EMPIRICAL INVESTIGATION OF DYNAMIC RELATIONS AMONG FOREIGN DIRECT INVESTMENT, ECONOMIC GROWTH AND POVERTY PREVALENCE USING AFRICAN DATA

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Abstract
This study examined dynamic relations among foreign direct investment (FDI), economic growth and poverty headcount ratio using a sample of 24 African Countries. To achieve this goal, historical data of the variables regarding cross section of countries were collected over 14-year period. The stratified random sampling technique was employed in selecting the sample. Following pre-regression diagnostics, we specified Vector-Auto-Regression model for computation of coefficients of the variables in dynamic relations. These were complimented with computation of relative impulse response function and forecast-error-variance decomposition of regression estimates. We found that FDI did not granger-cause economic growth among African economies, just as growth was found not sustainable and inclusive enough as to achieve substantial poverty reduction. More-so, evidence appeared to support earlier isolated findings that FDI has been largely exploitative and attracted to economies with high growth rates and low poverty ratios. The study reinforces earlier isolated findings that it is not necessarily 'growth' that results in decline in poverty prevalence but 'sustained economic growth'. Hence most developing nations that depend on annual fiscal plans for poverty reduction may consistently miss development targets. Again, contrary to widely held view that foreign direct development leads to economic growth, the study established exceptional case for Africa.
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1.0 INTRODUCTION

As at 2015, world poverty rate was reported to be on target at 10% under the Millennium Development Goals (World Bank, 2018). This remarkable achievement apparently spurred the more ambitious goal of ending extreme poverty (by reducing average rate below 3%) and promoting shared prosperity by 2030 under the Sustainable Development Goals (SDGs) framework. For Sub-Sahara Africa, however, poverty rate was reported at 42.3%, after achieving a relatively paltry decline from 50.9% in 2005. Infact, out of 725million persons recorded as globally poor in 2015, 413million or 57% were resident in Africa; a continent with 27 out of the

world's 28 poorest countries (Nirav, 2018). According to World Bank (2018), in order to have a chance of attaining the SDGs, the world economy need to grow at an average rate of 6% per annum while Africa need to grow consistently at 2% points faster than average. This is consistent with an earlier view by Harsch (2003) that Africa would need 6-8% sustained growth rate and investment rate of about 30% of gross domestic product to achieve its development aspirations.

For Sub-Saharan Africa, economic growth rate had declined from 6.2% in 2005 to 2.39% in 2018 (World Bank, 2018) creating concerns that if the trend continues, the possibility is high that the continent may yet falter in achieving desired development outcomes under the new SDG framework. According to Abramovitz (1989), availability of resources in the form of highly skilled manpower, technology and capital is said to be a pre-requisite for sustained growth and development of any economy (Abramovitz, 1989). Unfortunately, Africa does not appear to have comparative advantage with these resources (Adeyeye, 2015; UNECA, 1990). This means that for desired growth and development to be attained, the continent would need to tap the resource pool of the external sector. Many developing countries have relied on different forms of foreign capital flows, including grants-in-aid, foreign transfers, and remittances to fill this gap (Shafiq & Ahmad, 2016). It however appears that the most reliable and sustainable manner of filling this gap is through private foreign investment flows. As Learner (1995) argued, FDI helps economies attract resources (including skilled labour, technology, and capital) to sectors in which they have competitive advantage. Accordingly, under the New Partnership for African Development (NEPAD) framework, emphasis was meant to shift to private investment flows (Harsch, 2003). Over the years, African countries have redoubled efforts in this direction, with Sub-Sahara Africa growing FDI inflow from $19.6billion in 2015 to $32.05billion in 2018 (World Bank, 2020). Although growth in FDI has been remarkable, the size of inflows appears to remain insufficient to fill enormous gap required to fund infrastructure and production requirements of the continent (Bakare & Bashorun, 2014). Moreover, out of total foreign direct investment of $1.19trillion made globally in 2018, the share of Sub-Saharan Africa amounted to 2.7% only. Issues have also been raised as to whether the investments are attracted to sectors with significant multiplier effects on income and employment (Opoku, Ibrahim & Yakubu, 2019).

The above issues have raised concern as to nature of link between poverty rate, growth rate and FDI in Africa. A great deal of research exists in literature to explain these relationships. Drawing from neo-classical school of thought, mainstream empirical evidence appears to hold that FDI stimulates economic growth (Kuhn, 2018; Njangang et. al., 2019; Khan et. al., 2022; Muhammad et. al., 2022) and reduces poverty rate (Arogundade et al., 2022; Kunofiwa, 2023). Several studies posit that FDI – Poverty rate nexus cannot be explained directly, but through FDI's influence on economic growth (Haruna et. al., 2022; Arogundade et. al., 2022). Yet, others found that this is not a unidirectional relationship, a seemingly implausible suggestion that causation can also run from poverty rate, through growth, to foreign direct investment (Amah, 2020; Arogundade et. al., 2022). With performance levels considered sub-optimal at close of MDGs timeline in 2015, and onset of the SDGs journey towards 2030, greater clarity would be required by policy makers to understand channels of transmission amongst these key growth and development variables. In this paper, the researchers seek to investigate the nature of dynamic relations that exists among the three variables using a panel sample that consists of 24 African countries over the period 2005 to 2018. Accordingly, the specific objectives are to: a) determine the nature of influence of FDI and economic growth and poverty prevalence, b) evaluate how significantly FDI and poverty prevalence impact economic growth, and c) investigate the effects of economic growth and poverty rates on FDI. The objectives are specified in a manner to capture the possible multi-directional

relations hypothesized to exist between the variables. This approach is presumed to be more helpful to researchers and policy makers, not only in understanding the dynamics involved in interaction of the variables, but also in sequencing policy measures to achieve the desired outcomes. For the relatively under-researched FDI-Economic Growth – Poverty Rate nexus with respect to African countries (to the best of the authors' knowledge), this is no doubt significant.
The rest of the paper is organized as follows: In section 2, concepts, theories, and findings in related literature are reviewed with a view to contextualize the arguments and results of the study. Section 3 briefly lays out the design and methods adopted to conduct the investigation. The paper, in section 4, presents analysis of data and results of the study. In section 5, key findings are summarized with conclusions, policy implications and recommendations.

