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Africa-China investment and growth link

Isaac Koomson-Abekah, Eugene Chinweoku Nweba,

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Africa-China investment and growth link

Investment
and growth
link

Isaac Koomson-Abekah

*School of Business and Economics (SBE), Universiti Brunei Darussalam,
Gadong, Brunei Darussalam, and*

Eugene Chinweokwu Nweba

W2points Limited, Hong Kong, Hong Kong

Abstract

Purpose – This paper aims to investigate China–Africa Investment link, using over two decades of FDI's data. During the specified periods, African economic growth path has been predominantly upward trending, despite multiple external threats. This impressive growth was partly because of the growth of FDI stock across the region. This study explores the various sources of FDI to Africa, mainly China's FDI's and how they influence African macroeconomic indicators, i.e. unemployment, export and import activities.

Design/methodology/approach – Pesaran autoregressive distributive lag (ARDL) is used as a framework to test the short-run and long-run relationship of indicators. Granger causality test checked the causality between growth and macroeconomic indicators.

Findings – The link between China's FDI and African economic growth reported a negative/declining effect in both short and long run. In the long run, the effect of world FDI on growth was significant but not the in the short run. However, US FDI to Africa, China Export and Import from Africa reported an insignificant effect on growth. There was no evidence of Okun's law, as a decrease in Africa unemployment does not increase growth. Overall, China's FDI's inflows to Africa are allocated to capital-intensive activities which has less labor employability. The Granger causality test reported a uni-directional link between growth and all series, except for human capital which experienced no link at all in all directions. Despite the issue of socio-infrastructure militating against growth in the region, African economy is likely to perform better, if more FDI's are channeled into labor-intensive activities, because it has a reductive effect on unemployment.

Research limitations/implications – The research considered point annual FDI data but not accumulated stock and is a macro-based study, i.e. regional economy.

Practical implications – This paper bridged the literature gap in African investment performance by providing an empirical justification in understanding the inflow of FDI, especially China. This is a useful guard in policy design and implementations in the attraction of the right type of investment, so as to reduce unemployment and promote growth.

Originality/value – The authors confirm that this study has not been published elsewhere and is not under consideration in whole or in part by another journal.

Keywords China, Africa, Foreign direct investment (FDI), Economic growth, Macro-economic policy

Paper type Research paper

1. Introduction

Africa–China economic cooperation began since the Second World War era (Adewumi *et al.*, 2006). However, it was until early 1990s that the cooperation grew stronger owing to China's economic enlargement program, i.e. global vision and Africa growth program. Various



initiatives have emerged, the latest being “China One Belt Road or Maritime silk Road initiatives”, connecting China via railway and shipping link with major markets in the Middle East, Central Asia and Africa. What is unique about China’s partnership in connection with African economies is that, it is mainly centered on economic motive with less interference politically. Since economics and politics cannot be separated (mutually exclusive), China at some point meddles in Africa political matters. However, Compared to the USA and EU, the margin of China’s involvement in political matters is considered minimal. Because of that, China has become an acceptable pattern in Africa economy. They have investment portfolios across the length and breadth of the region. Currently, China’s is presence in about 45 countries in Africa, engaging in different types of businesses. Most of these businesses are privately own. There are also significant number of state-owned enterprises (Gu, 2009). Statistically, more than 2,200 Chinese enterprises are operating in Africa, (most of them are private ownership) (UNCTAD, 2014).

China is a significant player in global manufacturing sector. It owns its successes (in industrial development) to low wages, active skilled labor force and large domestic market (Pigato and Tang, 2015). The latter was the key to economic (industrial) sustenance because it allowed emerging and small and medium scale industries to grow effectively. Later on, they became strong partakers in the international trade market. China found itself in a favorable condition, an edge in development most developed and emerging economies were not exposed to the beginning of development. The economic space of China became a magnet in attracting various types of investment portfolios. Many manufacturing firms relocated to take advantage of low wage highly skilled labor force to hence profit and expedite growth. Today, China is among countries with the largest market footprint in the globe. As a significant global player, it faces huge gap in natural and human resources demand (to feed existing industries), which are beyond the carrying capacity of the domestic market, hence rest on China–Africa economic cooperation and other foreign partners to supply them (as a way to maintain the pace of growth).

Africa as a continent has a huge deposit of natural resources capacity and youthful population. Statistically, it has over one-third of world resources capacity, making it a potential partner for China. Yet, compared to China, African industrialization program and growth are constraint by economic challenges, among them being technical, financial and infrastructural problems. However, these potential gaps or challenges faced by Africa’s economies are, conceivably, China’s greatest strength, hence the highlight of China–Africa economic cooperation. China–Africa economic cooperation is an official platform for establishing a gain again solution to diverse developmental problems facing China and Africa, with too much stringencies. Advantage-wise, Africa use this platform (give its high resource potentials) as a leverage to attract highly efficient technical and financial investment from China, to support infrastructural development and improve the standard of living (reduce poverty). Furthermore, via import activities mutual exchange of goods and technical capacity are exchanged from both economies to raise GDP level. At manageable interest rate financial capitals are transferred to finance developmental programs in the region and create new job (hence reducing margin in youth Unemployment). The loans are also use to support infrastructural project in the region which is a better alternative to IMF or World Bank loans (which has series of conditionality).

