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# China-Africa Investments and Economic Growth in Africa

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## Abstract

China-Africa's economic cooperation has existed for decades. In this chapter, we observed the significance of China's FDI on economic growth, using two decades of FDI data. In the last decades, the economic growth of Africa has been impressive despite recurrent structural and technical issues. China's FDI stock relative to other economies has been growing, rapidly. How does it affect the performance of key macroeconomic indicators, particularly unemployment and export? Using the Pesaran Autoregressive Distributive lag (ARDL) model, there was a negative growth link between China's FDI to Africa and growth. However, the impacts of US FDI to Africa, China Export, and Imports from Africa were insignificant. The long-run effect of World FDI inflow to Africa reported a positive effect on growth. There was no evidence of Okun's law as unemployment increases with growth. For the Granger causality test, all macroeconomic indicators reported a uni-directional link with economic growth, except human capital and unemployment. It is recommended to shift FDI resources toward promoting labor-intensive programs because it has high employability compared to capital intensive programs. Pursuing the Pull Growth Model (PGM) technique will pull enough funds to support the growth of infrastructures and technical capacity development in the region.

**Keywords:** China, Africa, foreign direct investment (FDI), economic growth, macro-economic policy

## 1. Introduction

As the global economy expands, market activities grow and become more complex leading to product heterogeneity. Product heterogeneity increases the pace of competition which then leads to scarcity of resources. Partnerships become an official platform where economies cooperate mutually to boost trade and facilitate the flow of economic resources under less stringent rules. Non-partners are exempted from the rules and are made to go through all the complexities in trade and resource transfer.

Therefore, cooperations are developed to favor partners within a group. Strong economies help the weaker ones with favorable economic packages to sustain the partnership. China is a key player in partnership agreements. It has several economic engagements with both developed and less developed economies. It connects with Africa through what is known as the Forum on China-Africa Cooperation (FOCAC). FOCAC was established in 2000. Since its developments, several economic packages and investment programs have been developed to boost trade and infrastructural development in the region.

FOCAC was not the first economic cooperation China has had with Africa. The long-standing friendship between China and Africa can be traced 600 years ago via the legendary expeditions of Chinese navigator Zheng He, whose fleet reached the East African shores four times. In the 1960s, China developed the TAZARA Railway line between Tanzania and Zambia, which served as a monument of what the two regions can achieve together. The cooperation did not progress further until the mid-1900s [1]. FOCAC is the most successful cooperation China has ever had with Africa.

The FOCAC has supported many growth initiatives in Africa, the latest project being “China One Belt Road or Maritime silk road initiatives,” connecting Africa with railway and shipping link to major markets in the Middle East and Central Asia. Despite other interests, it is believed that China is much focused on developing infrastructural systems in Africa through the provision of loans and financial investment, hence a preferred partner for most African economies. Currently, China’s investments are found in at least 46 countries in the region under different investment portfolios [2]. At least 2200 Chinese enterprises, both private and state-owned, are operating in Africa [3]. China’s social program launched in 2013 has developed hundreds of educational projects, medical institutions, anti-malarial centers, and agricultural technologies [4]. China’s banks, notably the People’s Bank of China, the China Development Bank, and the Export-Import Bank of China (Exim Bank of China), have financed large-scale investment projects in Africa.

In addition to financing projects in Africa, China is also interested in sustaining its industrial program in the mainland. It has a strong manufacturing sector and a wider market share (both domestic and international), which requires constant resource and commodity supplies to sustain activities and supply its partners. With such a wider market share, China is scared of losing its activities because of the resource or commodity gap. It cannot have a sustainable operation without partnering with other resource-rich economies, hence cooperating with Africa. On the one hand, China’s domestic resource and commodity capacities are currently under pressure because of higher demands. Africa, on the other hand, has vast resource and commodity potentials yet in a less industrialized zone. It has an emerging industrial sector facing infrastructural, technical, and funding challenges. The economy of China, however, is stronger in that sector, hence a good reason for a mutual partnership. China’s technical competencies and industrial experiences can help Africa to build an effective industrial economy, while African resources and commodity potential can help sustain China’s manufacturing sectors.

At this moment, China is well positioned to grow favorably. It has a large domestic and international market (due to growing population), efficient human capital, and a low-wage economy, which gives it a competitive edge over other industrialized economies. As a result of this, China attracts more industries and companies into its space. This reallocation has further raised the inflow of FDI into the economy and widened its position as a global leader in manufacturing activities, overtaking the US. It is now in high demand for resource and commodity supplies to feed anthropogenic activities. Through economic cooperation, China is partnering with resource-rich economies to boost supplies and to close the resource gap in the domestic economy [5].