2.0 REVIEW OF LITERATURE

2.1 Review of Concepts

Ordinarily, poverty as a concept connotes a state of lack in essential elements of well-being. Carney (1992) explained poverty within the context of lack of financial income and lower social status, and explored its evolution from public health perspective with roots on general state of pre-natal care in a society. Kim (2018), while outlining thrust of World Bank's focus on reducing poverty, opined that "the concept of poverty … encompasses a shortfall in income and consumption, but also low educational achievement, poor health and nutritional outcomes, lack of access to basic services and a hazardous living environment". Accordingly, different thresholds were created by the World Bank for a more definitive measurement of the concept. International Poverty Line was fixed at $1.90 per day (at 2011 Purchasing Power Parity) to derive poverty headcount ratio; national poverty line for lower middle-income countries was fixed at $3.20 per day; while threshold of $5.50 per day was fixed for upper middle-income countries. This would appear to be a more realistic approach to account for differences in standards of living and determining dimensions of poverty across countries and regions. Hence a 'poor' household in one country may not be so classified in another country even with the same income level and purchasing power. Interestingly, most of the Sub-Sahara African Countries are classified with the International Poverty Line.
Economic growth is arguably the most recurring word among nations and multi-lateral institutions as they seek macroeconomic policies and reforms necessary to improve standards of living of the people. This is because economists traditionally see an economy that witnesses consistent growth in output or income level (often measured by gross domestic product) as one capable of addressing the problems of poverty incidence (Ranieri & Ramos, 2013). In this context therefore, such descriptive words as "inclusive" and "sustainable" have been used in literature and policy documents to situate growth. Walby (2018) joined the raging debate on inclusive growth by strongly repudiating the claim of existence of trade-off between equality and growth. This means that equality, equity, and inclusion should necessarily be embedded in discussions of production and economic growth. Hence, achievement of high economic growth without substantially reducing poverty and enhancement of wellbeing of the people (generally characterized as growth without development) cannot be regarded as quality growth. The same applies to occurrence of cycles of boom and burst in the economy occasioned by frequent changes in sign of growth rate. It is in recognition of imperative for enduring growth and development consistent with wellbeing of the people that the World Bank, in partnership with United Nations, adopted the Sustainable Development Goals (World Bank, 2015). This was aimed to achieve growth, that is balanced and environmentally sustainable, and prosperity that is shared by all.

Investment is a key component in the determination of national income. Because most modern economies are not self-sufficient in amount of resources required to achieve desired growth, foreign investments, which may be in the form of portfolio or direct investment, have become necessary. Writing for the World Trade Organization, Richard and Otten (1996), in a categorization of foreign direct investment states that this form of investment occurs when "an investor based in one country (home country) acquires an asset in another country (host country) with the intent to manage it". From this perspective, the issue of residence is important and more importantly, management and control are involved. Unlike Foreign Portfolio Investment (FPI), Foreign Direct Investment (FDI) is considered a powerful enabler of growth of modern economies because of its long-term nature and other potential packages like skilled manpower and technology that often accompany it (Abramovitz, 1989; Learner, 1995). On threshold of foreign interest to qualify as FDI, literature is generally silent on this, though OECD (2021) considers minimum holding of 10% as sufficient to confer control.

2.2 Theoretical Literature

The body of literature is replete with rich theories of growth, development and foreign investment and interactions among them. There is equally no shortage of contradictions and convergences among the theories. In this paper, we shall review the popular ones including the neo-classical Solow-Swan Model, the Endogenous Growth Model, Human Capital theory, and Dependency theory of foreign Investment.

2.2.1 Neo-Classical Solow-Swan Model

Under the neo-classical Solow-Swan model developed simultaneously by Solow (1956) and Swan (1956); using labor, capital, and population growth to ensure technological progress, a nation's economy will in the long-run converge to its 'steady-state' equilibrium rate of growth. The combination of these resources creates "productivity growth" which follows path of the Cobb Douglas production function until the economy attains the long run steady state. Any change in growth rate beyond the steady state can only come from a change in "total factor productivity" which is only possible from exogenous factors attributable to external technology. By implication, poor nations will eventually catch up with rich nations given identical natural endowments. This is true given that poorer nations will enjoy increasing rate of return arising from technical progress while richer nations will face diminishing returns. With this model, poor nations can become rich by investing increasing proportions of their national income and adopting new technologies and processes. This model has been criticized on grounds of being an outgrowth of classical thinking and seeming implausibility of the assumption that goods are perfectly mobile while factors of production are immobile. Hence, growth beyond the steady state can only happen through external shock. However, in the world of globalization, capital, labor, and technology have become largely mobile (Eicher et al, 2009). Accordingly, in an open economy model with global financial flows, investment will continue to flow from rich to poor countries until capital and labor productivities are equalized at steady state growth rates across the countries. But due to the factor of competitiveness, convergence to a desired steady-state growth would be difficult for poor countries where goods and input factors are perfectly mobile.

2.2.2 Endogenous Growth Model

Endogenous model is complementary to the Solow-Swan intuition of sustainability of growth. The idea here is that technological change is endogenous where the production function shows greater reliance on human capital. As a demonstration of this, Lucas (1988) and Romer (1986) extended the Solow-Swan model to endogenize human capital in the growth equation. Beyond technology, human capital is thought to be the one factor that spices up total factor productivity (TFP) to

achieve sustainable growth. The thinking behind this is that, with education and innovations arising from new knowledge, nations can sustain the path of economic growth. One of the key criticisms of the endogenous growth theory stems from it's being an outgrowth of the unrealistic neo-classical assumptions (Cesaratto, 2010). Cesaratto highlighted that by assuming independence of saving rate and growth, the theory fails to account for relationship between aggregate demand and long-term growth. More importantly, while the endogenous model introduced human capital into the long run growth equation, it was silent on the desirability of growth and its relationship with key indicators of wellbeing of the people like poverty. Moreover, the model appeared not to clearly establish the distinction between physical and human capital as it relates to source of technical change in the production process. On both counts, the model would appear not to have added much to the body of knowledge than an earlier theory of human capital developed in the sixties.

2.2.3 Human Capital Theory

There is a fair amount of work at research and policy level about the concept of poverty, but not much is known about a generally agreed poverty generation process. What have instead sufficed are several related theories of labor supply and wages which economists have tried to use to explain aspects of poverty (Mckernan & Ratcliffe, 2002). One of the most fascinating ones in growth and development literature, which is equally analogous to the endogenous model is the Human Capital Theory. While Shulz (1961) and Mincer (1962) did pioneer works on human capital, it was Becker (1962) that is credited to have come up with the most coherent body of theory that explains its linkage to productivity and poverty. The summary of this theory is that earnings follow investment in human capital, just as poverty follows earnings through stages in society/people's life time. At early stage, when society/people invest in education and training, earnings are bound to be low, but will pick up with the passage of time when the reward for such investments begins to mature. At old age, when productivity of individuals declines, earnings will also recede. Accordingly, young and old people are more susceptible to poverty. The thinking behind this theory is that availability of physical capital and modern technology means little to growth and development in the absence of skilled manpower. However, this theory failed to incorporate how these material and human resources can be made available in a situation where they are lacking in the domestic economy. FDI has been shown to be an important conduit of capital, technology, and skilled manpower, especially to developing countries (Learner, 1995).