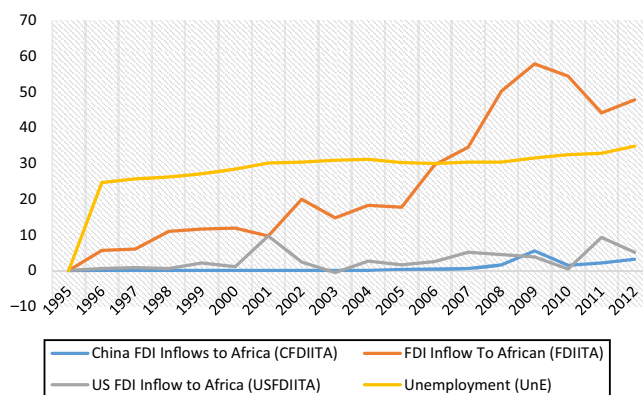
A significance share of African resources transfers (about one quarter) goes to China. Because of growing industrial and urban expansion, China’s energy consumption size has more than doubled (Crompton and Wu, 2005). One-third of Africa’s oil supplies goes to China mainly from Egypt, Libya and Tunisia; Nigeria (McKinsey Global Institute, 2016). Regarding non-oil resources, China imports coal from South Africa, ore from Gabon, timber

from Equatorial Guinea and copper from Zambia. China's exports consumables and capital goods to Africa, specially textiles, pharmaceuticals, telecommunication gadgets, and technological goods are imported from China to support small- and medium-scale enterprise (Baah and Jauch, 2009; Baah, 2003). There volume of trade between China and Africa is not even. China engages more than Africa. In 2012, Africa's total export (US\$3.1bn) to China was one-third of China's total exports to Africa (US\$9.4bn).

In Figure 1, the pattern of US and China FDI inflows to Africa (from 1995 to 2012) follows a gentle undulating effect (China Statistical Year Book, 2012). However, the World FDI inflows to Africa reported a steeper smooth slope. China's FDI inflow to Africa shows a continuous rising prospects (especially in the latter years) compared to US FDI inflows to Africa, which exhibits a decline trend. The stock of China's FDI across that period (Figure 1) was about US\$40bn, out of that, US\$13.8bn was capital injection (Shen, 2014). Africa's total unemployment shows a rising trend according to Figure 1 as FDI increases across time. China's inflow of FDI to Africa is greater than Africa's inflow to China (China Statistical Year Book, 2012). Africa's FDI inflow to China grew by two fold, while China's FDI to Africa grew by eighty fold (from 1995 to 2012). This is due to Africa's and China's economic policies which strictly controls movements of funds (Adewumi *et al.*, 2006).

In Africa, China, committed to the course, has initiated a series of social intervention programs in the area of education and health to enhance the well-being of the people. This initiative was launched in 2013. Since its inception, it has supported hundreds of educational projects, 30 medical institutions, 30 anti-malaria centers and 20 agricultural technologies in Africa (Ighobor, 2013). China banks, i.e. People's Bank of China, the China Development Bank and the Export-Import Bank of China (Exim Bank of China), have financed also large-scale infrastructural projects in the region. Via multilateral agreement, the Forum on China-Africa Cooperation, formed in 2000 and convened every three years, has become the primary vehicle via which China engages Africa on development matters.

FDI is a key factor of growth. It has many literature justifications (Adams, 2009; Ndikumana and Verick, 2008; Pigato, 2000; Ayanwale (2007). In most developing economies, it is a major source of resource transfers, i.e. capital funds (like loans) to achieve growth. Government considers it a significant part of development (Oladipo, 2010). For that matter, national policies are streamlined to facilitate its movements, to support jobs and technical transfers (Sun, 2002). Venture financiers and trans-national companies utilized this



Sources: China Statistical Year Book 2012, WDI and UNCTAD

Figure 1.
The trend of China, US, world FDI inflow to Africa (in US\$bn) and unemployment (in millions population)

opportunity to establish contracts with opened economies and expand their portfolios, market size and promotes competition (Adams, 2009). Transfers of technical capacities promote effective use of human capital and economic resources in a way that minimizes cost and inspires favorable completion (Soediono, 1989). Therefore, attracting FDI is a least-cost way of getting access to investment credits (without incurring debt) to easy government budgetary plans to support infrastructure development and reduce unemployment in the domestic economy (Jenkins, 2006). At the regional level, FDI inflows help deepen group commitment toward established directives in a partnership, as investors are likely to allow their resources in a more united and stable economies than in a single economy (te Velde and Bezemer, 2006).

Busse and Groizard (2006) outlined some pre-requisites of an effective FDI in an economy. The foremost was infrastructure and institutional quality. They stated that, a more effective institution ensures effective inflow of investable capital to potential areas of the economy. Access to infrastructure like road, financial institution, telecommunication, electricity and others are products of effective institution. Alfaro (2003), in a sectorial study emphasis, stated the importance of financial institutions. An effective financial institution serves as a venture capitalist to support and finance growth projects in an economy. De Gregorio and Guidotti (1995) in a country-based study highlighted the issue of human capital development. Similarly, Kamara (2013) emphasized human capital development and institutional quality as mentioned by Busse and Groizard (2006). Effective human capital optimizes output performance. Borensztein *et al.* (1998) underscored some issues related to dysfunctional institutions. A dysfunctional institution creates unhealthy competition in the localized market as foreign firms occupy spaces already taken by domestic firms or investors, exacerbating the rate of unemployment. It is the duty of institutions to make FDI inflows more beneficial by directing FDI into areas the domestic investors or firms have less technical capacity, i.e. know-how or capitalization to operate. This, when achieved, broadens the development scope of the economy. Large shares of investment go into capital-intensive activities in Africa unlike labor-intensive activities. According to World Investment Report (WIR) (2012), about 60 per cent of investment inflows in Africa go to the mining and oil and gas industries (Kamara, 2013).

This study brings to the light some of the implications of China and the US FDI on African economy. Given China's increasing presence in the region, it makes it easier to conclude that it is having huge impact on African economic development. This study investigates the data to establish an empirical fact about China's investment in the region. An observation of past literature shows scanty empirical evidence on Africa regional FDI performance. This is because of data unavailability at international databases, despite the long period China–Africa economic cooperation. Even today, data issue still persists. In this current study, majority of China's FDI data were extracted from China's statistical year book. Most international data institutions hardly have China's FDI data. But, at country level, there are somehow, a fair amount of data, hence explaining why there are lot of studies on FDI. Adewuni *et al.* (2006) examined developing economies FDI performance. An extension was made by looking at China–Africa economic cooperation. The result shown a lower growth prospect, citing infrastructural inadequacies and low human capital development as major gap. Kamara (2013), in a +broader study, examined a couple of Sub-Saharan Africa (SSA) countries' FDI performance. Also, a positive growth was reported but the effect was inelastic (i.e. less than effect). Studies such as Busse and Groizard (2006) experienced a positive growth link, highlighting the significance of infrastructure development. AbuAL-Foul (2010) studied Morocco and Tunisia FDI performance and found Morocco to be resilient in FDI inflows, while Tunisia is not.