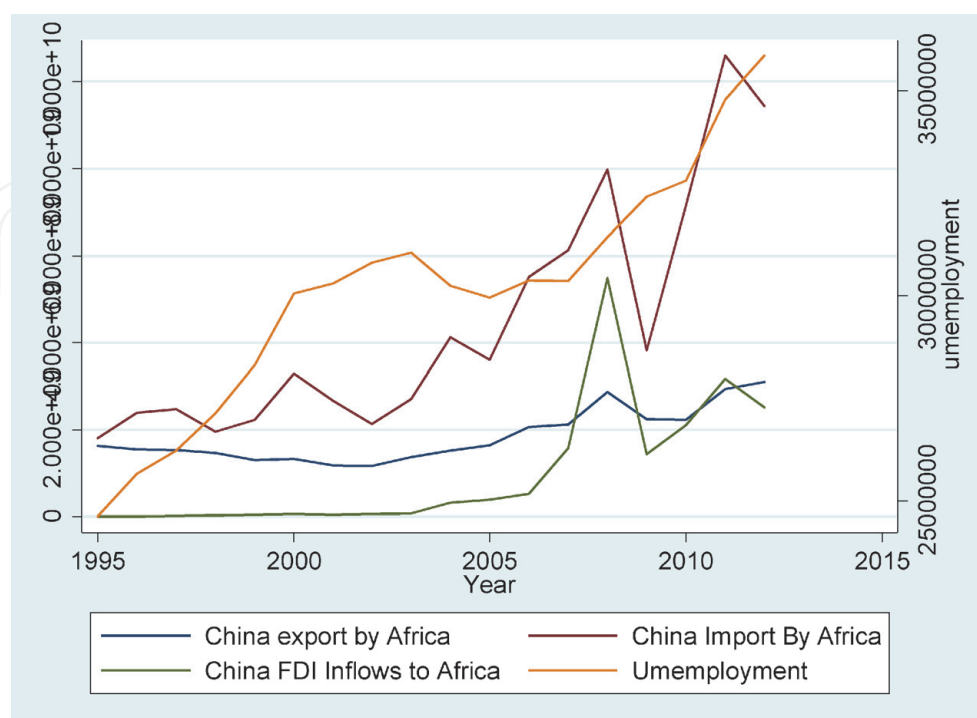
China imports a significant part of its economic resources and commodity from Africa. It also has private companies operating in the agricultural and mining sectors. The resources and commodities produced are transferred to China to feed industries. Private businesses in Africa import processed and technical goods from China to feed and support domestic activities. Financial investment via loans supports infrastructural projects in Africa, hence reducing the financial burdens on the budget. China is Africa’s major trading partner; it buys one-quarter of Africa’s trade.

China's energy demand has doubled in the last decades [6]. It buys at least one-third of African oil supplies, particularly from Egypt, Libya, and Tunisia, and Nigeria.

It also imports non-oil products from various parts of Africa (coal is imported from South Africa, ore from Gabon, timber from Equatorial Guinea, and copper from Zambia). Some local exporters export primary resources to China and in return import consumables such as textiles, pharmaceuticals, technological systems, and telecommunication to boost the small- and medium-scale sectors [7]. FOCAC is the key facilitator in all these activities. In 2012, Africa's total export (\$3.1 billion) to China was one-third of China's total export to Africa (\$9.4 billion). In 2011, it was four times the size of China's total export to Africa [8].

China imports more from Africa than what Africa imports from China. According to **Figure 1**, from 1995 to 2012, China's import by Africans was three times the size of China's export by Africans on average. In the same period, China's FDI inflow to Africa grew by 800-fold. It was significantly high in 2008, where it grew by 2000-fold but dropped significantly in 500-fold in 2009. This was induced by the cascading effect of the global financial bubble. It later picked up massively in 2011 to 1200-fold. On aggregate, China has invested about \$40 billion of FDI stocks in major African economies. About \$13.8 billion of the stock is capital injection, which went into infrastructural development. The inflows of African FDI to China from 1995 to 2000 grew about two-folds [9].

Foreign direct investment (FDI) is a key indicator of economic development. It stimulates the performance of the factor of production to boost economic growth [10]. It is a reliable source of technical resources and financial capital [11]. As a result of these, policies and programs are formulated to facilitate its movement across sectors [12]. FDI also promotes efficient output performance of the human capital [13]. It is considered the cheapest source of technical and financial capital to support growth [14]. In a broader spectrum, FDI's negotiations deepen group commitment, as investors prefer working with a group rather than a single economy [14].



**Figure 1.** Shows the pattern of China's export by Africans, China's import by Africans, China's FDI inflows to Africa, and unemployment. Sources: China Statistical Year Book 2012, and World Development Indicator (WDI).

Developing economies receive FDIs from various regions but they gain less from it because of institutional and infrastructural challenges. An economy with an established institutions and proper infrastructural systems is able to coordinate effectively with the flow of FDI [15–17]. In such economies, FDIs are properly allocated without compromising activities of local investors. FDIs are directed into areas of the economy where local investors have limited capacities to operate, thus widening the economic scope [18, 19]. Investors' confidence is high in such economies because of low operational cost and high investment returns.

A dysfunctional institution creates unhealthy competition between foreign and local investors [20]. Unhealthy competition freezes the activities of local investors causing them to exit the market (because of capital and skills disadvantage), creating a foreign-dominated market. An effective institution properly coordinates FDI inflows across all sectors. According to the World Investment Report (WIR) (2012), about 60% of FDI inflows in Africa go to capital intensive activities such as mining and oil and gas activities [21]. Capital intensive requires high capitalization which the local investors have no capacity to operate.

A review of growth literature highlights some studies on FDI. They examined the key determinants of FDI at the national level. Similar to what we highlighted in the foregone paragraph, institutions and infrastructure are the main prerequisite for affective FDI programs. For instance, Adewuni [1] examined Nigeria-China economic cooperation. The findings revealed a less than expected growth between FDI and economic growth, citing institutions and infrastructural and human capital as the main challenges. Kamara [21] in broader studies examined several Sub-Sahara African (SSA) economies. Busse and Groizard [15] also examined a national economy. Despite finding a positive growth relationship between FDI and economic growth, the finding also cited low human capital and weak infrastructural systems as the main drawbacks. However, AbuAl-Foul [22] found mixed outcomes in a di-country study between Morocco and Tunisia. The economy of Morocco experienced a resilient growth link between FDI and growth while the economy of Tunisia experienced otherwise. All the studies gave insights in understanding FDI-growth relation, particularly at the national level [22]. However, there remains a gap at the regional level that needs to be filled.

