); GDP per capital real (gross domestic product real); Infrastructure; ROI (Return on Investment); Openness (trade openness).
*** Significance at 1%, ** significance at 5% and * significance at 10%. Standard errors in parenthesis

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Infrastructure

Infrastructure covers many dimensions in a country, ranging from transport networks, including roads, railway and ports, to telecommunication systems. According to ODI (1997), poor infrastructure may be seen as an impediment to international trade but may also be an opportunity for foreign investment, especially in countries where the government works with foreign firms as partners. Good and well-developed infrastructure that can enhance transportation and movement increases productivity (Jordaan, 2004). In addition, good infrastructure may reduce the cost of operations. The results provide interesting findings with regard to the four major Sub-Saharan economies. The coefficients for current infrastructure are positive and significant at 5% across the four countries, implying that a developed infrastructure is fundamental for the economic development necessitated by FDI. When lagged, the results demonstrate that infrastructure is significant to South Africa and Nigeria. Although there are positive coefficients in all countries, the magnitude for South Africa and Nigeria is much higher than for Kenya. Similarly, as shown in the descriptive statistics in Appendix 8, the mean for infrastructure is higher (70.842) compared with other countries. Therefore, one could conclude that the better the infrastructure, the higher the FDI inflow and, hence, improved economic growth.

GDP

In 2016, economic growth in sub-Saharan Africa dropped to its lowest level in more than 20 years, reflecting the adverse external environment and a lack-lustre policy response in many countries, especially those at an embryonic stage. Nevertheless, the aggregate picture is one of multispeed growth compared with other world regional groupings. While most of the non-resource-intensive countries—half of the countries in the region—continue to perform well because they benefit from lower oil prices, an improved business environment and continued strong infrastructure investment, most commodity exporters are under severe economic strain. This is particularly the case for oil exporters whose short-term prospects have significantly worsened in recent months. Sub-Saharan Africa remains a region of immense economic potential but policy adjustment in the hardest-hit countries needs to be enacted promptly to allow for a growth rebound that, among other drivers, could be enhanced by FDI. The results of the research (Table 8) indicate a positive significant coefficient of GDP per capital real to FDI across the countries. Examining the relationship between GDP per capital real and FDI indicates a bi-directional relationship (Appendices 5 to 7) for Nigeria. That is, FDI can cause GDP per capital real and the growth of the economy can be an attractive incentive for foreigner investors. For South Africa and Kenya, the results indicate a uni-directional relationship, showing that when the economy is growing this tends to attract foreign investors. In terms of the sign of the coefficient, the results support Ancharaz (2003) who noted a positive effect with lagged growth for

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the full sample and for the non-sub-Saharan African countries but an insignificant effect for the sub-Saharan Africa sample. The results also support Mottaleb and Kalirajan (2010) who noted positive effect of GDP growth. All the results regarding market size, obtained from alternative models, show that the growth of per capita real GDP affects FDI but per capita real GDP does not.

Openness

As a result of globalization and trade liberalization, trade openness has increased in trading nations. Trade openness can enhance technology transfer, the transfer of skills, increased labor, total factor productivity and economic growth and development in general. However, Jordaan (2004) claims that the impact of openness on FDI depends on the type of investment. When investments are market-seeking, trade restrictions (and therefore less openness) can have a positive impact on FDI. The reason for this stems from the "tariff jumping" hypothesis, which argues that foreign firms that seek to serve local markets may decide to set up subsidiaries in the host country if it is difficult to import their products to the country. In contrast, multinational firms engaged in export-oriented investments may prefer to invest in a more open economy because increased imperfections that accompany trade protection generally imply higher transaction costs associated with exporting. As shown in Table 8 above, in measuring trade openness as the ratio of exports plus imports to GDP, the results indicate significant positive coefficients in all countries under consideration, whether level or lagged. This is consistent with the FDI theory that openness is indicative of ease of access to the world market. Accessing the world market enables companies to source resources, including finance, at low prices. This, in turn, is more attractive to foreign investors. However, interestingly, considering the impact of trade openness and economic growth, the results indicate a negative association between trade openness and GDP per capital real.

Return on investment

The rate of return on FDI per region across the world is of interest because it determines the attractiveness for investors. Investors invest their resources and anticipate not only profit but a return higher than their cost of capital. As shown in the descriptive, Kenya offers a marginally higher rate of return in comparison to the rest of the sample. This indicates that the rate of return across Africa does not differ significantly. As shown in Table 8 above, the rate of return significantly influences FDI positively. However, the significance differs slightly across the countries: it is 1% for Kenya, whereas it is 5% in South Africa and Nigeria. This could be attributed to the fact that Kenya is a small economy compared with South Africa and Nigeria. The rate of return may be influenced by several factors including the cost of capital, the cost of operation (including labor and materials) and taxation.

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The more developed the country in terms of infrastructure, the less the cost of manufacturing or operation. As shown in appendix 7, South Africa is almost four times more developed (measured by infrastructure) than Kenya. This implies (other factors constant) that the cost of manufacturing in South Africa is lower than in Kenya. In addition, a higher return may not necessarily mean a lower cost of operations but it also captures the risk in investing in those countries. That is, the higher the risk, the higher the return an investor may demand.

5. Conclusion

The objective of this study was to analyze the main determinants of foreign direct investment in major economies in sub-Saharan Africa. All the variables are integrated with order one, that is, I (1). Across the three countries, the optimal lag length of two, found in the Cointegration test, showed that the variables were cointegrated. Thus, the vector error correction model was used. From the result, the past year of foreign direct investments, the trade openness that encouraged the current foreign direct investment inflows in the major economies. However, the magnitude differs depending on the size of the economy. Similarly, the results indicate that the return on investment is significant in attracting foreign investment. Surprisingly, the results indicate that Kenya has a higher return on investment compared with South Africa and Nigeria. A higher return may not only be attributable to the lower cost of operation but could also be attributed to the riskiness of investing in the country. Further, the findings indicate that past economic growth and the extent to which an economy is open to trade are significant factors in attracting foreign investment. Therefore, policies that encourage foreign direct investment ease of trade or removal of trade barriers and reductions in the cost of investment, for instance, interest rates and taxation, should be encouraged.

Declaration of conflict of Interest

I can confirm that there is no conflict of interest.

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