

Gradual Economic Growth in Africa: What are the Underpinning Factors? An Empirical Analysis

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Abstract

We inquire about the forces underpinning the recent gradual economic growth in Africa. Our study covered 41 countries in Africa, cutting across the Western, Eastern, Central, Southern and Northern parts. Our study adopted the fixed effect, feasible generalized least squares (FGLS) and One Step System GMM to estimate the determinants of upsurge in the economic growth in Africa. Our results divulge that aid has no effectiveness on the economic growth of Africa. Further, the study suggests that China's FDI to Africa and trade with Africa has helped in the economic growth of Africa. Our study also suggest that the recent improvement in the institution of Africa has contributed to the growth of Africa. Overall, the result of this study helps in recompensing the imbalance in the extant literature.

Keywords: economic growth, aid, foreign direct investment, trade, institutions, Africa

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1. Introduction

The conceptual framework of economic growth is “nothing new under the sun” of international economic literature. Across theoretical, policy oriented and empirical researches, the economic performance of Africa has received massive attention. The Africa economic growth puzzle has received this great attention for close to three decades. As a matter of urgency and importance, the majority of African countries themselves have become enlightened and worried about the deplorable state of their economies and through their umbrella body African Union (AU) developed measures to aid in the growth of the African economies. The paramount of these measures is of course the African Continental Free Trade Area (AfCFTA). It worth mentioning that the modern trends of economic growth in Africa present a disquieting setting, underscoring the primacy that countries within the continent need vivid structural thresholds for aligning their policies.

Outside all odds, the African continent began seeing economic improvements at the turnout of the 21st century. The continent saw yearly growth of 6.2 percent between 2002 – 2008 (United Nations, 2018). Africa's growth projections have experienced fluctuations having been affected by some exogenous blows since 2015. Economic growth has however, recovered from the global financial crisis and the other external shocks (World Bank Data, 2017). The (United Nations, 2018) attributes this resumption of growth to improvement of capital inflows, particularly foreign direct investment (hereafter FDI) which contributed to financing the current account deficits and bolstering foreign reserves. Trade Openness has been said to be an underlying contributor to the improvement in the economic growth of African economies (Egyir et al., 2019). From the periods of 2008 to 2018, the total exports of goods and services from Sub Saharan Africa increased from about US\$454.7 billion to about US\$544.3 billion. Within the same period, real GDP (2010 as base year) improved from about US\$ 1.260 trillion to US\$ 1.789 trillion. The annual GDP growth rate for the same period was on average, 3.73 percent (World Bank Data, 2019).

The growth and development trajectory of African economies in the last two decades have been attributable to a number of growth factors. According to African Economic Outlook 2017 report by (AfDB et al., 2017), the growth improvements in Africa is gingered by forces including domestic demands (as a result of increased consumption by the growth in population). The increased domestic demands further stimulates private consumption and government expenditure in the area of infrastructure investments. Reforms in the area of business and macroeconomic environment have played a steady role in the growth of Africa. In addition, Africa's gradually increasing diversification underpins the recent improvements in its growth. More countries within the continent have begun making developments in their industrial and services sector deploying technological innovations.

Although numerous studies have emerged to inquire about the forces supporting the recent gradual economic growth in Africa, there is however, inconclusive results and findings about the determinants of economic growth in Africa. This thus provides a guided backing to the principal objective of this study to help recompense the

imbalance in the available literature. What factors are actually accounting for the gradual economic growth of Africa? We pose! The key novelty of our paper accordingly is to attempt to find an answer to this question.

The remainder of the paper is structured in the following manner. Section 2 briefly reviews related literature. Section 3 provides the source of data and econometric modeling. Section 4 presents the empirical analysis of the results from the regression and robustness tests. Section 5 offers our conclusions and policy recommendations.

2. Related Literature Review

2.1 Aid and Economic Growth Nexus

The theory of aid versus economic growth has gained much attention in extant economic literature. Results have been mixed without definite conclusions about aid's effectiveness to economic growth. (Burnside & Dollar, 2000) found that aid has, on average, little effect on growth. They highlighted that aid has a more positive influence on growth in economies with good policies. Standard economic theory postulates positive relationship between aid and economic growth (Rifat Baris Tekin, 2012) and that the actual thought that aligns with this is that aid increases the capital stock of a country, which in turn yields economic growth. (Busse et al., 2016) firmly assert that regardless of the source, the overall effect of aid on economic growth is debatable and hugely depends on its utilization by the host country. In studying "Aid, institutions and economic growth in sub-Saharan Africa", (Wako, 2018) reached an indeterminate conclusion on the effect of aid on economic growth. He established that aids from traditional donors have an indirect and overall negative effect on economic growth as against aids China, which have direct positive effect and negative indirect effect but overall indeterminate effect on economic growth.