This chapter is examining Africa regional economy, looking at the impact of key macroeconomic indicators particularly China's FDI on regional economic growth using at least two decades of data. The remaining macroeconomic indicators include export, import, unemployment, and trade openness. Furthermore, the chapter is examining the impact of World and US FDI inflow on African economic growth using Granger causality test and autoregressive distributed lag (ARDL) model. The ARDL model will help test the short- and long-run effects of FDI on economic growth. Granger causality technique will help examine the causal relationship between economic growth and all the macroeconomic indicators. Finally, the chapter will look at whether Okun's law exists between unemployment and economic growth.

The outcome of this chapter has a two-fold effect; (1) inform policy regulators about the actual empirical behavior of China's FDI on economic growth in Sub-Sahara Africa, (2) Policy regulators will be able to make effective allocation of FDI resources to areas of greater impact in the economy. The recommendation session will offer some practical guidelines or policies that will boost the benefits of FDIs in creating jobs and reducing inequalities.

The rest of the chapter is organized as follows. Section two explains the methods (i.e. Autoregressive Distributed Lag (ARDL) and Granger Causality) Section three

explains materials and methods for the analysis. Section four explains results and analysis. Section five offers conclusion and policy recommendations.

## 2. Model

### 2.1 Bound testing technique

The vector auto-regression (VAR) of order  $p$ , denoted VAR ( $p$ ), is expressed as the following [23]:

$$Y_t = a + \sum_{i=1}^p \phi_i Y_{t-i} + \sum_{i=1}^p \theta_i X_t + \varepsilon_t \quad (1)$$

where  $y_t$  is the dependent variable presented by economic growth (RGDP),  $x_t$  is a vector matrix representing explanatory variables, i.e., trade openness (OPENN), China's FDI inflow to Africa (CFDIITA), US FDI inflow to Africa (USFDIITA), China's export by Africa (CEBA), China's import by Africa (CIBA),  $t$  is trend variable, and others. According to bound model,  $y_t$  must be an  $I(1)$  variable, but the independent variable  $x_t$  must be stationary at either  $I(0)$  or  $I(1)$ .

The vector error correction model (VECM) is expressed as follows:

$$\Delta Y_t = a_t + \delta_t + \lambda Y_{t-1} + \sum_{i=1}^p \phi_i \Delta Y_{t-i} + \sum_{i=1}^{p-1} \theta_i \Delta X_{t-1} + \varepsilon_t \quad (2)$$

where  $\Delta$  is the first-difference order and  $\lambda$  represents the long-run multiplier matrix as follows:

$$\lambda = \begin{vmatrix} \lambda_{yy} & \lambda_{yx} \\ \lambda_{xy} & \lambda_{xx} \end{vmatrix} \quad (3)$$

The diagonal elements of Eq. (4) are unrestricted, so the selected series can be either  $I(0)$  or  $I(1)$ . If, then  $Y$  is  $I(1)$ . In contrast, if, then  $Y$  is  $I(0)$ .

Eq. 2 is expanded to include all the regressors for the study, as shown below for later bound testing after estimation.

$$\begin{aligned} \Delta \ln \text{RGDP}_t &= a_t + \sum_{i=1}^p \phi_i \Delta \ln \text{RGDP}_{t-i} + \sum_{i=0}^p \theta_i \Delta \ln \text{OPENN}_{t-i} + \sum_{i=0}^p \gamma_i \Delta \ln \text{SSE}_{t-i} \\ &+ \sum_{i=0}^p \varphi_i \Delta \ln \text{CEBA}_{t-i} + \sum_{i=0}^p \rho_i \Delta \ln \text{CIBA}_{t-i} + \sum_{i=0}^p \delta_i \Delta \ln \text{AFDIOTTW}_{t-i} \\ &+ \sum_{i=0}^p \vartheta_i \Delta \ln \text{CFDIITA}_{t-i} + \sum_{i=0}^p \#_i \Delta \ln \text{FDIITA}_{t-i} \\ &+ \sum_{i=0}^p \epsilon_i \Delta \ln \text{USFDIITA}_{t-i} + \pi_1 \ln \text{RGDP}_t + \pi_2 \ln \text{OPENN}_t \\ &+ \pi_3 \ln \text{SSE}_t + \pi_4 \ln \text{CEBA}_t + \pi_5 \ln \text{CIBA}_t + \pi_6 \ln \text{AFDIOTTW}_t \\ &+ \pi_7 \ln \text{CFDIITA}_t + \pi_8 \ln \text{FDIITA}_t + \pi_9 \ln \text{USFDIITA}_t + \varepsilon_t \end{aligned} \quad (4)$$

where  $\varnothing_i, \theta_i, \gamma, \vartheta_i, \vartheta_i, \bar{A}_i, \in_i, \rho_i, \delta_i,$  and  $\varphi_i$  are short-run coefficients for the model and  $\pi_1, \pi_2, \pi_3, \pi_4, \pi_5, \pi_6, \pi_7, \pi_8, \pi_9, \pi_{10}$  are long-run coefficients.