This study expands existing literature on investment [specially Adewuni *et al.* (2006)] by exploring China–Africa FDI and growth link. It seeks to answer the question, whether FDI has a significant effect on Africa key macroeconomic indicators such as exports, import and unemployment. It also examines the significance of US FDI and World FDI on Africa growth. Okuns Law was tested (by examining the link between growth and unemployment. Pesaran *et al.* (2001) autoregressive distributed lag (ARDL) (is use to test the short- and long run significance of each series) and Granger causality techniques are the key frameworks.

The significance of the study is to provide a reference guide to policy development on FDI attraction and allocation in Africa so as to have better impact on growth.

The rest of the paper is organized as follows. Section 2 of the paper examined the methodologies. Analysis and discussion of the result are found in Section 3. Section 4 presents conclusion and recommendations.

2. Model

2.1 Bound testing approach

Following Pesaran *et al.* (2001), the vector auto-regression (VAR) function in order p , is expressed as:

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

where Y_t is the dependent variable, and X_t denotes independent series. The guideline of ARDL model is that, all stationary must be at level I (0) or first I (1),

Vector error correction model (VECM) for equation (1) is.

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

Where, Δ is first-difference I (1) and λ represents the long-run multiplier matrix, which is defined as:

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

The diagonal elements are unrestricted, are either I (0) or I (1). If $\lambda_{yy} = 0$, then Y_t is I (1). In contrast, if $\lambda_{yy} < 0$, then Y_t is I (0).

Referral to equation (2), real gross domestic product (RGDP) is considered as a dependent variable. The explanatory series X_t , in this study constitutes multiple of vectors such as China FDI inflow to Africa (CFDIITA), US FDI inflows to Africa (USFDIITA), China export by Africa (CEBA), China import by Africa (CIBA), unemployment (UNEMP) and openness (OPEN). Appendix 1 displays the full ARDL model order (p, q, r) . However, a subtle version is highlighted in equation (4):

$$\begin{aligned} \Delta \ln RGDP_t = & a_t + \sum_{i=1}^p \phi \Delta \ln RGDP_{t-i} + \sum_{i=0}^p \varphi \Delta \ln CEBA_{t-i} + \sum_{i=0}^p \beta \Delta \ln CFIITA_{t-i} \dots \\ & + \pi_1 \ln RGDP_t + \pi_2 \ln CEBA_t + \pi_3 \ln CFIITA_t + \dots \varepsilon_t \end{aligned} \quad (4)$$

where $\varnothing_i, \phi, \bar{A}_i \dots$ and $\pi_1, \pi_2, \pi_3, \dots$ are short- and long-run unknown coefficients for RGDP, CEBA and CFDIITA.

The lag structure is determined by Akaike's information criteria (AIC) (the least or minimum score among the criteria). In testing for overall significance the Wald test (F -statistic) is considered. The Wald test allows the checking of long-run (LR) and short-run (SR) significance based on the following hypothesis:

$$\begin{aligned}
 H_0 &= \pi_1 = \pi_2 = \pi_3 = \pi_4 \dots \dots \dots \pi_{10} = 0 \text{ (NO SR or LR Association)} \\
 H_0 &\neq \pi_1 \neq \pi_2 \neq \pi_3 \neq \pi_4 \dots \dots \dots \pi_{10} \neq 0 \text{ (SR or LR Association)}
 \end{aligned}
 \tag{5}$$

The overall significance, i.e. F -statistic, is determined using predetermined critical values which have been tabulated in Table CI (iii) of Pesaran *et al.* (2001) (see Appendix 2). In essence, the lower and upper bound critical values assume the X_t 's are integrated either in order of zero or I (0). If the F -computed value is less than the lower bound critical value, then a null hypothesis is accepted, i.e. there is no long-run relationship between economic growth and the independent variables. However, if the computed F -value is greater than the upper bound value, then there is long-run relationship between growth and independent variables. But, if the computed F - falls between the lower and upper bound values, there is inconclusive situation.

2.2 Granger causality

The Granger causality technique is an analytical tool which stipulates that the future cannot predict the past because time does not travel backward. It introduces the lag term of dependent variable into the regressors to infer the causal link between regressors. See below:

$$\begin{aligned}
 Y_t &= \sum_{n=1}^{\rho} \varnothing_n Y_{t-\rho} + \sum_{n=1}^{\rho} \delta_n X_{t-\rho} + \varepsilon_t \\
 X_t &= \sum_{n=1}^{\rho} \gamma_n X_{t-\rho} + \sum_{n=1}^{\rho} \varphi_n X_{t-i} + \epsilon_t
 \end{aligned}
 \tag{6}$$

where Y and X represent the two time series at time t and represent the time series at time $t-p$, p representing the number of lagged time points (order). \varnothing_n , and γ_n are signed path coefficients. δ_n and φ_n are auto-regression coefficients, while ϵ_t and ε_t are residuals.

Considering equation (7), the lag of each series was introduced. For instance, CFDIITA and CEBA:

$$\begin{aligned}
 \ln RGDP_t &= a + \sum_{i=1}^p \varnothing_i \ln RGDP_{t-i} + \sum_{i=0}^p \theta_i \ln CEBA_{t-i} + \varepsilon_t \\
 \ln CFDIITA_t &= a + \sum_{i=1}^p \varnothing_i \ln RGDP_{t-i} + \sum_{i=0}^p \vartheta_i \ln CFDIITA_{t-i} + \varepsilon_t
 \end{aligned}
 \tag{7}$$

Equations of the remaining series such as, CIBA, US FDI inflows to Africa (USFDIITA), openness (OPEN), and secondary enrolment (SSE) are found in Appendix 3.