In her book "Dead Aid", (Moyo, 2009, pp.14) discloses that aid is detrimental and ineffective to the growth of African economies. She further discusses that aid yields corruption and conflicts in Africa, thus has similar effects as the ownership of valuable natural resources. The research work of "Development aid, openness to trade and economic growth in Least Developed Countries: bootstrap panel Granger causality analysis" by (Rifat Baris Tekin, 2012) refutes the usefulness of aid to growth but establishes that the study found no case in which aid had a negative correlation with economic growth. Thus, he drew a conclusion that aid is economic growth neutral. The studies of (Busse et al., 2016) could not find growth association with Chinese aid to Africa. (Urtuzuastigui & Urtuzuastigui, 2019) also concluded that government-to-government aid enhances growth but only in economies with robust institutional landscape and in countries where institutions are not good enough; there exist no positive relationship between aid and growth.

Hypothesis 1: Aid will have a negative relationship with the economic growth of Africa.

2.2 FDI and Economic Growth Nexus

The role of FDI in economic growth has been widely debated both from theoretical and heuristic perspectives in contemporary economic literature. In their research about "The Impact of Governance on Economic Growth in Africa", (Fayissa & Nsiah, 2013) found that FDI has a positive effect on the economic growth in sub Saharan African countries. FDI inflows tend to play a pivotal role by augmenting the treasuries and capital stock for domestic investment in the recipient nation according to (Modou & Hai, 2017), in their study, "The Impact of Asian Foreign Direct Investment, Trade on Africa's Economic Growth". They concluded that FDI contributes positively to growth of West African countries. Utilizing the fixed effect regression model (Doku et al., 2017) found that Chinese FDI has significant positive causal effect on the economic growth of Africa. In similar studies, the results of (Borojo & Jiang, 2017) intimated that net inflow of FDI to Africa has significant positive outcome on the growth of African economies. The work of (Combes et al., 2017) found a sturdily positively significant effect of net capital inflows on economic growth.

(Kolstad & Wiig, 2011) found that Chinese FDI to Africa was skewed towards the natural resource rich countries and where institutional landscape is not robust enough. The studies of (Zhang et al., 2014) arrived at the conclusion that both Chinese FDI and FDI net inflows had no impact on the economic growth of sub Saharan African economies. Consistently, (Busse et al., 2016) also indicated a negative effects of FDI from China and from the rest of the world on African growth. They stressed that the negative effects could likely stem from the reason that FDI to African countries have been inadequate.

Hypothesis 2: FDI will be positively related to economic growth of Africa.

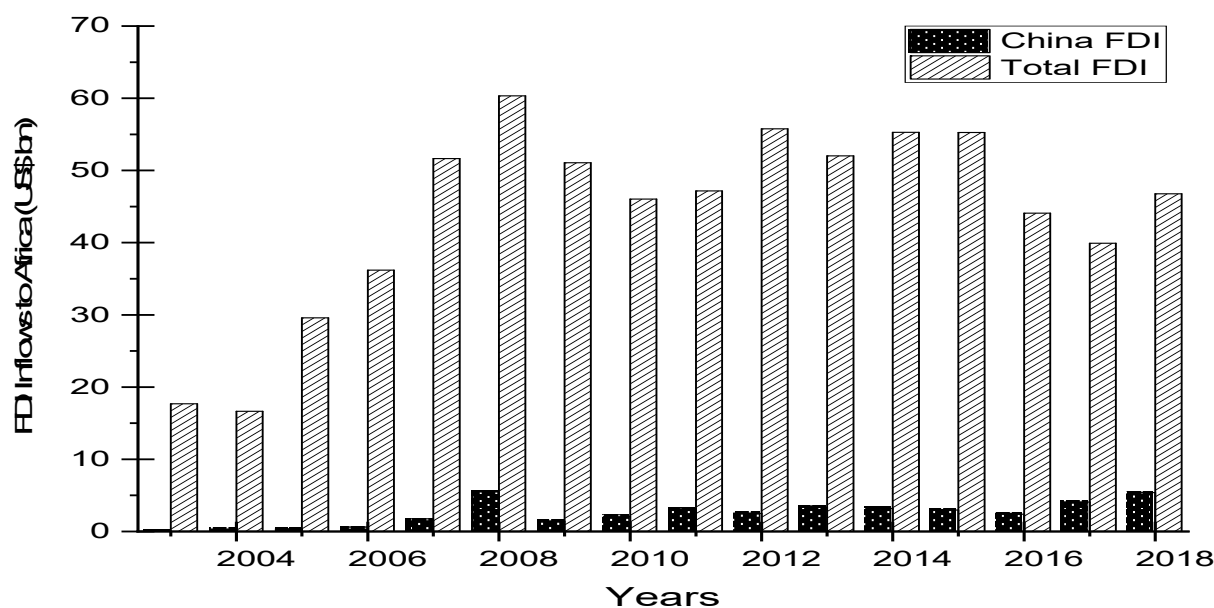


Figure 1: FDI Inflows to Africa (2003- 2018)