Eq. (4) also can be viewed as an ARDL of order (p, q, r). Eq. (4) indicates that economic growth tends to be influenced and explained by its past values. The structural lags are established by using minimum Akaike's information criteria (AIC). After regression of Eq. (4), the Wald test (F-statistic) is used to test the long-run coefficient to check whether it is significant or not. According to Pesaran et al. [23], the null and alternative hypotheses can be read as follows:

$$H_0 = \pi_1 = \pi_2 = \pi_3 = \pi_4 \dots \dots \dots \dots \dots \dots \pi_{10} = 0 \text{ (NO LR Association)} \quad (5)$$

$$H_0 \neq \pi_1 \neq \pi_2 \neq \pi_3 \neq \pi_4 \dots \dots \dots \dots \dots \dots \pi_{10} \neq 0 \text{ (LR Association)} \quad (6)$$

The computed F-statistic value will be evaluated with the critical values tabulated in Table CI (iii) of Pesaran et al. [23] paper. As explained in Table CI (iii), the lower bound critical values assume the explanatory variables are integrated of order 0, or I(0), while the upper bound critical values assume the explanatory variables are integrated of order one, or I(1). Therefore, if the computed F-statistic is smaller than the lower bound value, then the null hypothesis is not rejected, which implies that there is no long-run relationship between economic growth and its determinants. However, if the computed F-statistic is greater than the upper bound value, then there is a long-run relationship between economic growth and its determinants. But, if the computed F-statistic falls between the lower and upper bound values, then the results are inconclusive.

## 2.2 Granger causality

Granger causality analysis is an analytical tool for examining whether a one-time series can correctly predict the other [21]. It is built on the premise that the future cannot predict the past because time does not travel backward. Theoretically, lag term of the independent variable is introduced into the model to statistically improve its prediction on the dependent variable as shown below:

$$\begin{aligned}
 Y_t &= \sum_{n=1}^p \varnothing_n Y_{t-p} + \sum_{n=1}^p \delta_n X_{t-p} + \varepsilon_t \\
 X_t &= \sum_{n=1}^p \gamma_n X_{t-p} + \sum_{n=1}^p \varphi_n X_{t-i} + \epsilon_t
 \end{aligned}
 \tag{7}$$

where  $Y_t$  and  $X_t$  represent the two time series at t.  $X_{(t-p)}$  and  $Y_{(t-p)}$  represent the time series at time t-p, and p represents the number of lagged time points (order).  $\varnothing_n$  and  $\gamma_n$  are signed path coefficients.  $\delta_n$  and  $\varphi_n$  are autoregression coefficients, while  $\varepsilon_t$  and  $\epsilon_t$  are residuals.

Peculiar to this study, mathematically, we introduce the lag of each series such as China's FDI inflows to Africa (CFDIITA), China's export to Africa (CEBA), China's import to Africa (CIBA), US FDI inflows to Africa (USFDIITA), openness (OPEN), and secondary enrolment (SSE) into equations for better prediction. Our model is thus expressed as follows:

$$\ln \text{RGDP}_t = a + \sum_{i=1}^p \varnothing_i \ln \text{RGDP}_{t-i} + \sum_{i=0}^p \theta_i \ln \text{OPENN}_{t-i} + \varepsilon_t$$

$$\ln \text{OPENN}_t = a + \sum_{i=1}^p \varnothing_i \ln \text{RGDP}_{t-i} + \sum_{i=0}^p \theta_i \ln \text{OPENN}_{t-i} + \varepsilon_t$$

$$\ln \text{SSE}_t = a + \sum_{i=1}^p \varnothing_i \ln \text{RGDP}_{t-i} + \sum_{i=0}^p \gamma_i \ln \text{SSE}_{t-i} + \varepsilon_t$$

$$\ln \text{CEBA}_t = a + \sum_{i=1}^p \varnothing_i \ln \text{RGDP}_{t-i} + \sum_{i=0}^p \varphi_i \ln \text{CEBA}_{t-i} + \varepsilon_t$$

$$\ln \text{CIBA}_t = a + \sum_{i=1}^p \varnothing_i \ln \text{RGDP}_{t-i} + \sum_{i=0}^p \alpha_i \ln \text{CIBA}_{t-i} + \varepsilon_t \quad (8)$$

$$\ln \text{AFDIOTTW}_t = a + \sum_{i=1}^p \varnothing_i \ln \text{RGDP}_{t-i} + \sum_{i=0}^p \delta_i \ln \text{AFDIOTTW}_{t-i} + \varepsilon_t$$

$$\ln \text{CFDIITA}_t = a + \sum_{i=1}^p \varnothing_i \ln \text{RGDP}_{t-i} + \sum_{i=0}^p \vartheta_i \ln \text{CFDIITA}_{t-i} + \varepsilon_t$$

$$\ln \text{FDIITA}_t = a + \sum_{i=1}^p \varnothing_i \ln \text{RGDP}_{t-i} + \sum_{i=0}^p \#_i \ln \text{FDIITA}_{t-i} + \varepsilon_t$$

$$\ln \text{USFDIITA}_t = a + \sum_{i=1}^p \varnothing_i \ln \text{RGDP}_{t-i} + \sum_{i=0}^p \in_i \ln \text{USFDIITA}_{t-i} + \varepsilon_t$$

### 3. Materials and method

The research considered point annual FDI data but not accumulated stock data. Two models were used for the estimation, GMM and Granger causality method.

#### 3.1 Data and analysis

As a policy-based paper, the purpose of this chapter is to find an empirical justification for what has become a popular dialog in the economic environment, “China sudden interest in Africa.” Has China’s increasing presence in Africa via bilateral trade and investment link during the last two decades impacted significantly on Africa’s macroeconomic indicators such as GDP per capita, unemployment, and human capital development. Considering Okun’s law, there a link between economic growth and unemployment in the region? These questions arise because of the growing domination of China’s investment in Africa vice versa that of the United States. Is the supposedly China’s economic motive plan more effective and receptive to African economies than the US in addition to political motive? The latter will be addressed in detail in the next chapter.