3. Data and analysis

As a policy-based paper, this paper provides empirical evidence concerning China-Africa economic partnership. How has China's growing interest in African economic space via various trade and investment packages over the past two decades helped significantly improve macroeconomic (GDP per capita, unemployment and human capital) development. Is there evidence of Okun's law? The study further looked at the relationship US FDI on Africa economic growth. In recent decades, US investment in Africa has been declining, while China's is rising. This suggests growing support for China's investments by African economies (which are speculated to have less political influence). The data series are taken from different statistical sources, spanning over 20 years (1990 to 2014).

The China's investment series such as CFDIITA, CEBA and CIBA were extracted from China's statistical year book. SSE (a measure of human capita), and trade openness (OPEN), unemployment (UNEMP) and Africa FDI outflows to the World (AFDIOTW) were taken from World Development Indicators (WDI). US FDI inflows to Africa (USFDIITA) and World FDI inflows to Africa (WFDIITA) were taken from the United Nation Conference on Trade and Development (UNCTAD). The investment data are not accumulated stock[1] but annual point values. See [Appendix 1](#), for each data sources and labeling. [Table I](#) shows the log description of all series.

The average mean of *RGDP* is 0.037. It is less than the average mean of all regressors except CEBA and openness (OPEN), (an average mean values of 0.034 and 0.010, respectively). Each series reported a higher variability, i.e. higher standard deviation (SD). The Jarque-Bera test outcome shows all series except *CIBA* and *UNEM*, are normally not-distributed (not significant at 5 per cent). Issues of serial correlation were carefully controlled according to [Table II](#) (no multicollinearity problem).

In [Figure 1](#), the augmented Dickey-Fuller unit root test illustration shows that all series were stationary at first difference $I(1)$ except UNEM and USFDIITA which were at level. The breaks in in the middle of AFDIOTW, USFDITA and CFDIITA series were due to missing data issue. The series CFDIITA, CIBA, USFDIITA and CEBA also experienced lost of data in the beginning ([Figure 2](#)).

4. Results analysis

Here, the ARDL model is used as a model instrument to experientially examine the behavior of each series on growth. Real Gross Domestic Product (RGDP) is dependable variable. [Table III](#) highlights the short- and long-run results of each series. According to Dickey-Fuller unit root test (in [Figure 1](#)), each series is stationary either at $I(0)$ or $I(1)$. Unemployment (UNEM) and US FDI Inflow to Africa (USFDIITA) are stationary at level ($I(0)$). RGDP, CEBA, CFDIITA, Openness (OPENN), SSE, CIBA, Africa FDI outflow to the World (AFDIOTW), FDI inflow to Africa (FDIITA) are stationary at first difference ($I(1)$). They all satisfy ARDL conditions.

The ARDL model [[equation \(4\)](#)] has an unrestricted intercept and no trend condition. According to [Pesaran et al. \(2001\)](#), (Table CII (iii) of page 303), [equation \(4\)](#) has a lower $I(0)$ and upper $I(1)$ bound critical values of 2.86 and 5.03, respectively. In [Table III](#), the constant term reported an insignificant but negative effect on growth. The shows a certain decline in growth, even without other indicators. The F-computed value, i.e. 2.9595, in the short run reported an indecisive decision. On that account, change in China's FDI inflows to Africa, China export and import to Africa, US FDI inflows to Africa and Africa openness policies have no direct link on growth. However, a combined effect of China FDI inflows to Africa (CFDIITA) and FDI inflow to Africa (FDIITA) are significant on growth, i.e. has a decisive link (at a short run F-computed value of 22.47, greater than upper bound limit (5.03)).

Table I.
Descriptive statistics
for all vectors

	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
Maximum	1.352	2.220	0.303	2.228	0.727	0.075	0.082	0.095	17.457	22.995
Minimum	-1.423	-1.338	-0.248	-0.737	-0.303	-0.003	-0.108	0.010	15.183	19.918
SD	0.730	0.810	0.131	0.587	0.251	0.019	0.042	0.018	0.429	0.929
Skewness	-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
Probability	0.756	0.805	0.868	0.000	0.379	0.897	0.167	0.812	0.000	0.448
Observation	22	21	22	22	24	25	25	24	25	21

Note: Log of variables from 1990 to 2014

Therefore, a change in China FDI inflows to Africa (EFDIITA) and World FDI inflows to Africa (WFDIITA) can affect growth pattern in Africa. [Alfaro and Chanda \(2006\)](#) and [Nunnenkamp and Spatz \(2004\)](#) also experienced a link between FDI and growth.

Also, the overall F-computed value (18.94) in the long run is greater than the upper-limit critical value (5.03), so is found in the decision region. Selected computed F-value (14.677) of unemployment (UNEMP), SSE and China FDI to Africa (CFDIITA) also reported a significant link on economic growth. Therefore, change in China's FDI inflow to Africa (CFDIITA), unemployment (UNEMP) and SSE have some level of impact on the economic growth. But what is the nature of impact? [Table III](#) highlights the elasticity of each series on growth according to the ARDL model.

In [Table III](#), we found that entirely all indicators, except China's FDI inflows to Africa (CFDIITA), unemployment (UNEMP) and SSE experienced an insignificant dependence on the economic growth in the long run. Individually, SSE exhibited a positive link on the economic growth, highlighting the importance of education in raising Africa growth prospect in the long term. Therefore, increasing the level of investment toward skills and knowledge development across Africa is a stimulant to future economic growth. Unexpectedly, the effect of unemployment on growth is statistically significant and positively correlated. This is contrary to Frank (1968). According to the findings, an increase in unemployment promotes growth. This is contrary to theory, in the sense that it is a leakage in development and leads to slower growth. A reduction in labor services requires raising the level of capital in the economy. Fundamentally, an increase in capital raises the level of unemployment in the region. Statistically, the level of unemployment in Africa is substantially high, about 20 per cent (according to ILO). Governments must invest in labor-intensive activities rather than capital-intensive activities. This will not only result in a more rapid growth because of the low opportunity cost of labor relative to capital, but will increase the rate of growth of employment for any given level of investment. Conferring the results, there is no evidence of Okun's law because unemployment and economic growth are positively related.