2.2.4 Dependency Theory

Zebregs (1998) argued that the standard neoclassical approaches are not particularly useful in explaining FDI flows and their significance to developing countries**.** Perhaps it was against this background that dependency theory was formulated to provide alternative framework for understanding the place of foreign investment in economic growth and development (Amah, 2020). The theory was first amplified in the Prebisch-Singer thesis (Prebisch, 1950) and focused essentially on the undesirable features of foreign investment. This was reinforced by Harvey, Kellard, Madsen and Wohar (2010) which highlighted the tendency of prices of primary commodities (typically produced by developing countries) to consistently decline relative to the prices of manufactured goods (typically produced by developed nations) over the long term. Consequently, terms of trade of primary product-based economies tend to deteriorate over time. This followed concerns of growing poverty in Latin America and rising third world debt even as "center" countries prospered. Accordingly, Lucas (1990) opined that in the process, foreign investment is seen as an instrument to sustain a lopsided world economic order in which developing economies remain in their under-developed state to the advantage of the developed economies. If this theory holds in its pure form, a positive relationship will not be expected

between foreign investment and economic growth in developing economies. By extension, it will not also lead to reduction of poverty incidence.

2.3 Empirical Review

There is no shortage of empirical studies on the 'one and one' relationship that exists between FDI, economic growth, and poverty. In a US-based study that agreed largely with classical growth paradigm, Morck and Yeung (1992) found that foreign acquisitions created growth for the host country leading to a situation where announcement of such foreign investments results in abnormal returns. This implies that the markets impound possibility of growth in pricing of assets in countries that attract foreign direct investment. What Morck and Yeung failed to emphasize however is that the foreign investors end up benefiting disproportionately from the value created through the abnormal return, the proceeds which are often repatriated to the home country. In a developing country study that focused on Cambodia, Khun (2018) studied time series data for the period 2006 – 2016 using a multiple regression analysis and found a positive relationship between FDI and growth of output in both short and long run. Although FDI was reported to be concentrated around the city centers, the positive relationship appears not surprising as substantial portion of FDI flows went to labor-intensive, export-oriented industries. This finding again raises the question of whether such investments are primed to exploit cheap local labour and satisfy raw material needs of manufacturers in the home country. The paper however used absolute values of gross domestic product to represent growth and failed to subject data to critical diagnosis to ascertain integrity of analytical process.

Several other studies have reported mixed results in models of foreign investment and economic variables (Gaston et al, 2012; Vollmecke, et al, 2016; Chuham-Pole et al, 2017; Younesse, 2019; Njangang et al, 2019; Amah, 2020; Getzner et al, 2020; Muhammad et al, 2022; Haruna et al, 2022; Khan et al, 2022; Arogundade et al, 2022 & Kunofiwa, 2023). Njangang et al. found a largely positive and significant effect in the long run between foreign investment and growth, but a surprisingly negative and significant effect in the short run for low-income countries. Chuham-Pole et al found that foreign investment had lifted growth but not well-being of African countries, Younesse, on the other hand, found that while the relationship is positive for Northern and Southern African economies, it was negative for West, Central and East African countries. In a related study that investigated regional differences in the underlying relationships, Gaston and Soumare (2012) found a positive and significant relationship between FDI and HDI in Africa, but also reported significant differences that seemed to dichotomize across regions based on Economic Output per capita. While positive and significant relationship was found for the 'poor' East and Central economies, it was insignificant for Northern and Southern sub regions and at best inconclusive for West Africa. Similarly, Amah (2020) investigated bi-directional relations between foreign investment and certain macroeconomic indicators among African countries, and the result was interesting. The study exposed the exploitative nature of foreign investments in Africa. There was no evidence that FDI supported growth and job creation, instead, foreign investors appeared to be attracted to economies with better infrastructure and high economic output. FDI and FPI also showed contrasting result; hence the paper exposed policy makers to focus areas in formulating measures to attract the desired amount and type of foreign investment. In yet another study targeted at a regional economy outside Africa, Getzner & Serhiy (2020) employed exploratory panel time series to investigate how FDI has been used in the transition economy of Ukraine. The authors found that there is only limited impact of FDI on economic performance indicators because of political instability, weak governance practices, conflicts, and mal-adapted reforms. Consequently, they recommended comprehensive and faithfully

implemented governance and structural reforms. Khan et al. (2022) investigated a possible link between FDI and growth, investment opportunities and industrialization using Pakistani annual data for the 1990-2019 period. Employing the ARDL test, the study affirmed existence of long run relationship between FDI and growth which was however mediated through gross capital formation and industrialization. Using identical methodology and the same Pakistani data, but specifically with Chinese FDI, Muhammad et al (2022) also found favourable influence on economic growth that is mediated through investments in renewable energy.

Assuming, but without conceding from above that there exists a link between FDI and growth, would this have any effect on wellbeing of people or poverty prevalence in the society?

In a recent study, Kunofiwa (2023) investigated 1989 – 2020 data from BRICS countries using 3 panel methods of analysis namely; Pooled OLS, Fixed Effects and Fully Modified OLS. Remarkably, in each of the methods, economic growth fitted significantly as the channel of influence through which FDI impact poverty rate. While mainstream view in Development Economics is that of positive growth – poverty reduction nexus, emerging research outcomes appear to be raising the curiosity of researchers and policy makers, particularly among developing countries. Cerra et al. (2021), in a classic IMF survey, investigated the link between growth, inequality, and poverty. The study found a complex and seemingly ambiguous relations between the variables. Infact, the authors opine that "multiple channels link growth to inclusion, and inclusion to growth, making it difficult to determine causation" This is compounded by the fact that many factors affect inclusion and growth simultaneously, some of which include technological change, innovation, and globalization. They found that, among individuals, growth does not improve income or welfare proportionately, and that impact of growth on development outcomes will also depend on its sources. Hence, in the study of FDI-poverty reduction nexus, the role played by the linkage to economic growth needs to be well understood in order to proffer the right policy options.