However, this Chapter is looking at the impact of FDI on key macroeconomic indicators in Africa using over decades of time series data from 1990 to 2014. The series include China’s FDI inflow to Africa, China’s Export to Africa, China’s import from Africa, Secondary School Enrollment (SSE) (a measure of human capital), openness index, US FDI Inflows to Africa (USFDITA), World FDI inflows to Africa (WFDIITA) and African Investment Outflows to the World (AIOTTW). Annual



	DAFDIOTW	DCFDIITA	DCEBA	DCIBA	DFDIITA	DGDP	DOPENN	DSSE	UNEM	USFDIITA
Mean	0.202	0.322	0.034	0.216	0.122	0.037	0.010	0.049	17.109	21.887
Median	0.345	0.295	0.009	0.252	0.075	0.037	0.013	0.049	17.225	22.069
Max.	1.352	2.220	0.303	2.228	0.727	0.075	0.082	0.095	17.457	22.995
Min.	-1.423	-1.338	-0.248	-0.737	-0.303	-0.003	-0.108	0.010	15.183	19.918
Std. dev.	0.730	0.810	0.131	0.587	0.251	0.019	0.042	0.018	0.429	0.929
Skew.	-0.264	0.041	0.273	1.552	0.691	-0.227	-0.807	0.223	-3.778	-0.615
Kurt.	2.423	3.699	3.100	7.584	3.176	3.109	3.987	3.465	17.661	2.433
J.B.	0.560	0.434	0.282	28.096	1.939	0.218	3.578	0.416	283.367	1.605
Prob.	0.756	0.805	0.868	0.000	0.379	0.897	0.167	0.812	0.000	0.448
Obs.	22	21	22	22	24	25	25	24	25	21

*Log of variables from 1990 to 2014.*

*Source: author's computation.*

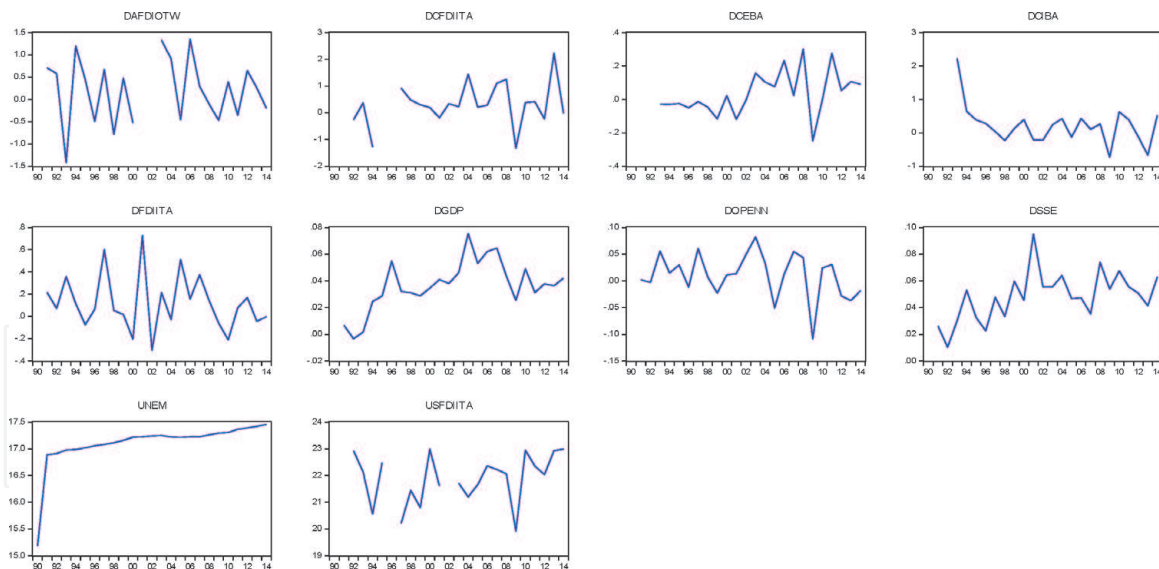
**Table 1.**

*Descriptive statistics for all vectors.*

	DOPEN	DSS	DFDIITA	DCIDA	DCFDIITA	DAFDIOTTW	USFDIITA	UNEM
DOPEN	1							
DSS	0.133681	1						
DFDIITA	0.117451	-0.2984	1					
DCIDA	0.6689	0.4875	-0.1330	1				
DCFDIITA	0.4569	-0.0583	0.0472	0.0762	1			
DAFDIOTTW	0.4183	0.20233	0.113561	0.304829	0.201383	1		
USFDIITA	0.3837	-0.0339	-0.15267	0.465755	0.417959	0.03539	1	
UNEM	-0.2191	0.2461	-0.1824	-0.0444	0.0174	0.0237	0.4628	1

*The correlation matrix for all vector series from 1990 to 2014.  
 Source: author's own computation.*

**Table 2.**  
*Correlation matrix for each series from 1990 to 2014.*



**Figure 2.** Shows the unit root testing results for each of the series using the augmented Dickey-Fuller (ADF) technique. The series were stationary at different levels (either at  $I(0)$  or  $I(1)$ ). The gaps represent missing data.

FDI series (rather than FDI stock<sup>1</sup>) is used in the analysis. Real GDP<sup>2</sup>, served as the dependable variable, a measure of economic growth.<sup>3</sup> Trade openness stimulates economic growth.