The short- and long-run effect of China's FDI inflow to Africa (CFDIITA) has a declining effect on growth (see [Table III](#)). This is an expected outcome, given the rise in China's investment in both state and private enterprises across the corridors of Africa. Renald (2001), among others, found a positive link investment on growth. It is imperative for African economies to weigh the nature of FDI allowed into the economic pace, if achieving a positive growth is the desired purpose. FDI inflows allocated in the development of manufacturing industries, skills and knowledge development are key drivers of economic growth.

	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

Table II.
Correlation matrix
for each vector for
the period 1990 to
2014

Note: The correlations matrix for all vector series from 1990 to 2014

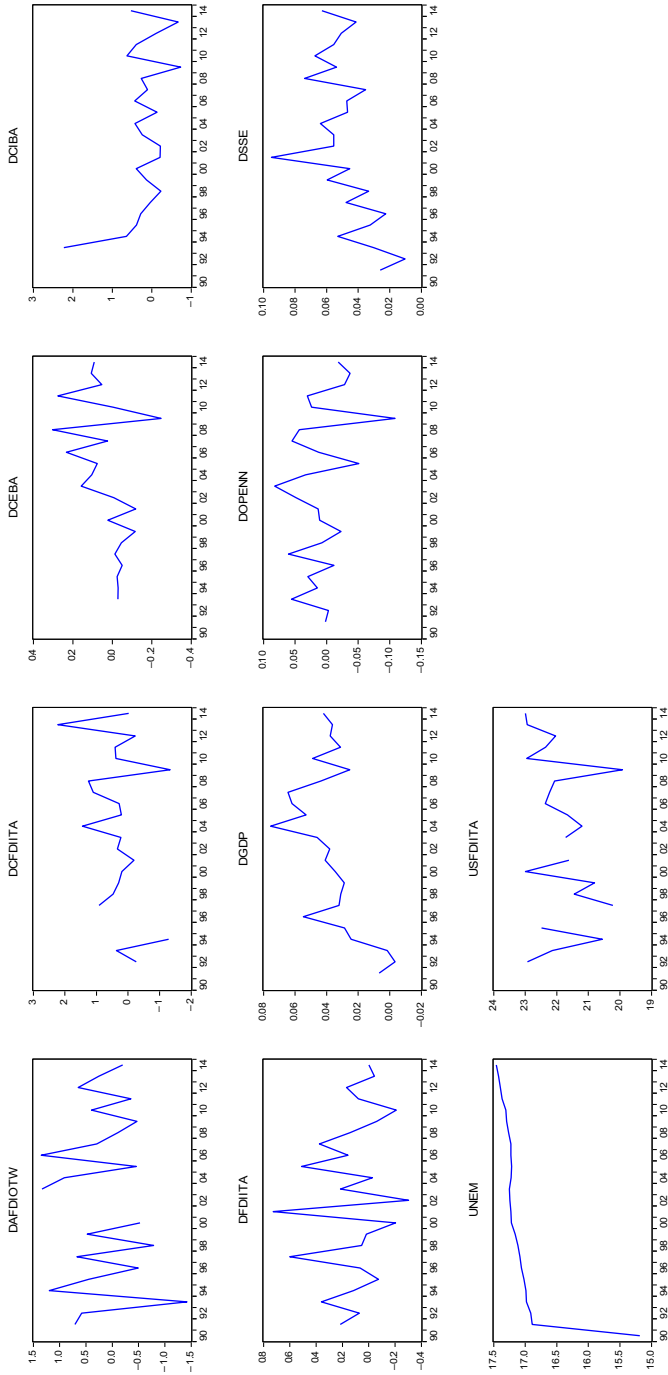


Figure 2. Augmented Dickey-Fuller illustrations for unit root for each series at level

The static OLS results are shown in Table IV. According to the results, world FDI inflows to Africa (WFDIITA) had a positive effect on growth. This is consistent to Adam's (2009) conclusions. The African economies, as resource-based economies, attract substantial amount of investment resources across the world, excluding China and the USA. Businesses and private investors within Africa also invest in various type of portfolios across the world. However, the margin is considered low relative to world FDI inflows. In Table IV, Africa's FDI inflows to the world (AFDIITW) is positively related on growth. Here also, the static model found a positive effect of the SSE on growth, just like ARDL model in Table III. Furthermore, US FDI inflows to Africa (USFDIITA), CEBA and CIBA reported an insignificant effect, likewise the ARDL model in Table III. Generally, the share of US FDI and China FDI inflows to Africa is considered low, given the economic size but does not

Variable	Short run	Long run
Constant term	-1100 (-6.080)	
RGDP	D(RGDP(-1)) 0.989 (-0.232)	D(RGDP) -0.792 (-0.193)
China export to Africa	D(CEBA(-1)) -8.513 (-3.502)	D(CEBA) 49.783 (-13.383)
China's FDI inflow to Africa	D(CFDITA(-1)) -4.518 (0.712)*	D(CFDITA) -8.865 (1.579)*
Openness	D(OPEN)(-1) -8.908 (-8.597)	D(OPEN) -8.975 (-8.500)
Unemployment	D(UNEMP(-1)) 59.566 (-12.056)	D(UNEMP) 942.98 (182.909)*
USA FDI inflow to Africa	D(USFDIITA(-1)) 0.658 (-0.518)	D(USFDIITA) 0.026 (-0.770)
SSE	D(SSE(-1)) -1026.498 (-420.350)	D(SSE) 170.536 (363.717)*
World FDI inflow to Africa	D(WFDIITA(-1)) 1.783 (0.3554)*	D(FDIITA) -0.0124 (-0.660)
China import to Africa	D(CIBA(-1)) 0.687 (-2.641)	D(CIBA) -13.413 (-3.304)
Africa FDI inflow to the world	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

Table III.
Dynamic ARDL
model (Model 2)
results (dependent
variable – RGDP)

Notes: Absolute lower I (0) and upper-bound value 1(1) of 2.86 and 5.03. The standard errors reported in brackets. Significance levels: *** if $p < 1\%$, ** if $p < 5\%$ and * if $p < 10\%$