Data sources: World Bank (2019); Johns Hopkins China-Africa Research Initiative (2019)

2.3 Trade Openness and Economic Growth Nexus

For over two centuries the special effects of international trade on the economic growth of a country has been an issue of a debate (Savvides, 1995). There have been wide array of studies on the proposal that there is higher tendency for outward-leaning economies to grow faster and the majority of the evidence lean towards supporting this proposition (Savvides, 1995). His findings buttressed his hypothesis that countries in Africa with fast growing trade sectors are more inclined to experiencing faster economic growth. (Soukiazis & Antunes, 2011) in their study found that foreign trade in all its forms such as the share of intra- and total-exports to GDP, the degree of openness, rate of the extra-EU exports ratio and the trade balance with the EU has significant influence on regional growth. They however emphasized that external trade has more inclination to economic growth. (Fayissa & Nsiah, 2013) measured trade in their studies and concluded that trade openness results in economic growth especially in the face of good system of governance. The works of (Busse et al., 2016) showed that Sino-African trade has an effect on Africa's economic growth. Their findings revealed that imports to Africa from China, primarily non-resource items, have negative correlation with growth in Africa. However, they found that exports from Africa to the rest of the world exclusive of China positively influence economic growth in Africa. (Borojo & Jiang, 2017) concluded in their studies that Africa-Sino trade liberalization has vigorous positive effect on economic growth of African countries. Similarly, (Modou & Hai, 2017) established from their findings that trade has a significant positive effect on economic growth.

The research work of (Ioanna Vlastou, 2010) about trade openness and African economic found that trade liberalization has a negative effect on economic development of the 34 countries studied. The study of (Rifat Baris Tekin, 2012) found that trade has a growth-neutral effect. He thus, concluded that trade liberalization is plausible to have depressing effect on economic growth in some least developed countries in Africa. Also (Belloumi, 2014) did not find any causation between trade and African economic growth using Tunisia as a case study.

Hypothesis 3: Trade will have a positive causal relationship with the economic growth of Africa.

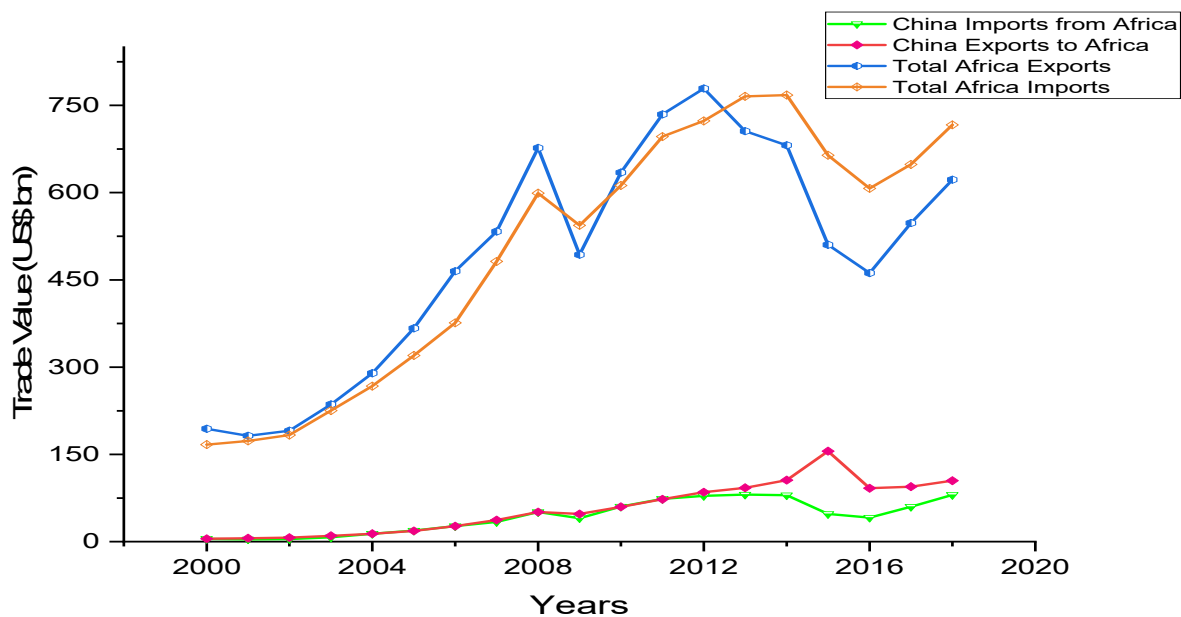


Figure 2: Africa's Trade with the World and with China (2000 - 2018)
 Data sources: World Bank (2019); Johns Hopkins China-Africa Research Initiative (2019)

2.4 Institutional Transformation and Economic Growth Nexus

In a period of a little over a decade, Africa has been making continual improvement in transforming its governance and institutions. Most importantly, there has been an upgrade in doing business scores, governance, public policies, electricity network extensions, telecommunications, employing information and technological innovations in the various public sectors. These improvements notwithstanding, one cannot undermine the need for continual reforms to tackle the wide governance and institution gap in Africa.