**Table 1** shows the log description of the vector series. The average mean of real GDP is 0.037, less than the average mean of all regressors except China's export to Africa (CEBA) and openness (OPEN), which estimated average mean values of 0.034 and 0.010, respectively. The standard variance of all vectors is relatively a higher mean, suggesting high variation within vector indicators. Except for CIBA and UNEM, other vectors are not normally distributed (look at the Jarque-Bera test, they are not significant at 5%). In **Table 2**, there is a lower correlation between variables, suggesting a lower chance of perfect multicollinearity (**Figure 2**).

**Figure 1** shows the log stationary for each series for the Africa economy forms the period 1990 to 2010 employing the augmented Dickey-Fuller unit root test. We found a stationary path for all vector series at first difference  $I(1)$  except for UNEM and USFDIITA. The break within AFDIOTW, USFDIITA, and CFDIITA stationary paths was due to missing data series. CFDIITA, CIBA, USFDIITA, and CEBA also lost some data at the beginning.

#### 4. Results analysis

In this session, the analysis was based on the Pesaran [23] autoregressive distributed lag (ARDL) technique. There are two phases in the model: the long run and the short run [23]. Using real GDP (proxy by economic growth) as a dependent variable, the finding for both phases is presented in **Table 3**.

Given the principle of ARDL model, each series must be either be stationary at first different  $I(1)$  or at the level  $I(0)$ . According to Dickey-Fuller unit root test in **Figure 1**, all the series satisfied the ARDL condition, i.e.,  $I(0)$  or  $I(1)$ . For instance,

<sup>1</sup> It is broader and includes previous reserves and capital invested.

<sup>2</sup> GDP is a domestic-based indicator that measures the monetary value of all the finished goods and services produced within a country's borders in a specific time.

<sup>3</sup> Some use net export.

Variables	Short-run coefficients	Variables	Long-run coefficients
Constant term	-1100 (-6.080)		
D(RGDP(-1))	0.989 (-0.232)	D(RGD)	-0.792 (-0.193)
D(CEBA(-1))	-8.513 (-3.502)	D(CEBA)	49.783 (-13.383)
D(CFDITA(-1))	-4.518 (0.712)*	D(CFDITA)	-8.865 (1.579)*
D(OPEN(-1))	-8.908 (-8.597)	D(OPEN)	-8.975 (-8.500)
D(UNEMP(-1))	59.566 (-12.056)	D(UNEMP)	942.98 (182.909)*
D(USFDIITA(-1))	0.658 (-0.518)	D(USFDIITA)	0.026 (-0.770)
D(SSE(-1))	-1026.498 (-420.350)	D(SSE)	170.536 (363.717)*
D(FDIITA(-1))	1.783 (0.3554)*	D(FDIITA)	-0.0124 (-0.660)
D(CIBA(-1))	0.687 (-2.641)	D(CIBA)	-13.413 (-3.304)
D(AFDIOTTW(-1))	-0.654 (-1.272)	D(AFDIOTTW)	5.798 (-2.563)
R-squared	0.896	R-squared	OBS: 23
F-computed	2.959		F-computed:18.94

Real GDP as dependent variable (Model 1).

Absolute lower  $I(0)$  and upper bound value  $I(1)$  of 2.86 and 5.03. The standard errors are reported in brackets.

Significance levels: \*\*\* if  $p < 1\%$ , \*\* if  $p < 5\%$ . and \* if  $p < 10\%$  [22].

Source: author's computation.

**Table 3.**  
 Dynamic ARDL Model Result.

unemployment (UNEM) and US FDI inflow to Africa (USFDIITA) were stationary at the level  $I(0)$ , while RGDP, China's export to Africa (CEBA), China's FDI to Africa (CFDIITA), openness (OPENN), secondary school enrollment (SSE), China's import from Africa (CIBA), Africa FDI outflow to the World (AFDIOTTW), and FDI inflow to Africa (FDIITA) were stationary at  $I(1)$ . Furthermore, all the models satisfied the conditions for multicollinearity, i.e., there is no serial correlation.

In Pesaran (2001), there are predefined critical values for making a statistical decision for the ARDL short- and long-run parameters [25]. There are different critical values for different significant levels depending on the structure of the model. Essential to this analysis is the critical values highlighted in Pesaran (2001), Table CII (iii) of page 303. It has an unrestricted intercept and no trend condition. At a 5% critical value, using ten (10) parameters point, Pesaran (2001) predefined the critical values in Table CII (iii). According to **Table 3**, critical values of 2.86 and 5.03 are decision results for an absolute lower  $I(0)$  and upper bound value  $I(1)$ .

In **Table 3**, the dynamic model presented a computed F-value of 2.9595 for the short run. Based on the decision rule, it falls on the indecisive region, suggesting that China-Africa economic cooperation over the decades (in the short run) has not shown a significant effect on economic growth, i.e., indeterminate. Therefore, a lot is expected to be done for Africa's economic growth to experience the significance of China's FDI to Africa, China's export and import to Africa, US FDI to Africa, and Africa openness policies in the short run.

However, some selective series reported a decisive outcome. For example, F-computed value (22.47) for China's FDI inflows to Africa (CFDIITA) and FDI to Africa (FDIITA) critical value fell above the upper bound limit (5.03), suggesting a significant effect on regional economic growth. This is consistent with the theory that states that FDI stimulates growth [22]. This analysis has shown the significance of China's FDI on African growth.