Variables	Static Model 2	OLS regression
Constant term		22.900 (350.941)**
China export to Africa	D(CEBA)	-14.446 (-8.226)
China's FDI inflow to Africa	D(CFDITA)	-0.262 (-0.966)
Openness	D(OPEN)	-9.240 (7.734)
Unemployment	D(UNEMP)	-397.358 (-815.03)
USA FDI inflow to Africa	D(USFDIITA)	0.884 (-0.948)
SSE	D(SSE)	175.769 (99.78)**
World FDI inflow to Africa	D(FDIITA)	2.217 (0.523)**
China import to Africa	D(CIBA)	2.453 (-2.591)
Africa FDI inflow to the world	D(AFDITW)	3.567 (1.438)*
R-SQUARED:		23

Table IV.
Static model results
(Model 1) (dependent
variable – RGDP)

Notes: The standard error is reported in brackets; significance levels: *** if $p < 1\%$, ** if $p < 5\%$ and * if $p < 10\%$

undermine its effect on growth. The share of China's export to Africa compared to the economic size is also small. In [Table IV](#), we found no link between CEBA on growth.

Unexpectedly, the effect of openness (OPENN) on growth was insignificant and negatively correlated. However, Li and Liu (2004) found a positive link on growth. This does not suggest Africa being a rigidly closed economy, but rather the value of goods traded. Africa traditionally exports mostly primary goods, which have lower and unstable market price. Processed goods (like the manufactured goods), on the other hand, have higher market value, hence given them higher value/returns in the international market. This affects Africa economies from realizing the full effect/value of export activities ([Ayanwale, 2007](#)). Statistically, the share of African trade compared to the global estimate is less than 15 per cent. The combined share of China and US trade is about 18 per cent. Meanwhile, Africa is a major exporter. See the market share of Equatorial Guinea, Nigeria, Liberia, Kenya, Botswana, Tunisia, Ghana and South Africa in terms of oil and commodity activities.

US FDI inflow to Africa has an insignificant effect on growth. This is inconsistent with [Asiedu \(2002\)](#). The stock of US FDI is by far the largest in the region, followed by China. But over the past decades, it has been declining, while China's is rising. Speculatively, the fall in US investment stock has been argued to be in part caused by US foreign policy. US foreign policy ensures a stable political environment in economies they have economic interest. This is considered meddling, especially in countries where democratic principles are less considered, hence making US investments less preferable in the region. Research has shown that a stable political environment is a key catalyst in achieving effective growth ([Ozturk, 2007](#)). Therefore, China's less concern about the political state of countries they have economic interest in is detrimental to long term economic growth programs.

4.1 Granger causality test

This session observed the causality link between growth and each macroeconomic indicator considering the Granger causality technique. The Granger causality model is a technique to determine the causal relations between series in a model (Zhang, 2000, 2001). When two series are cointegrated, then there is a likelihood of experiencing at least one directional causation. [Table V](#), shows the findings growth and series of macroeconomic indicators. There is no theoretical evidence that can conclusively give a bidirectional link between FDI and growth. Most of the series reported a one-directional causality.

In [Table V](#), all investment indicators reported a one-directional causality link. For instance, Africa FDI outflow around the world (AFDIOTW) and China FDI inflow to Africa (CFDIITA). Similarly, other such as openness (OPEN), CEBA, CIBA and unemployment (UMEP) also experienced a one-directional link.

This is an indication that a change in CEBA, Africa FDI outflow around the world (AFDIOTW), China FDI inflow to Africa (CFDIITA) has a significant effect on growth performance in the region but the reverse proved otherwise. Therefore, if not in all directions, promoting of FDI inflows has a catalytic effect on growth in Africa, especially, China's FDI inflow to Africa (CFDITA). The results from the dynamic model in [Table III](#) confirm a positive or rising effect between China FDI to Africa and growth.

Similar to the dynamic model, the Granger causality results found no bidirectional causality between unemployment and growth. Unemployment is a leakage in economic development, government has to use available resources via social intervention to support their welfare. Low unemployment promotes effective growth and helps improve the standard of living. To raise the level of employment in the region, demand directing investment into areas that create more labor-intensive activities like manufacturing

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

Table V.
Granger causality
test results

industries and service sector activities. Recently, lot of the investment are directed toward capital-intensive activities mining, which has less labor employability. Also, in [Table V](#), we found no bidirectional causality between secondary enrollment and growth. Education has a direct effect on unemployment. An educated society has access to knowledge, which enhance job creation if well supported by local and state governments to promote growth.

5. Conclusions and policy implications

5.1 Conclusions

The progress made by China–Africa economic cooperation in the past two decades has been laudable. Through this cooperation, many economies in Africa have had access to financial and infrastructural investments, which can be seen across the length and breadth such economies. Via mutual agreement, China has also gained tremendously from resource transfers and investment opportunities from Africa. China's businesses are also significance across the economic space of Africa in the form of foreign direct and portfolio investment (existing as state and private industries). This study observes the real data, to infer whether Africa is gaining from China's in increasing presence in the region. We observed this issue using over two decades of China and Africa FDI data. The series includes exports, imports, US FDI inflows to Africa, World FDI inflows to Africa and China's FDI inflows to Africa. We also investigated the significance of openness on growth. Furthermore, the significance of Okun's law was observed by considering unemployment index into the model.

Two interlinking models were considered, dynamic ARDL and Granger causality model. Furthermore, a static OLS model was introduced to check results' certainty. According to the results, we found a consistent positive link between China FDI to Africa and economic growth in the long term. Similarly, the impact of world FDI inflows to Africa on growth was positive. This emphasizes the importance of foreign investment support to generate additional growth in Africa. However, the impact of US FDI inflows to Africa was not significant in both long and short run. The USA is a significant investment giant in the African economy. Regardless of the outcome, its investment inflows have some level financial development in the region's economy.