Vollmecke et al. (2016) had earlier conducted research into foreign investment, human capital, and income among some European nations between 2003 and 2010. Using Markov Chain approach to a disaggregated data set of 269 sub-nationals, the authors reported surprising findings. The study indicated weak process of income convergence across the EU, and particularly poverty trap in the Central and Eastern regions of Europe. It also found that FDI was not associated with high levels of income. It could be inferred from the study that FDIt did not play significant role in economic output of Eastern and Central European sub-regions and could equally play no role in lifting the populace out of poverty. It would then appear from this result that FDI do not monotonically lead to poverty reduction. Haruna et al. (2022) investigated the responsiveness of poverty prevalence to FDI flows in Nigeria for the period 1980 – 2019 relying on ARDL and NARDL methods of analysis. The study found that poverty is significantly reduced in the short and long run, but through 'growth effects'. This was found to be true where growth is stimulated by the creation of job opportunities and modern technology spillovers. The authors however recognized negative spillover effects of environmental degradation as a possible downside, especially in most developing countries with inadequate regulation. Expanding research to include panel data of 30 Sub-Saharan African countries, and employing fixed effects method of analysis, Arogundade et al. (2022) found that FDI does not have direct influence on poverty rate. Instead, the nature of relationship among the variables depends on the absorptive capacity of the economy defined by human capital and institutional quality. It then follows that those countries with low institutional quality and human capital development would be characterized by high poverty

prevalence. Remarkably, the Arogundade et al. (2022) also found a causal relationship that is bi-directional.

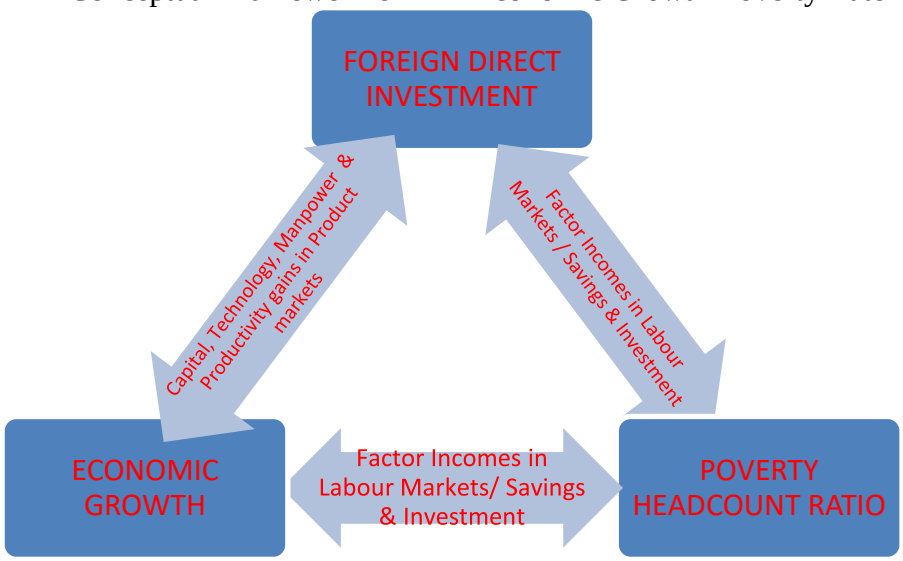
In summary, it could be seen that some gap still exists in establishing exact relations between FDI and the key growth and development variables. This gap, created by the mixed results, appears to be more pronounced in literature that focused on economies of developing countries and regions. While mainstream literature purports to find a positive relationship between FDI and growth; and, between growth and poverty, it has been largely inconclusive and inchoate for Africa-focused studies. In fact, findings from some of the investigations reviewed here suggested that FDI has not played a positive role in promoting growth, just as growth has not reduced poverty incidence. Moreover, virtually all the studies did not give insight into the changing pattern of interaction among the variables over time. This paper is designed to simultaneously investigate the dynamic nature of the relations among FDI, economic growth and poverty using data from 24 African countries.

3.0 METHODOLOGY

3.1 Conceptual Framework

To the best of our knowledge, no single theory exists to comprehensively analyze the nature of the relationships in a direct manner. Accordingly, the study integrates the theoretical frameworks of Neo-classical Solow-Swan Model (Solow, 1956; Swan, 1956), Becker's Human Capital Theory (Becker, 1964) and Prebisch-Singer Dependency Thesis (Prebisch, 1950) to estimate and explain parameters of the relationship that exists between the variables in a dynamic interactive manner.

Figure 1: Conceptual Framework of FDI-Economic Growth-Poverty Rate Nexus



Source: Authors' generated Concept

Under this framework, as seen in Figure 1, FDI is seen to be major channel through which capital, technology and manpower move from one nation to another, and in the process, influence the growth and wellbeing of the people. The principle behind this framework is that a shock (provided to the system by FDI) is required in the goods and labor markets, by the introduction of capital, technology, and skilled manpower, to stimulate productivity improvement, leading to growth in economic output. In the first instance, as these resources become more productive, earnings of suppliers of capital and manpower will increase thereby reducing poverty. Apart from this productivity gain, expansion of industries and infrastructure arising from new investments would result in higher demand in the labor market, and hence, increased income level.

On the other hand, with increased income and reduced poverty level, households can influence capital formation process (by way of more saving and investment), leading to increased economic growth. Following the intuition of Dunning (1979, 1992), foreign investors have "market-seeking" motive and hence would locate their businesses in markets with high growth features. Accordingly, poverty and growth would have influence on the direction of FDI as foreign investors seek to exploit resources of the host country. The variables are thus modeled to reinforce one another in an interactive system of relationships.

3.2 Methods

The approach adopted in this study is empirical and quantitative. The design is cross-sectional survey with panel that includes time and cross-sectional secondary data series covering a fourteen-year period from 2005 to 2018 across 24 African countries. The sample was selected using stratified random sampling technique wherein 24 economies were selected randomly from West, Central, North, East and Southern Africa regional sample frames. Using random sampling procedures in the sub-regions, 5 countries each were selected except for East Africa where we chose 4 countries. We adopted this approach to achieve reasonable representation at both sub-regional and continental levels. Data on gross domestic product growth rate, poverty headcount ratio and FDI were collected from the database of World Bank and International Financial Statistics Reports for the various years in our coverage. The choice of period covered by the study is based on the most recent (2018) household survey on poverty prevalence that cut across our sample frame, as published in the official database of World Bank.

3.3 Model Specification

In order to understand the parameters of the dynamic relations conceptualized for the study and extent of their significance, we specify the Vector Auto Regression (VAR) model. VAR sidesteps the complexity of structural modeling by treating every endogenous variable in the system as a function of lagged values of the endogenous variables. In other words, every explanatory variable is made to be pre-determined or exogenous, and pure independence exists between the variables and the error terms. Consequently, using the VAR specification, endogeneity bias is eliminated in the parameter estimates. Moreover, it offers additional flexibility of arbitrarily choosing lag order and adding other pure exogenous variables (where necessary) without substantial loss of efficiency of the estimates.

$$y_{it} = \sum a_i y_{it-1} + \sum \beta_i x_{it} + C_i + u_i \quad (1)$$

Where y is a k-vector of endogenous variables, x is d-vector of exogenous variables, a *and* β are matrices of coefficients to be estimated, C is the intercept while u is a vector of residuals.