Inquiring about "The Impact of Governance on Economic Growth in Africa", (Fayissa & Nsih, 2013) found that good governance has a positive and significant causal effect on the economic growth of sub-Saharan African nations. They drew a firm conclusion that good governance is vital for the economic growth of sub-Saharan African economies, mainly in nations at the lower and higher ends of the income distribution scale. In their studies, (Zghidi et al., 2016) provides empirical evidence that institutional development makes economic growth stronger when they used economic freedom as a proxy for institution on North African countries. The report of (AfDB et al., 2017) documents that Africa has seen improvements in providing public goods and services through the operational management and enhancement of financial resources and undertaken regulatory transformations to address primacy needs for business environment and adopted some e-government mechanisms within major public administrations.

In spite of the recent institutional improvement, Africa still has a hollow gap in institutions that must be addressed. It is imperative for countries to guarantee that public institutions are adept in setting and instituting policies while delivering on those policy obligations in an all-encompassing manner (AfDB et al., 2017). This stresses the vital role of accountability and oversight procedures for further economic growth. (Li et al., 2019) highlight that institutional quality did not play a crucial role in the rapid economic growth of China. However, they recognized that in the latter period of the country's growth, institutional quality a very significant influence to economic growth.

Hypothesis 4: Institutions will have a positive causal relationship with the economic growth of Africa.

3. Source of Data and Heuristic Specifications

3.1 Data Source

Our study employs annual macroeconomic panel datasets for 41 African countries for the years spanning 2009 to 2018. Our sample countries is well depiction of Africa. We included 15 countries from the Western part, 9 from the Eastern part, 5 from the Central part, and 6 from the Southern and Northern part correspondingly. Our choice of countries was purely based on the obtainability of data. The datasets were collected from the World Bank Development indicators, World Governance Indicators (worldbank.org) and the China-Africa Research Initiative of the Johns Hopkins School of Advanced International Studies. Specifically, datasets on Chinese FDI to Africa, Chinese Loans to Africa and Chinese Trade to Africa were garnered from the China-Africa Research Initiative of the Johns Hopkins School of Advanced International Studies. The data on governance indicators were gathered

from World Governance indicators of the World Bank Group with the remaining data collected from the World Bank Development indicators. Real GDP per capita (measured at 2010 USD Prices), which was used as the proxy for economic growth was adopted as the dependent variable.

(3)

3.2 Model specification, description of variables and expected results.

We used three estimation techniques: fixed effect, feasible generalized least squares (FGLS) and dynamic GMM (Roodman, 2009). “In a fixed effects model, the unobserved variables are allowed to have any associations whatsoever with the observed variables.” Fixed effects partial out or control for, the effects of time-invariant variables through time-invariant effects. “In a random effects model, the unobserved variables are assumed to be uncorrelated with (or, more strongly, statistically independent of) all the observed variables” (Williams, 2018). However, if the assumption of fixed-effect model accounting for the exogeneity of past and future explanatory variables does not hold then the fixed-effect estimators are biased. A more significant assumption is that the error terms are perceived to be uncorrelated with all the explanatory variables of the fixed-effect model (Zhang et al., 2014). Some unobserved variables unconsidered in the model may potentially correlate with any of the explanatory variables in the regression. Thus, the fixed effect estimation may be biased.

To reduce the biasness and account for unobserved country-specific characteristics, we adopted the one-step system Generalized Method of Moments (hereafter GMM) dynamic panel estimation method. Our choice to adopt the system GMM hinges on the argument that the presence of frail instruments asymptotically suggests that the coefficient’s variance increases and that the coefficients can be biased in small samples. The system GMM helps correct endogeneity by the introduction of more instruments to improve efficiency dramatically and transforms instruments to make them uncorrelated with the fixed effects. The system GMM also uses orthogonal deviations. The consistency of the system GMM estimation hinges both on the cogency of the assumption that the error term does not indicate any serial correlation and on the cogency of the instruments. As a rule of thumb, we must reject the test for the null hypothesis of no first-order serial correlation under the recognizable supposition that the error is not serially correlated; however, the test for the null hypothesis of no second-order serial correlation should not be rejected.

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We use two specification and diagnostic tests suggested by (Arellano & Bover, 1995) and (Roodman, 2009), which are the Hansen J test and Arellano-Bond test. The Hansen J test of over-identifying restrictions, estimates the overall cogency of the model specification and the instruments. The Arellano-Bond tests whether the differenced residuals are second-order serially correlated i.e. it tests for autocorrelation). Failure to reject the null hypothesis for both tests indicates that there are no autocorrelation and the model adequately specified with the instruments being valid. The system GMM estimation is shown in Table below.