The impact of secondary school enrollment on growth was insignificant in the short run. This underscores the importance of channelizing investment in promoting educational and training institutions to boost skills and knowledge in Africa. We found no evidence of Okun's law in the findings because unemployment and growth are positively correlated (long term). Okun's law claims that, growth increases and unemployment reduces, therefore, there a negative relationship link between them. Due to high profit returns on capital activities in Africa, most of FDI inflows are allocated channeled into capital intensive activities. These activities have low labor employability, hence widening the unemployment gap. This strongly indicates the need to regulates investment inflows in the region (instead leaving it in the hands of investor), in order to ensure fairer distribution across various parts of the economy, so as to have a significant effect in reducing unemployment. The effect of openness on growth was unexpectedly negative in all models. It implies limited participation in the global economy. Africa is a major exporting and importing economy, hence very open to global partnerships. Conversely, this result implies that the current level of trade inclusiveness is not adequately enough to change the cause of growth in the economy. Budgetary programs are largely financed via international trade activities, mainly from oil and non-oil export activities.

Generally, Africa is yet to gain from multiple economic partnerships, especially China-Africa economic partnership. Now, there are multiple developmental issues which hinder the effectiveness of this cooperation. Most significantly, the institutions need to be well established, not to mention human capital development. Africa needs domestic smart entrepreneurs and quality leadership to take advantage of FDIs to maximize gain. Finally, Africa needs to develop a more comprehensive strategy to effectively balance the engagement of China to leverage its own strength and create a plan for sustainable development that resonates with its people.

5.2 Policy recommendation

China-Africa cooperation is tailored toward mutual economic benefit. For partner countries to benefit effectively, from established cooperation, policies need to be streamlined to reflect both economies characteristics to ensure full effect. First priority lies in getting the necessary capability to develop better policies to promote effective growth. Economies need to see China as a partner not a competitor. As a partner, it is possible to see the unparalleled gap in development and initiate better policy to close them via the cooperation. Africa will be able to expand its development and articulate comprehensive schemes that address its long-term needs.

Oil-producing nations need to avoid temporary fixes and front-loaded deals with China and move on to long-term mutually beneficial deals, beyond the oil economies to non-oil economies also. In the past decades, the undulating oil prices shocks have produced adequate evidence for developing economies to note that, depending on oil as an engine of growth is unsustainable and disastrous to monetary and fiscal policy programs. African economies need to shift away from the model of development to a more diversified model where the non-oil economies interplay in development. This is the hallmark of a successful and resilience economy in safeguarding itself against multiple economic shocks. Diversification attracts a series of FDIs.

African economies need a more comprehensive plan of action. The old, shallow, short-term vision which is built on resource capacity, i.e. oil, mineral and commodity, needs to give way for long-term programs which also include non-resource activities. Non-resource activities have the potential of attracting better China's investments (technical inputs) to expedite growth and most importantly reduce unemployment (because they are less capital-

intensive). A less capital-intensive activity creates jobs which reduce the unemployment gap. For instance, the service sector economy (via industrial linkage) has the capacity to create multiple jobs for both skilled and unskilled labor.

Technology development is a new frontier in Africa's development. It transforms traditional activities into hi-tech activities, which are more efficient. China-Africa partnerships can be well tailored to attract better technical capacity to build emerging economies. Across the region, infrastructural development is a critical issue against investment in Africa. Investors look at the support mechanism to their investment before coming into an economic space to invest. For instance, a good transport system, effective judicial system, stable political environment, railway, telecommunication and reliable electricity are few of the examples. These prerequisite facilitates long-term economic development and investment transfer, thereby reducing unemployment.

The manufacturing sector of the African economy remains less developed, despite endowed with the needed resources to mind it. Presently, the strong completion from the free trade world has further hindered its development. It can be improved if there are right kind of investment or FDI's (like skills and technologies) from China-Africa cooperation. The issues of technical know-how and financial lapses have slowed down African manufacturing sector's development. Product quality and cost can be improved when the right kind of knowledge is gained. The major concern rests on how to attract that kind of FDI's. For ages, Africa has continued to export agricultural and natural resources at the crude stages. These resources are processed and sold back to Africa at a very expensive price. A better China-Africa cooperation includes supporting the development of production bases in Africa, in areas where African domestic investors or SMEs lack the capacity to do so. This will help reduce poverty and create more employment avenues. As the industrial revolution in the 1980s, SMEs have remained the brainchild of industrialization. If they are well supported (tax incentives, financial development and knowledge), they are likely to become larger-scale industries. Lastly, Africa needs a full review of past China-Africa engagement, identify areas that needs better improvement to ensure long-term benefits. A study of past US-China economic engagement, (despite having different economics characteristics) may be of better policy guidelines for Africa, when dealing with China because they have had much longer period of engagement together.

Note

1. FDI stock is broader and includes previous reserves and capital invested.

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Appendix 1

An expansion of the ARDL model in [equation \(2\)](#), it considered all the series particular to this study:

$$\begin{aligned}
 \Delta \ln \text{RGDP}_t = & \mathbf{a}_t + \sum_{i=1}^p \varnothing_i \Delta \ln \text{RGDP}_{t-i} + \sum_{i=0}^p \theta_i \Delta \ln \text{OPENN}_{t-i} + \sum_{i=0}^p \gamma_i \Delta \ln \text{SSE}_{t-i} \\
 & + \sum_{i=0}^p \phi_i \Delta \ln \text{CEBA}_{t-i} + \sum_{i=0}^p \rho_i \Delta \ln \text{CIBA}_{t-i} + \sum_{i=0}^p \delta_i \Delta \ln \text{AFDIOTTW}_{t-i} \\
 & + \sum_{i=0}^p \vartheta_i \Delta \ln \text{CFDIITA}_{t-i} + \sum_{i=0}^p \zeta_i \Delta \ln \text{FDIITA}_{t-i} + \sum_{i=0}^p \epsilon_i \Delta \ln \text{USFDIITA}_{t-i} \\
 & + -_1 \ln \text{RGDP}_t + \pi_2 \ln \text{OPENN}_t + \pi_3 \ln \text{SSE}_t + \pi_4 \ln \text{CEBA}_t + \pi_5 \ln \text{CIBA}_t \\
 & + \pi_6 \ln \text{AFDIOTTW}_t + \pi_7 \ln \text{CFDIITA}_t + \pi_8 \ln \text{FDIITA}_t \\
 & + \pi_9 \ln \text{USFDIITA}_t + \varepsilon_t
 \end{aligned}$$