Therefore, the system is modeled in a log form as follows:

$$LGDPR_t = a_1 + a_{11}\, LGDPR_{t-1} + a_{12} LPOVR_{t-1} + a_{13} LFDI_{t-1} + e_1 \quad (2)$$

$$LPOVR_t = a_2 + a_{21}\, LGDPR_{t-1} + a_{22} LPOVR_{t-1} + a_{23} LFDI_{t-1} + e_2 \quad (3)$$

$$LFDI_t = a_3 + a_{31}\, LGDPR_{t-1} + a_{32} LPOVR_{t-1} + a_{33} LFDI_{t-1} + e_3 \quad (4)$$

Where GDPR is gross domestic product growth rate, POVR is poverty headcount ratio, FDI is foreign direct investment, a_{ij} are coefficients while e_i are the specific error terms. Accordingly, we estimate coefficients of the model within the vector auto regression framework and further analyze the dynamic relations among the variables by computing the impulse responses and

forecast error variance decomposition of the regression estimates. The Impulse Response Function (IRF) helps to understand effect of one standard deviation shock of one variable on the other variables over time, while forecast error variance decomposition (FEVD) is complementary, and helps us determine extent of error variance for a variable attributable to its own innovations and those of the other variables. IRF and FEVD provides a more dynamic view to explanation of the VAR coefficient estimates by visualizing intensity of responses over an extended period.

4.0 DATA ANALYSIS AND RESULTS

4.1 Descriptive Statistics

Data from World Economic Outlook database (IMF, 2019) for the period 2005 to 2018 showed that global economy grew at average annual rate of 2.85%. Largely arising from base effects, the African continent performed much better with 4.29% reported for Sub-Sahara African economies.

For the countries in our sample, only three out of the twenty-four, namely South Africa, Gambia and Gabon performed below global average (see Appendix A). The fastest growing economies among those sampled include Ethiopia (10.22%), Rwanda (7.82%) and Ghana (6.58%). Nigeria, the largest economy in Africa, recorded average growth performance of 4.87% for the period. On the other hand, Povcalnet database (World Bank, 2005….2018) showed estimates of poverty headcount ratio that averaged 14% for the global economy against 45.74% recorded for Sub-Sahara African economies. Appendix A shows that only six of the twenty-four economies comprised in this study had lower poverty incidence than the global average. Incidentally, apart from Mauritius, which had the lowest poverty rate in Africa at 0.40% and Gabon (6.16%), the rest are the North African countries including Algeria (0.77%), Tunisia (1.63%), Morocco (1.71%), and Egypt (2.66%). Countries with the remarkable poverty incidence include Congo Democratic Republic (80.80%), Mozambique (66.57%), Rwanda (60.81%), Zambia (59.79%), Tanzania (53.76%) and Nigeria (51.48%). As for foreign direct investment, Africa also fared badly in comparative terms during the reference period. From the Global Competitiveness Report database (WEF, 2005 …… 2018), out of average global annual FDI flow of $2,127.95b, Sub-Sahara Africa was able to attract $34.43b, representing just 1.6%. Worse still, from Appendix A, only three countries namely Egypt ($6.42b), Nigeria ($5.56b) and South Africa ($4.93b) accounted for more than 50% of the average annual flows to the twenty-four countries in the sample. Countries with insignificant flows include Gambia ($0.04b), Swaziland ($0.05b) and Rwanda ($0.19b). It is interesting to note that these are average figures. As computed from time series of data, minima, maxima, and standard deviation of variables for the individual countries are quite revealing

4.2 Diagnostic Tests

We subjected data to unit root tests using the panel unit root of Levin, Lin & Chu and Augmented Dickey Fuller tests to determine whether the series conform to random walk.

Table 1: Panel Unit Root Test

	Levin, Lin & Chu test (Assumes common unit root process)		ADF-Fischer Chi-square test (Assumes individual unit root process)	
	Stat.	p value	Stat.	p value
Log FDI: Level	(3.7552)	0.0001	76.3178	0.0005

Log GDPR: Level		(1.2515)	0.1054	47.3876	0.1967
	1st Diff	(6.0632)	0.0000	103.392	0.0000
Log POVR: Level		(2.6579)	0.0039	37.4927	0.5837
	1st Diff			44.6352	0.2832
	2nd Diff			102.475	0.0000

Source: Author's E Views' Computation

Panel unit root test examines stationarity where the presence of cross sections generates multiple series out of a single series. This is examined using the ADF-Fischer Chi-square test under the assumption of individual unit root process and Levin, Lin & Chu test under the assumption of common root process. Results from table 1 show a rejection of null hypothesis that there is unit root in only logFDI series at level in the two processes. LogGDPR only became stationary at first difference in both processes while logPOVR could only attain stationarity at second difference. Since at least one of the series is integrated of the order one, 1(1), we perform panel co-integration test to examine presence of significant co-integrating relations among the variables. We proceeded to check for significant long run co-integration relationship among the variables at 0.05 level of significance. Using Pedroni Residual tests (Pedroni, 2004) to evaluate null hypothesis of no cointegration against alternative hypotheses specifications in homogenous (within) and heterogenous or individual (between) dimensions, 11 statistics and their p values were computed.

Table 2: Pedroni Residual Co-integration Test

Alternative hypothesis: common AR coefs. (within-dimension)

			Weighted	
	Statistic	Prob.	Statistic	Prob.
Panel v-Statistic	-3.313446	0.9995	-3.041765	NA
Panel rho-Statistic	-1.124717	0.1304	-1.221588	0.1109
Panel PP-Statistic	-2.249282	0.0122	-2.691696	0.0036
Panel ADF-Statistic	-2.083681	0.0186	-2.710792	0.0034

Alternative hypothesis: individual AR coefs. (between-dimension)

	Statistic	Prob.
Group rho-Statistic	2.291163	0.9890
Group PP-Statistic	-0.27089	0.3932
Group ADF-Statistic	0.520089	0.6985

Source: Author's E Views' Computation

The results are mixed at automatic lag length selection based on SIC with lags from 0 to 2 as shown in table 2. The tests largely (7 out of the 11) fail to reject null hypothesis of 'no co-integration' of the variables, suggesting that there is no convergence of variables in the long run and can be seen in the Appendix.

4.3 Regression Results

Evidence from our empirical results show the dynamic nature of relationships existing between growth rate, poverty rate and foreign direct investment. This is remarkably evident in the changing signs and sizes of coefficients of the lag variables in the estimated model.