We further conducted some robustness checks using the FGLS that fits panel-data linear models. This method enables estimates in the existence of AR (1) autocorrelation in panels and cross-sectional correlation and heteroscedasticity across panels. Our results showed that the panels were homoscedastic and devoid of autocorrelation. We present the results in Table 2.

We used the Pearson’s correlation coefficient as a test statistics to further check the robustness of our results. The Pearson’s correlation coefficient is seen by most researchers as the best method for determining the correlation

between variables since the estimation is based on the method of covariance. It provides information about the degree and the direction of the correlation.

To estimate the determinants of upsurge in the economic growth in Africa, we specify the econometric model below:

$$\ln gdp_{it} = \alpha + \beta_1 \ln aid_{it} + \beta_2 \ln fdi_{it} + \beta_3 \ln openness_{it} + \beta_4 \ln goveff_{it} + \beta_5 \ln law_{it} + \beta_6 X_{it} + U_i + V_t + \varepsilon_{it} \quad (1)$$

Where $\ln gdp_{it}$ is the real GDP per capita. i denote the countries and t represent the time periods. $\ln aid$ is the real Net Official Development Assistance and Official Aid Received, $\ln fdi$ is the inflows of FDI in the 41 sampled African countries. $\ln openness$ represents trade openness, indicated by trade as a percentage of GDP and $\ln goveff$ and $\ln law$, representing institutions, which is denote government effectiveness and rule of law.

In our model specification, we anticipate FDI inflows to Africa, trade openness and institutions to have positive effects on GDP per capita in Africa. We however hypothesize a negative effect of aid on economic growth. Generally, it makes every sense to predict a positive effect for the three of our four key explanatory variables on economic growth; however, extant studies have produced mixed findings for all four variables as depicted in our literature.

X signifies a vector of controlled variables such as tertiary industry ($\ln tindus$), mobile cellular subscriptions per 100 people ($\ln mobs$), general government final consumption expenditure ($\ln govexp$), gross capital formation ($\ln gfc$), access to electricity (% of population) ($\ln electr$). We controlled for access to electricity also an indicator of the institutions in Africa according to (United Nations, 2018). Lastly, in our model, U, V and ε are the composite error terms that capture unobservable country and time-specific events that could affect economic growth in Africa.

To ascertain the economic impact of China's increasing cooperation and integration with Africa, we also controlled for China's FDI ($\ln cfdi$) and China's trade with Africa ($\ln trade_a$). We expect mobile cellular subscription, gross capital formation and access to electricity to have positive effects on economic growth whilst the tertiary industry and government expenditure are indeterminate. The consumption expenditure proxies cannot be determined a priori because early work by (Solow, 1956) postulates that higher household consumption expenditures has the tendency to diminish economic growth by reducing investment due to minimal savings. In contrast, (Myrdal, 1971) posit that increased household expenditures on nutrition, health and education actually enhance rather than wane economic growth since educated and healthy individuals are more productive and expected to contribute to economic growth. We take logs for all variables with the exclusion of institutional factors, due to the presence of many negative observations.

Similar to the work of (Fayissa & Nsiah, 2013) we make estimation of the parameters analogous to the independent variables of (1) above by the fixed-effects and random-effects models based on our panel data for the 41 African countries covering 2009 to 2018. A heuristic depiction of the model is as presented in (2).

$$Y_{it} = \delta_i + \Gamma_t + X_{it} + \Phi_{it} + \psi_{it} \quad (2)$$

Y_{it} is the natural logarithm for real GDP per capita in country i at time period t . X_{it} represents the vector of the independent variables for country $i = 1, 2, \dots, n$ and at time $t = 1, 2, \dots, t$; Φ is a scalar vector for the parameters of β_1, \dots, β_6 ; ψ_{it} is a classical stochastic disturbance term with $E[\psi_{it}] = 0$ and $var[\psi_{it}] = \sigma^2$, δ_i and Γ_t are country and time specific effects, respectively.

From (2), three assumptions may be made;

1. Should an assumption be made that the country specific effects are constant throughout countries and the time specific effects are absent [i.e. $\delta_i = \lambda$ and $\Gamma_t = 0$], then model (2) is estimated by the Ordinary Least Squares (OLS) technique, or restricted OLS method.
2. The next estimation method is an assumption that the country specific effects are unchanged, but unequal (i.e. $\delta_i = \lambda_i$ and $\Gamma_t = 0$ which produces a one-way fixed effects model.
3. Third, the assumption is a condition where the country effects are not constants, but instead are disturbances; the time effects are absent [i.e. $\delta_i = \lambda + w_i$ and $\Gamma_t = 0$] where $E[w_i] = 0$ and $var[w_i] = \sigma_w^2$ and $cov[\varepsilon_i, w_i] = 0$. In such instance, the generalized least squares (GLS) which yields random-effects model is used in estimating model (2).