k	0.100		0.050		0.025		0.010		Mean		Variance	
	I(0)	I(1)	I(0) ₋	I(1)	I(0)	I(10)	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
0	9.81	9.81	11.64	11.64	13.36	13.36	15.73	15.73	5.33	5.33	11.35	11.35
1	5.59	6.26	6.56	7.30	7.46	8.27	8.74	9.63	3.17	3.64	3.33	3.91
2	4.19	5.06	4.87	5.85	5.49	6.59	6.34	7.52	2.44	3.09	1.70	2.23
3	3.47	4.45	4.01	5.07	4.52	5.62	5.17	6.36	2.08	2.81	1.08	1.51
4	3.03	4.06	3.47	4.57	3.89	5.07	4.40	5.72	1.86	2.64	0.77	1.14
5	2.75	3.79	3.12	4.25	3.47	4.67	3.93	5.23	1.72	2.53	0.59	0.91
6	2.53	3.59	2.87	4.00	3.19	4.38	3.60	4.90	1.62	2.45	0.48	0.75
7	2.38	3.45	2.69	3.83	2.98	4.16	3.34	4.63	1.54	2.39	0.40	0.64
8	2.26	3.34	2.55	3.68	2.82	4.02	3.15	4.43	1.48	2.35	0.34	0.56
9	2.16	3.24	2.43	3.56	2.67	3.87	2.97	4.24	1.43	2.31	0.30	0.49
10	2.07	3.16	2.33	3.46	2.56	3.76	2.84	4.10	1.40	2.28	0.26	0.44

Table A1.
Values according to Pesaran *et al.* (2001)

Note: The table has an unrestricted intercept and unrestricted trend

Appendix 3. Granger causality equation

$$\begin{aligned}
 \ln \text{RGDP}_t &= \mathbf{a} + \sum_{i=1}^p \varnothing_i \ln \text{RGDP}_{t-i} + \sum_{i=0}^p \theta_i \ln \text{OPENN}_{t-i} + \varepsilon_t \theta_i \ln \text{OPENN}_t \\
 &= \mathbf{a} + \sum_{i=1}^p \varnothing_i \ln \text{RGDP}_{t-i} + \sum_{i=0}^p \theta_i \ln \text{OPENN}_{t-i} + \varepsilon_t \\
 \ln \text{SSE}_t &= \mathbf{a} + \sum_{i=1}^p \varnothing_i \ln \text{RGDP}_{t-i} + \sum_{i=0}^p \gamma_i \ln \text{SSE}_{t-i} + \varepsilon_t \\
 \ln \text{CEBA}_t &= \mathbf{a} + \sum_{i=1}^p \varnothing_i \ln \text{RGDP}_{t-i} + \sum_{i=0}^p \varphi_i \ln \text{CEBA}_{t-i} + \varepsilon_t \\
 \ln \text{CIBA}_t &= \mathbf{a} + \sum_{i=1}^p \varnothing_i \ln \text{RGDP}_{t-i} + \sum_{i=0}^p \varphi_i \ln \text{CIBA}_{t-i} + \varepsilon_t \\
 \ln \text{AFDIOTTW}_t &= \mathbf{a} + \sum_{i=1}^p \varnothing_i \ln \text{RGDP}_{t-i} + \sum_{i=0}^p \delta_i \ln \text{AFDIOTTW}_{t-i} + \varepsilon_t \\
 \ln \text{CFDIITA}_t &= \mathbf{a} + \sum_{i=1}^p \varnothing_i \ln \text{RGDP}_{t-i} + \sum_{i=0}^p \vartheta_i \ln \text{CFDIITA}_{t-i} + \varepsilon_t \\
 \ln \text{FDIITA}_t &= \mathbf{a} + \sum_{i=1}^p \varnothing_i \ln \text{RGDP}_{t-i} + \sum_{i=0}^p \zeta_i \ln \text{FDIITA}_{t-i} + \varepsilon_t \\
 \ln \text{FDIITA}_t &= \mathbf{a} + \sum_{i=1}^p \varnothing_i \ln \text{RGDP}_{t-i} + \sum_{i=0}^p \zeta_i \ln \text{FDIITA}_{t-i} + \varepsilon_t \\
 \ln \text{USFDIITA}_t &= \mathbf{a} + \sum_{i=1}^p \varnothing_i \ln \text{RGDP}_{t-i} + \sum_{i=0}^p \epsilon_i \ln \text{USFDIITA}_{t-i} + \varepsilon_t
 \end{aligned}$$

Series	Definition		Symbols	Investment and growth link
African human capital index	SSE	WDI	SSE	
African unemployment value	Labor force – Total Employment	WDI	UNE	
Africa economic growth index	GDP at constant 2005 price	WDI	GDP	
China FDI share to Africa	China share of FDI to Africa	UNCTAD bilateral data	CFDIITA	
US FDI share to Africa	US share of FDI to Africa	UNCTAD bilateral data	USFDIITA	
China export value	Africa import share from China	China Statistical Yearbook	CEBA	
China import value	Africa export share to China	China Statistical Yearbook	CIBA	
Openness	World Bank formula, export + import/GDP	WDI	OPEN	
African investment abroad	Africa FDI outflow to the world	WDI	AFDIOTW	
World investment	FDI inflows to Africa	UNCTAD bilateral data	USFDIITA	

Notes: All data are measured in constant 2005 prices and are a time-series aggregate data taken from different sources

Sources: WDI; China Statistical Yearbook; PW8.1, UNITA, UNCTAD and Penn World Version 8.1; Gu, 2009; Ndikumana and Verick, 2008; Pigato, 2000; Busse and Groizard, 2006; De Gregorio and Guidotti, 1995; Borensztein *et al.*, 1998; Adewumi *et al.* (2006)

Table AII.
Data sources and
definition

Corresponding author

Isaac Koomson-Abekah can be contacted at: isabkoworld@gmail.com

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