4.3.1 Dynamics of FDI and Economic Growth relations

As could be seen in section 2 above, substantial part of literature suggests that FDI has significant positive influence on economic growth. Evidence from table 3 partially supports this view. Current growth in GDP was found to be positively influenced by two-period-lag of FDI by a factor of 0.086. This however was not the case with one-period-lag of the variable which motivates a decline in economic growth rate by a statistically significant coefficient of 0.079. On the reverse side, one-period-lag of GDPR was found to be negatively related to FDI (by a factor of 0.114 whereas two-period-lag had positive relation with a coefficient of 0.229. These are however statistically insignificant at 5% level of significance.

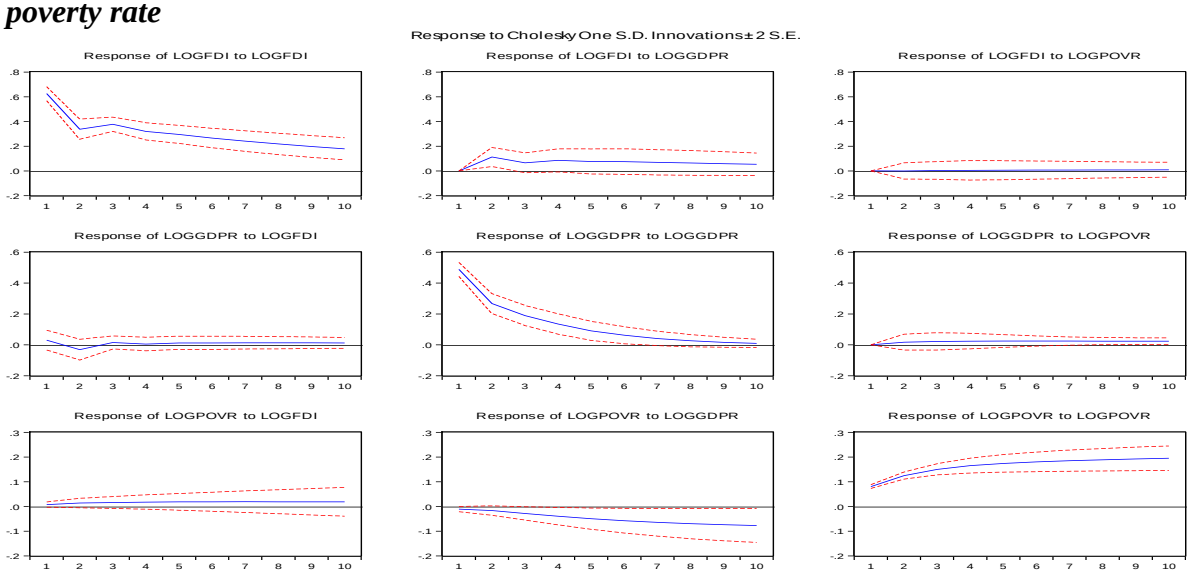
Table 3: Vector Autoregression Estimates

	LOGFDI	LOGGDPR	LOGPOVR
LOGFDI(-1)	0.529337	-0.079103	0.003606
	(0.05944)	(0.04658)	(0.00774)
	[8.90534]	[-1.69819]	[0.46597]
LOGFDI(-2)	0.334792	0.086312	-0.003578
	(0.05657)	(0.04433)	(0.00736)
	[5.91786]	[1.94686]	[-0.48590]
LOGGDPR(-1)	0.229396	0.550899	-0.000378
	(0.07898)	(0.06189)	(0.01028)
	[2.90465]	[8.90134]	[-0.03676]
LOGGDPR(-2)	-0.114299	0.108163	-0.017182
	(0.07271)	(0.05698)	(0.00947)
	[-1.57195]	[1.89823]	[-1.81520]
LOGPOVR(-1)	-0.006413	0.211514	1.553196
	(0.41177)	(0.32268)	(0.05360)
	[-0.01557]	[0.65549]	[28.9753]
LOGPOVR(-2)	0.001844	-0.172316	-0.544065
	(0.42509)	(0.33312)	(0.05534)
	[0.00434]	[-0.51728]	[-9.83170]
C	2.759095	0.244120	-0.017520
	(0.67823)	(0.53150)	(0.08829)
	[4.06807]	[0.45930]	[-0.19844]
R-squared	0.770075	0.434022	0.997660
Adj. R-squared	0.764050	0.419193	0.997599
F-statistic	127.8293	29.26826	16275.44

Source: Author's Computation

In order to further dissect and appropriately explain these intricate relationships, we take recourse to the impulse response function and forecast error variance decomposition of the VAR estimates contained in figure 2 and table 4 respectively.

Figure 2: Response to one standard deviation innovation among FDI, Economic growth & poverty rate



Source: Author's EViews Output

Following analysis of graph on response of LogGDPR to LogFDI (in Figure 2), we found approximately positive and negative 3% (almost neutralizing) response of economic growth rate to one standard deviation innovation in foreign direct investment in the first two periods of our coverage. Thereafter, response rate gravitates around zero up to the tenth period. On the other hand, fdi did not respond at all to one standard deviation shock to growth in the first period but registered as much as 11% in the second period and about 5% in the 10th period. A decomposition of sources of variation in economic growth, as seen in table 4a, revealed that at least 98% of variation is attributable to its own innovation while shock to fdi accounted for less than 1% in each of the initial ten periods. The results can be interpreted to mean that fdi did not have substantial influence on the direction of economic growth during the period. Our granger causality test (table 5) tends to provide support to this interpretation. The test suggests that fdi did not granger-cause growth in gross domestic product. Surprisingly, the direction of causality is from economic growth to foreign investment, suggesting that perhaps foreign investors are attracted more to higher growth economies, rather than being drivers of growth and development. Are these results consistent with theory and evidence? Obviously, this result is not consistent with neo-classical views and empirical evidence which hold that foreign direct investment work through such channels as skilled manpower, technology, and gross capital formation to increase growth in economic output (Solow, 1956; Becker, 1962; Lucas, 1988; Muhammad et al., 2022; Khan et al., 2022). The result, however, is in line with dependency theory which hold that fdi cannot explain growth (Presbisch, 1950). Amah (2020) found similar result in an earlier study, with a suggestion that fdi did not appear to stimulate economic growth, but instead, showed exploitative tendency in the host countries of Africa.