We make a third equation specification given that some of the variables for explaining growth may either be endogenous or determined or perhaps both, and that growth in the present period could take on its previous values. This equation is a dynamic variant of the fixed effects and random effects provided in (2) and derived from the estimation of (Arellano & Bond, 1991; Fayissa & Nsiah, 2013). It is detailed as follows;

$$\Delta Y_{it} = \alpha' \Delta Y_{it-1} + \beta' \Delta X_{it-1} + \gamma' Z_{it} + \sigma_i + \varepsilon_{it} \quad (3)$$

From (3) above, ΔY_{it} represents the natural log of real GDP per capita in country i at time period t ; ΔY_{it-1} connotes the lag of the dependent variable, ΔX_{it} denotes a vector of lagged level of predetermined and endogenous variables, z_{it} is a vector of exogenous variables, and α, β , and γ are parameters to be estimated. σ_i and ε_{it} are assumed to be independent across time periods in country i . The term σ_i denotes country specific effects that are similarly and autonomously distributed over the countries while ε_{it} signifies noise stochastic disturbance term and also assumed to be independently distributed.

4. Modeling, Empirical Analysis and Robustness Checks

We present the estimation results of the fixed-effects and the random-effects models in Table 1. Comparing the results of the consistent fixed-effects with the efficient random-effects estimates using the Hausman specification test, rejects the random-effects estimates at $p < 0.0001$ in favor of the fixed-effects estimation. We therefore show both results but center the analysis of our results on the more robust fixed-effects results displayed in Table 1. Four of our variables of interest are statistically significant but have different coefficients indicating different effects on the real GDP per capita at different significance levels.

Table 1: Fixed Effects and Random Effects Estimates

Variable	Description	Fixed-Effects Coefficients	Random-Effects Coefficients
Inaid	ODA and OAR (constant 2016 US\$)	-0.0246 *** (0.0090)	-0.0300 *** (0.0111)
Infdi	Net inflows on FDI (% of GDP)	0.0076 ** (0.0035)	0.0063 (0.0043)
Inopeness	Trade (% of GDP)	-0.0636 *** (0.0229)	-0.0349 (0.0281)
goveff	Government Effectiveness Estimate	0.0516 (0.0369)	0.1185 * (0.0451)
law	Rule of Law Estimate	0.1021 *** (0.0329)	0.1117 * (0.0406)
diff_lngfc	Gross capital formation (% of GDP)	-0.0301 ** (0.0148)	-0.0224 (0.0184)
Incfdi	Chinese FDI Flow to African Countries (US\$ mn, unadjusted)	0.0069 ** (0.0029)	0.0049 (0.0036)
Inmobsub	Mobile cellular subscriptions (per 100 people)	0.1306 *** (0.0199)	0.1307 *** (0.0246)
Inelectr	Access to electricity (% of population)	0.0432 ** (0.0171)	0.0660 *** (0.0212)
diff_lngovexp	General government final consumption expenditure (% of GDP)	-0.0385 ** (0.0192)	-0.0439 * (0.0240)
Intindus	Services, value added (% of GDP)	-0.1965 *** (0.0353)	-0.1609 *** (0.0437)
Intrade_a	Annual China Export +Import with Africa (US\$ mn unadjusted)	0.0412 *** (0.0098)	0.0494 *** (0.0119)
Constant		7.7546 *** (0.2599)	7.5461 *** (0.3287)
Observations		287	287
Number of Countries		41	41
R-Squared		0.6654	0.7205

Note: Dependent variable is real GDP per capita. ***, **, and * indicate statistical significance at 1%, 5%, and 10 % levels, respectively.

In parenthesis are the t -statistics (standard errors) for the coefficients.

We find that aid is statistically significant with real GDP per capita of African economies but has a negative coefficient of 0.025 indicating that a 1% increase in aid reduces real GDP per capita by 0.025% at the 1% significance level in the short term, ceteris paribus. We refute the effectiveness of aid on African economies but our study finds no basis to rule out any causal relationship between aid and economic growth. This results is consistent with the assertions of (Moyo, 2009) about aid and the economic growth of Africa and the findings of (Tekin, 2012; Egyir et al., 2019).

The study reveals that both the total FDI and Chinese FDI to Africa have significant and positive causal effect

on the growth of Africa. We find that a respective 1% increase in total FDI and Chinese FDI to Africa will increase economic growth by 0.0076% and 0.0069 at the 5% significance level in the short term, all other things being equal. These findings are consistent with the studies of (Fayissa & Nsiah, 2013; Diouf, Modou & Hai, 2017; Doku et al., 2017) but contrary to the findings of (Alon et al., 2014; Busse et al., 2016).