In **Table 3**, in the long run, the F-computed value (18.94) fell above the upper limit of Pesaran [23] critical value (5.03), (i.e., it is in the acceptance region). The result suggests that overall change in all the series has a significant effect on economic growth. The estimated F-value (14.677) of unemployment, secondary school enrollment, and China's FDI to Africa is above the upper limit of the critical value, hence has a significant effect on economic growth. On this account, a change in China's FDI to Africa (CFDIITA) in the long-run will generally boost regional economic growth.

An individual analysis of each series or indicator reported different outcomes. In **Table 3**, all the series except China's FDI Inflows to Africa (CFDIITA) and Unemployment (UNEMP) in the long-run experienced an insignificant relationship with regional economic growth (at 5%). The impact of UNEMP on economic growth was positive at 5%. Highlighting the significance of education in economic development. A change in the quality of human capital will further boost regional economic growth.

Concerning China's FDI to Africa (CFDITA) series, in the long-run, a change leads to a fall in economic growth. A similar outcome was estimated in the short-run. These outcomes give policy regulators a fair notion about the behavior of Chinese investments in Africa. If the evidence is considered enough, African economies must question the credibility of the investment. A contrary outcome was assumed before the analysis because of Chinese investment domination vice versa other developed economies. On this caveat, policy regulators in the region must review Chinese economic potentials and effectively attract investments from areas they have a comparative advantage or greater efficiencies that will benefit African economies. When successfully achieved, African economies will gain favorably from Chinese growing investments in the region. In the immediate term, governments across Africa can push most of China's FDI into developing labor-intensive programs or value addition industrial activities.

In model 1, a change in unemployment leads to a decline in economic growth in the long run. On the contrary, economic growth widens the unemployment gap in the region. This shows the lack of consistency between the flow of FDI and how it is applied in reducing unemployment. Mis allocation of investment harms development and widens the gap in inequalities and unemployment. Unemployment is a leakage in development and can affect economic growth negatively if loosely handled. Currently, at least 20% of the regional population remains unemployed. This paints a glooming picture for the region's future development if practical steps are not proposed today to boost job creation.

In **Table 4**, the impact of World FDI inflow in Africa (FDIITA) on economic growth was positive. African FDI outflow to the World (AFDIOTTW) was found to have a positive effect on economic growth. On the contrary, the US FDI Inflows to

<b>Static model 2</b>	
Variables	OLS regression
Constant term	22..900 (350.941)**
D(CEBA)	-14.446 (-8.226)
D(CFDITA)	-0.262 (-0.966)
D(OPEN)	-9.240 (7.734)
D(UNEMP)	-397.358 -815.034
D(USFDIITA)	0.884 -0.948
D(SSE)	175.769 (99.78)**
D(FDIITA)	2.217 (0.523)**
D(CIBA)	2.453 -2.591
D(AFDIOTTW)	3.567 (1.438)*
R-SQUARED:	23

*The standard errors reported in brackets. Significance levels: \*\*\* if  $p < 1\%$ , \*\* if  $p < 5\%$ , and \* if  $p < 10\%$ .  
 Source: author's computation.*

**Table 4.**  
 Static Model-Real GDP as Dependent Variable.

Africa (USFDIITA), China's Export to Africa (CEBA), and China's Import to Africa (CIBA) reported an insignificant effect on economic growth. The effect of openness (OPENN) was also insignificant. The latter does not imply African economies are closed or are not fully integrated into the global economy but rather suggests that less is gained from external participation. The majority of the exporting activities are primary-based. Primary-based activities have lower economic returns compared to capital or processed activities. In the last decade, the net wealth of African global trade inclusiveness was less than 10%. This figure is small compared to the combined volume of China and the United States, about 18% of world trade. Meanwhile, Africa is a significant player in the commodity and resource activities (led by Equatorial Guinea, Nigeria, Liberia, Kenya, Botswana, and Tunisia; mining: Ghana, South Africa, and others).

The US FDI inflow to Africa was found to be insignificant on African economic growth. This is due to the US losing interest in the African economy. The US FDI stock is by far the highest in African compared to China. But lately, it is declining while that of China is rising because of increasing China's interest in Africa. It is argued that the model of operation in Africa by China businesses is very much liked by the national governments because it is mainly economic. The US model, on the

other hand, has a strong element of political interference which is not very much liked by the national governments. But research shows that a stable environment promotes an effective growth [24].

#### 4.1 Granger causality test

Granger causality test is used for forecasting between two series in an analysis. When two series are co-integrated then, there is likelihood of causality in at least one of the directions [25]. For instance, FDI and GDP are co-related, which implies that a change in one can cause the other to change, vice versa. To observe empirically the causality test for all the series in this study, Granger causality technique was employed. The results are presented in **Table 5**. Conclusively, there are situations of a unidirectional effect for some of the series.

**Table 5** summarizes the results for each series. According to **Table 5**, there is a uni-directional causality link between China's Export by Africa (CEBA), openness (OPEN), Africa's FDI Outflow Around the World (AFDIOTW), China's Import from Africa (CIBA), and China's FDI inflow to Africa (CFDIITA) on economic growth (GDP). This suggests that a change in any of the determinants or indicators will influence regional economic growth (but the reserve is not certain). As a result of this, proper allocation of FDI inflow from various sources including those from China and the US will directly boost regional economic growth. This certainly shows that Chinese investment in Africa is adding more to development. The ARDL findings in **Table 3** confirm this situation.