Table 4a Variance Decomposition of LOGGDPR:

Period	S.E.	LOGFDI	LOGGDPR	LOGPOVR
1	0.489628	0.375274	99.62473	0.000000

2	0.558811	0.602747	99.30491	0.092348
3	0.590607	0.602589	99.17677	0.220636
4	0.606246	0.578817	99.05662	0.364566
5	0.613509	0.607911	98.87654	0.515550
6	0.617227	0.642576	98.69171	0.665709
7	0.619197	0.686769	98.49912	0.814112
8	0.620373	0.731442	98.30815	0.960411
9	0.621184	0.774404	98.12017	1.105429
10	0.621835	0.813799	97.93608	1.250124

Table 4b: Variance Decomposition of LOGFDI:

Period	S.E.	LOGFDI	LOGGDPR	LOGPOVR
1	0.624802	100.0000	0.000000	0.000000
2	0.718965	97.56555	2.434401	5.13E-05
3	0.814483	97.46784	2.530785	0.001371
4	0.879056	96.89042	3.106570	0.003006
5	0.930310	96.55100	3.443219	0.005779
6	0.970260	96.23984	3.750927	0.009238
7	1.002020	95.99611	3.990470	0.013421
8	1.027419	95.79864	4.183118	0.018240
9	1.047852	95.64120	4.335131	0.023667
10	1.064358	95.51576	4.454566	0.029678

Table 4c: Variance Decomposition of LOGPOVR

Period	S.E.	LOGFDI	LOGGDPR	LOGPOVR
1	0.081337	0.816075	1.751289	97.43264
2	0.150459	1.062018	1.773892	97.16409
3	0.214928	1.053192	2.626539	96.32027
4	0.274348	1.058956	3.725210	95.21583
5	0.329182	1.047345	4.864516	94.08814
6	0.380178	1.029491	5.960816	93.00969
7	0.428001	1.006526	6.965112	92.02836
8	0.473216	0.980707	7.861549	91.15774
9	0.516287	0.953376	8.649273	90.39735
10	0.557585	0.925527	9.335919	89.73855

Source: Author's Computation

Table 5: Pairwise Granger Causality Tests

Null Hypothesis:	Obs	F-Statistic	Prob.
LOGGDPR does not Granger Cause LOGFDI	236	4.47054	0.0124
LOGFDI does not Granger Cause LOGGDPR		1.88731	0.1538
LOGPOVR does not Granger Cause LOGFDI	272	0.19025	0.8269

LOGFDI does not Granger Cause LOGPOVR		0.22095	0.8019
LOGPOVR does not Granger Cause LOGGDPR	250	3.51710	0.0312
LOGGDPR does not Granger Cause LOGPOVR		2.26595	0.1059

Source: Author's Computation

4.3.2 Dynamics of Relations between FDI and Poverty

There is a suggestion from our empirical review in section 2 that very little is known in literature concerning relations between foreign direct investment and prevalence of poverty across nations. However, as inferred from Solow-Swan Model and Human Capital theory, productivity gain arising from the former increases general income level leading to reduction in poverty. From our VAR estimates in Table 3, coefficients of FDI in the poverty headcount rate regression were positive at 0.0036 in first lag and negative at 0.0036 in second lag. Though statistically significant at 5% level of significance, the result not only showed figures that are negligible but also suggests that influence of FDI on poverty rate over the two preceding time periods may be neutral. This is not significantly different from findings from impulse response (Figure 2) and variance decomposition analysis (Table 4). While the response function stayed close to zero line in the horizontal axis, the extent of variation in the poverty headcount rate attributable to FDI did not exceed 1.06% over the first 10 years. Moreover, there was no evidence of granger-causality between the two variables (Table 5). On the flip side, we found that one period lag of poverty variable returned a negative coefficient of 0.006 in FDI regression, an indication that as countries became poorer, their ability to attract foreign direct investment diminished. All other estimated results contained in Table 4b and Figure 2 also suggests that poverty ratio had negligible and insignificant influence on foreign direct investment. Again, this is in line with dependency postulations and empirical findings which challenged the mainstream views in literature (Presbisch, 1950; Arogundade et al., 2022). Arogundade et al. tried to explain such contrarian evidence with absence of institutional quality in the Sub-Sahara African Countries examined. Our result in this research is however not statistically significant at 5% level of significance.

4.3.3 Dynamics of Economic Growth and Poverty Nexus

The issue of whether growth translates to reduction in poverty, and vice versa, is obviously not a trivial one in development economics. In fact, even the stylized positive link in literature regarding the fdi-poverty nexus has been found to be mediated through economic growth (Arogundade et al, 2022; Haruna et al, 2022). As contained in Table 3, we found statistically significant negative coefficients (-0.0004 and -0.0172 respectively) of first and second lags of gross domestic product growth rate in poverty headcount rate regression. This suggests that an increase in growth rate is associated with reduction in poverty rate in line with expectations. But the evidence appears weak. As observed, however, the small size of coefficients raises some questions regarding economic importance of this result. Moreover, result of causality test as shown in Table 5 reveals that growth rate does not granger cause poverty rate while direction of causality is in the opposite direction. Analyzing the relationship between growth and poverty in Nigeria, Olasode et al. (2022) found similar result. They found that economic growth has not translated to reduction in poverty rate and explained this with prevalent high level of inequality, corruption, jobless growth, and mono-product economy. Infact Bakare and Ilemobayo (2013) had earlier found that poverty incidence even deteriorated with increase in growth rate of the economy. Accordingly, we proceed to further investigate dynamics of relationship between the variables using impulse response and error variance decomposition of the coefficients.

Our impulse response analysis confirms the above results of inverse relationship between economic growth and poverty incidence. What is perhaps more striking is the increasing magnitude of effects of one standard deviation shock arising from economic growth on the poverty function. From -0.01076 for period 1, as observed in Figure 2, the variable recorded response magnitude of -0.07727 for period 10. Moreover, a decomposition of source of variation in poverty rate shows that from just 1.75% in period one, degree of change attributable to economic growth progressively increased to 9.34% in period ten (Table 4c). This further gives support to the general view that perhaps what is relevant for desirable developmental impact is not just growth but 'sustained growth'. This can be interpreted as being consistent with predominant findings in literature on regularity of the variables in the long-run. Kunofiwa (2023) found growth as a factor through which wellbeing of the people or poverty incidence may be impacted in the long run in the BRICS countries, just as Arogundade et al. (2022) agreed.

5.0 CONCLUSION AND POLICY RECOMMENDATIONS

5.1 Conclusion

Contrary to a prior expectation, FDI did not appear to exert significant positive influence on economic growth of African economies; showing perhaps that the Region has not been able to benefit substantially from this external route to growth. It also suggests that size of FDI (strictly speaking) may not be all that matters in the growth model. Interestingly, this result was sustained even when effect of FDI shock was measured over an extended period into the future. On the other hand, growth seemed to influence the direction of FDI flows with peak response in the second year, showing perhaps phenomena of 'demand-following' rather than 'supply-leading' foreign investment.

Following evidence of negligible coefficients in regression, we equally conclude that relationship between foreign direct investment and poverty incidence among African countries is at best neutral. Hence, the claim that introduction of foreign capital, manpower and technology will translate to positive impact on key growth and development indicators have not been validated by African data.