Unlike the works of (Savvides, 1995; Fayissa & Nsiah, 2013; Diouf, Modou & Hai, 2017), our studies finds that trade openness has a significant but negative effect on economic growth. Our findings are consistent with (Ioanna Vlastou, 2010; Rifat Baris Tekin, 2012). We deduce that the lack of trade impact on the economic growth of Africa is potentially as a result of lack value addition to African exports since most African countries trade in natural resources or products in their raw state (Biggeri & Sanfilippo, 2009; Sanfilippo, 2010; AfDB et al., 2017). In contrast to the effect of overall trade on Africa, we find that Chinese trade with Africa has a very significant and positive correlation with economic growth of Africa and this is consistent with the results of (Busse et al., 2016). According to the findings, 1% increase in Chinese trade will in the short run, increase economic growth in Africa by 0.0412% at 1% significance level, all other things being equal.

We had two main (government effectiveness, rule of law) and one other (access to electricity) controlled variables for accessing institutional impact on African economies. One of the main (rule of law) and the controlled (access to electricity) variables showed highly significance and positive relationship with the economic growth of Africa while government effectiveness though had positive coefficient was not significant. Our result of the rule of law is as per the results of (Zghidi et al., 2016) and that of the access of electricity in line with the finding of (AfDB et al., 2017). The lack of significance between the government effectiveness and the economic growth of Africa is still consistent with the assertions (AfDB et al., 2017) that African countries still have some gaps in the public institutions which must be filled. This finding holds true since the public services and civil services in most African countries are hard-hit with corruption, with low-level of independence from political pressures and low quality of policy formulation and implementation.

We found that gross capital formation is significant but has a negative effect on the economic growth of Africa. This result is consistent with (Solow, 1956) and Onyinye et al., (2017) whose studies found that gross fixed capital formation has no positive effect on the economic growth of Nigeria but also contrary to (Zhang et al., 2014) which found that there is a significant persistent relationship between physical capital accumulation and economic growth of sub Saharan Africa.

The findings also divulge a significant but negative effect of government expenditure on the economic growth of Africa, a result that is similar to (Mitchell, 2005) which claim to find no vivid proof that higher government spending has played a significant role in reducing income poverty in low- and middle-income countries. We explain this to be that even though investment in areas such as education, health and nutrition are deemed growth-enhancing as healthy and educated labour force are more productive, it takes time for such investments to be translated into productivity. Thus, African governments may not benefit in the short term from their recently improving expenditures. This might account for why government expenditure appears to have had a negative effect on economic growth from our findings.

Table 2: Estimation Results for FGLS and Arellano-Bond Dynamic Panel-Data

Variable	Description	FGLS	GMM Coefficients
Lngdppc L1	GDP per capita (constant 2010 US\$)	-	0.9582 *** (0.0189)
Inaid	ODA and OAR (constant 2016 US\$)	-0.3085 *** (0.0320)	-0.0008 (0.0061)
Infdi	Net inflows on FDI (% of GDP)	-0.0079 (0.0236)	0.00306 (0.0026)
Inopeness	Trade (% of GDP)	0.0070 (0.0743)	0.0206 (0.0140)
goveff	Government Effectiveness Estimate	.2753 ** (0.1231)	0.0213 (0.0137)
law	Rule of Law Estimate	0.1341 (0.1213)	0.0054 (0.0163)
diff_lngfc	Gross capital formation (% of GDP)	0.0708 (0.1147)	0.0406 (0.0573)
Incfdi	Chinese FDI Flow to African Countries (US\$ mn, unadjusted)	0.0330 ** (0.0153)	0.0053 ** (0.0023)
Inmobsub	Mobile cellular subscriptions (per 100 people)	0.3538 *** (0.0853)	0.5717 *** (0.1510)
Inelectr	Access to electricity (% of population)	0.4678 *** (0.0589)	0.0275 ** (0.0126)
diff_lngovexp	General government final consumption expenditure (%of GDP)	-0.4452 *** (0.1472)	-0.3474 *** (0.0753)
Intindus	Services, value added (% of GDP)	0.4579 *** (0.1333)	-0.0063 (0.0228)
Inctrade_a	Annual China Export +Import with Africa (US\$ mn unadjusted)	0.1353 *** (0.0271)	0.1158 ** (0.0493)
Constant		7.6414 *** (1.0080)	6.6617 *** (1.6537)
Year Dummies		No	Yes
Observations		287	287
No. of Countries		41	41
Wald Chi-square		1543.48	-
F Statistics		-	13075.16
Groups		41	41
Instruments		-	40
AR (1)		-	0.537
AR (2)		-	0.303
Hansen Statistic		-	0.116

Notes: Lngdppc L1 is the lagged dependent variable.

***, **, and * indicate statistical significance at 1%, 5%, and 10 % levels, respectively.

In parenthesis are the t-statistics for the coefficients, which are based on white heteroscedasticity-consistent standard errors.