Variable		F-stats	Prob.
OPEN does not Granger cause RGDP	24	8.19958	0.0093
RGDP does not Granger cause OPENN		0.01898	0.8917
CIBA does not Granger cause RGDP	24	0.44314	0.5129
RGDP does not Granger cause CIBA		15.4376	0.0008
AFDIOTTW does not Granger cause RGDP	24	2.47903	0.1303
RGDP does not Granger cause AFDIOTTW		8.51158	0.0082
CEBA does not Granger cause RGDP	24	0.12593	0.7262
RGDP does not Granger cause CEBA		7.86194	0.0106
CFDIITA does not Granger cause RGDP	24	0.90823	0.3514
RGDP does not Granger cause CFDIITA		5.13697	0.0341
UNEM does not Granger cause RGDP	24	3.47945	0.0762
RGDP does not Granger cause UNEM		51.5813	0.074
UNFDIITA does not Granger cause H	24	0.24272	0.6274
H does not Granger cause UNFDIITA		5.25532	0.0323
SSE does not Granger cause RGDP	24	2.04574	0.1673
RGDP does not Granger cause SSE		0.44133	0.5137
FDIITA does not Granger cause RGDP	24	1.21995	0.2819
RGDP does not Granger cause FDIITA		5.95881	0.0236

Source: author's computation.

**Table 5.**  
Granger causality test results.

On the contrary, there was no causality link between unemployment and economic growth. There was also no granger causality link between secondary enrollment (i.e., human capital) and economic growth. In theory, unemployment is a leakage in development when found to directly influence economic growth. Unemployment imposes a heavy burden on development via social intervention programs. As a result of that, minimizing the unemployment gap is a major aim for every economy. An increase in secondary school enrollment closes the literacy gap and increases the quality of human capital.

## **5. Conclusions and policy implications**

### **5.1 Conclusion**

The FOCAC cooperation has benefited China's economies more than it did for African because of growth hindering factors. In the form of foreign direct and portfolio investment, Chinese activities have grown in the region and are seen everywhere. China knows exactly what it wants from Africa while Africa is yet to wakeup. Africa is still assuming it will gain from China engagement.

Is African economic performance growing as a result of China's economic cooperation or is yet to happen? This Chapter examined this question from the preview of FDI and growth analysis using at least two decades of FDI data. The chapter also examined the effect of US and the World FDI on growth using Autoregressive Distributive Lags (ARDL) and Granger Causality models. According to the ARDL model, there was a positive growth relationship between China's FDI and African economic growth in the long term but not the short term. It was positive for the World FDI inflow to African. However, the effect of US FDI inflows to Africa was insignificant.

Change in human capital positively influences regional economic growth. There was no evidence of Okums Law as economic growth increases with unemployment, suggesting a lack of growth in the job market. Activities prevailing activities in the government and non-government sectors are not enough to bridge the gap in unemployment. The impact of openness i.e. economic inclusiveness was unexpectedly negative with economic growth in all models. This does not suggest, the region is a closed economy.

### **5.2 Policy recommendation**

The African community will gain significantly from China's investment engagements if the following recommendations are factored in the region growth plans.

In the African economy, resolving growth issues are necessary, if gaining the most from FDI is the ultimate objective. Lingering growth problems will continue to hinder effective investment allocations. Without specifically outlining the core issues (facing development in the region) and actually resolving them is a recipe for underdevelopment. For example, Oil-producing nations need to go beyond crude oil activities which has a lower market price to processing activities which has a higher market price. Continuing with temporarily fixed and front-loaded deals with China will not resolve the region's major problems. China in particular knows that it wants from Africa and as a result deals with African in that regard. In the same vein, African economies need to know what they want to influence investment programs with China. They will be able to attract investments that will resolve their growth issues other than going for anything at all which has a long-run effect of collapsing



the domestic activities and the exporting sectors. Diversification programs will have a greater impact as a result while the non-oil sectors will be well developed.

The African community can leverage China's economic interest to attract investment resources to bridge the infrastructural gaps facing development in the region. As the majority of countries experiencing heavy financial debts from donor organizations (the IMF and World Bank and) thereby losing their creditworthiness. The most viable approach to continue expanding infrastructural development in the region is to adopt and implement the Mutual or Pooled Growth Model (MGM/PGM) investment plan with China. This strategy as the name implies requires China and African economies to initiate a "susu" plan together. Depending on the agreement, both countries (i.e. China and any other country in African or all ) can pull a fixed amount of funds together to be invested in a viable structural program or project in a partner country (say an African country) for at least two years and later pull another for the remaining country (say China) for a similar or different project/s. Both countries after the two years will account for the funds to avoid miss-appropriateness. This type of financing or investment is unique because unlike the IMF funding system, it has no interest commitment hence reducing the debt to GDP ratio for partner economies.

Africa's manufacturing sector remains underdeveloped, yet China is an industrial hub. Africa is an endowed region with diverse resource potential, hence a suitable place to site processing and manufacturing industries. The lack of effective technical competencies is delaying industrial programs in the region. China-Africa cooperation is a forum that can help Africa close the technical gap and boost industrial development. The cooperation can be used to transfer technical resources to support the sector. Through government policies, young entrepreneurial visions can be supported by given special incentives such as tax holidays for at least one year, technical and skills training, and others to sustain activities. The government through its machinery can also protect young vision from competitions. This will allow them to grow into huge exporting industries and create more jobs to reduce unemployment.

Lastly, Africa needs to reform its investment policies with China. Observing China's past partnership engagements with the ASEAN community and other rising economies will help gain wisdom and help shape future engagement with China. In the future, Africa community will be able to develop proper economic deals with China via trade and investment. Again, the US has had long-standing trade and investment history with China. Most of such engagements have had a couple of successes and as well as failures to learn from.

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