On the other hand, and in line with expectation, inverse relationship between economic growth and poverty incidence is sustained by empirical evidence; suggesting that general increase in productive activities work through its several transmission channels to reduce the number of poor people in an economy. However, it is even more important to know that while growth is necessary to achieve reduction in poverty, it is growth sustained over a relatively long period of time that is required to record remarkable effect. Accordingly, high level of economic growth that is not sustainable cannot be relied upon to reduce poverty.

5.2 **Policy Recommendations**

Following the findings, we recommend as follows:

1) A re-examination of the nature and quality of FDI flowing into African economies, in terms of effectiveness and efficiency, need to be undertaken on country-basis. This will include comprehensive preview of nature of technology, manpower, and terms and conditions of capital which often accompany such investments. This will ensure, not only that those investments are not exploitative, but mutually beneficial to both home and host countries in terms of economic outcomes.
2) Fiscal Authorities in Africa should formulate deliberate policies to encourage flow of foreign investments to critical infrastructure and high growth 'preferred sectors' requiring enormous investment outlay, sophisticated technology and highly skilled manpower.

Examples include tertiary end of agro-processing value chain, manufacturing, information technology and telecommunication sectors. Such fiscal policies may come in the form of performance-linked tax incentives, duty waivers, market and sovereign-risk guarantee. These incentives should be linked to desired growth and development outcomes.

3) Such performance criteria should be defined around Economic, Environmental, Social and Governance outcomes consistent with sustainable and mutually beneficial operations of Multinational firms. Reduction of pollution/emissions, recycling of wastes, undertaking of corporate social responsibility initiatives, among others, are known to be consistent with increase in social wealth and poverty reduction. These should be incorporated in FDI design for African economies.
4) Fiscal authorities across Africa should endeavour to pursue and sustain growth-oriented policies in a consistent manner over long period of time. The use of quick-fix measures towards solving structural challenges should be avoided. This is because most supply-side measures and reforms needed to remove impediments to productivity and growth of the economy always take a long-term view. This is one sure way growth numbers can have meaningful effect in reducing the number of poor people in the continent. It is to be noted that frequent somersault in formulation and implementation of trade, monetary and fiscal policies often result in pattern of economic growth that hurts poverty reduction initiatives.
5) One key way of ensuring sustainable growth is by focusing on quality of institutions. Presently, policies in most African countries are ad-hoc in nature due to existence of weak institutional framework for formulation and implementation of policies. Hence, African countries should build the right institutions and seriously resource them with appropriate laws, manpower, technology, and exercise of independence of executory powers.
6) Re-distributional and inclusion policies in the form of Conditional Cash Transfers and Grants aimed at improving poverty reduction outcomes should shift from current leaning towards consumption in most African countries towards production. These have the effect of reducing poverty without necessarily compromising growth. It is also generally agreed that expanding access to education, healthcare, security, rule of law and capital can simultaneously boost economic growth and reduce poverty.

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APPENDIX A: DESCRIPTIVE STATISTICS OF FDI, ECONOMIC GROWTH & DEVELOPMENT DATA OF SELECTED AFRICAN COUNTRIES FOR THE PERIOD 2005 - 2018

Country	Ave GDPR (%)	Min GDPR (%)	Max GDPR (%)	Ave POVR (%)	Min POVR (%)	Max POVR (%)	Ave FDI ($mil)	Min FDI ($'m)	Max FDI ($'m)	SDev GDPR (%)	SDev POVR (%)	SDev FDI ($'m)
ALG	2.94	1.30	5.90	0.77	0.33	2.10	1,674.51	(537.79)	2,746.93	1.19	0.56	791.95
BOT	4.59	(7.65)	11.34	17.54	14.39	25.22	306.84	67.14	520.92	4.52	2.96	153.03
CAM	4.10	2.02	5.88	26.24	21.30	30.22	512.91	20.91	814.00	1.13	3.25	261.12
CDR	6.04	2.40	9.47	80.80	70.73	93.80	1,327.54	(243.20)	2,891.61	1.91	8.24	856.53
COT	4.91	(4.39)	10.71	28.93	21.50	36.33	485.62	301.58	972.61	4.13	3.80	199.62
EGY	4.48	1.76	7.16	2.66	1.33	4.31	6,424.71	(482.70)	11,578.10	1.71	1.13	2,971.06
ETH	10.22	6.81	12.55	32.10	22.31	37.03	1,421.70	108.54	4,142.94	1.43	4.20	1,451.01
GAB	2.81	(3.31)	7.09	6.16	3.40	9.02	722.61	41.71	1,498.04	3.28	2.05	412.24
GAM	2.49	(8.13)	6.67	23.39	8.91	42.42	40.39	(1.69)	82.21	4.11	11.21	26.93
GHA	6.58	2.18	14.05	16.91	11.89	25.81	2,559.51	144.97	3,485.33	3.00	4.84	1,035.27
KEN	5.42	0.23	8.41	39.28	32.64	43.88	662.27	21.21	1,625.92	1.82	3.31	535.61
MAU	3.94	1.78	5.73	0.40	0.14	0.58	338.19	41.78	589.02	0.93	0.12	139.99
MOR	4.05	1.06	7.57	1.71	0.70	4.23	2,614.03	1,240.63	3,626.01	1.51	1.00	674.99
MOZ	6.49	3.43	9.70	66.57	61.11	76.25	2,614.94	122.41	6,697.42	1.67	4.77	2,065.07
NIG	4.87	(1.62)	8.04	51.22	47.01	53.90	5,559.32	1,997.49	8,841.11	2.78	2.42	1,988.76
RWA	7.82	4.72	11.16	60.81	51.48	70.11	186.04	7.96	314.74	1.81	5.71	100.90

SA	2.47	(1.54)	5.60	19.06	16.53	26.12	4,927.87	623.29	9,885.00	1.96	2.54	2,633.08
SUD	4.34	(2.32)	11.52	15.32	11.77	25.07	1,594.95	1,063.77	2,311.46	3.87	4.02	354.72
SWA	3.07	0.82	6.00	35.52	27.30	45.25	48.88	(57.81)	135.66	1.76	7.00	55.06
TAN	6.36	4.50	7.67	53.76	48.85	67.71	1,211.81	403.04	2,087.26	0.84	6.10	466.51
TUN	2.92	(1.92)	6.71	1.63	0.22	3.59	1,313.69	432.67	3,239.91	1.96	1.17	744.02
UGA	6.33	3.59	10.78	43.44	36.57	57.85	834.87	379.81	1,337.13	2.15	6.37	254.49
ZAM	6.26	2.92	10.30	59.79	56.39	64.42	1,116.20	356.94	2,099.80	2.29	2.62	530.58
ZIM	3.56	(17.67)	19.68	28.77	19.33	39.97	268.92	40.00	744.64	9.55	5.48	194.46

Source: Author's Computation