The GMM regression passed both of the diagnostic and specification tests. We fail to reject the null hypothesis of no second-order serial correlation at the 5 % significance level. The Hansen test indicates that the regression is not inundated by simultaneity bias as the conditions of orthogonality cannot be rejected at the 5 % level. This shows that the model is well specified and the moment conditions deployed in our analysis are valid.

Of key interest from the results of the system GMM is that, both Chinese FDI and trade are significant and positively correlated with real GDP per capita. The results show that a percentage increase associated with Chinese FDI and trade will yield 0.0053% and 0.1158% increase respectively in real GDP per capita of African economies in the short term at 5% significance, ceteris paribus. Further, the study estimates an inelastic situation for Chinese FDI inflow to Africa and trade with Africa. This result shows consistency with the studies of (Diouf, Modou & Hai, 2017; Doku et al., 2017) about FDI to Africa and (Busse et al., 2016) findings about Chinese trade with Africa. Thus, Chinese FDI cum trade and growth of Africa exhibit inelastic relationship.

Additionally, from the GMM results we find that mobile cellular subscriptions and access to electricity have positively significance effect on the economic growth of Africa. This result is in line with the survey conducted

by (AfDB et al., 2017; United Nations, 2018) about Africa. Importantly, a 1% increase in the access to electricity in the short term will result in a 0.0275% rise in the economic growth of Africa, at the 5% significance level, *ceteris paribus*.

5. Conclusion and Policy Recommendations

With much nosiness about the underpinning factors to recent improvement in the growth of African economies, this study followed (Burnside & Dollar, 2000; Biggeri & Sanfilippo, 2009; Sanfilippo, 2010; Rifat Barış Tekin, 2011; Kolstad & Wiig, 2011; Cheung et al., 2012; Elicha & Corresponding, 2012; Rifat Baris Tekin, 2012; Kuipo & Abor, 2016; Borojo & Jiang, 2017; Awad & Ragab, 2017) to explore the responsiveness of different factors (total FDI, net aid, trade openness and institutions) on the economic growth of Africa using annual panel data of 41 African countries spanning 2009 to 2018. We supported our main variables of interest with additional pertinent policy variables (access to electricity, mobile subscription, government expenditure, gross capital formation, Chinese trade and Chinese FDI).

In line with the findings of our study, we make the ensuing commendations to policy makers. Firstly, African economies should not only consider FDI influxes as a direct sufficient inducement for economic growth but also an essential factor that can complement other crucial forces to result in economic growth. However, our study suggests African countries to strengthen their economic cooperation with China to derive economic growth. FDI inflows according to the new growth theory leads to technology spillover, which will go a long way to affect the growth of Africa.

Moreover, the study divulges that the dearth of sophisticated productive capacity in Africa to produce and export highly standardized products that can compete in the global marketplace remains a dire issue. This has not enabled the continent to derive enough benefits from its enormous export potential. We therefore suggest that moving forward, African countries should draw a deep connection between FDI inflows particularly Chinese FDI and trade openness reforms that will accentuate instituting free trade areas and export-processing zones to inspire and entice export-oriented foreign businesses that produce products that meet international needs and to diversify exports for enhanced growth.

The growth-reducing effects of foreign aid specify that aid is not a dependable conduit through which Africa can achieve economic growth. It is therefore significant for African countries to lessen their dependence on foreign aid which generally “ties their hands” to assent to arrangements that are often skewed. The amount of external debts should be minimized and attention given to help develop more vigorous domestic financial resources to enhance growth.

Lastly, we encourage African countries to stay committed to the route of improving their institutional landscape. A more robust institution will undoubtedly complement the other forces to result in economic growth. Respective government regimes should be persistent in their electricity extension programmes especially to reach every part of their countries. This will indubitably induce and intensify investments. We also suggest African economies to adopt more vigorous digitization systems to improve the effectiveness and efficiency of public institutions.

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Notes

Note 1. For a comprehensive review of the role of aid on African economies readers are referred to “Dead Aid” by (Moyo, 2009)

Note 2. The list of countries considered in our study is presented under Appendix 1. The periods captured in our study is when most African countries are experiencing trade openness, realizing increased FDI inflows and institutional transformations.

Note 3. For insight about why government expenditure may not yield short term results, we refer readers to the report of (Mitchell, 2005).

Table 1: Descriptive Statistics

Variable	Mean	Std. Dev.	Min	Max
lngdppc	7.191	0.985	5.351	9.267
lnaid	20.128	1.081	16.242	22.328
lnfdi	0.975	1.252	-6.280	4.638
lnopeness	4.185	0.417	2.950	5.110
goveff	-0.671	0.587	-1.848	1.057
law	-0.599	0.600	-1.852	0.975
diff_lngfc	-0.006	0.213	-1.050	1.230
lnctfdi	3.299	2.021	-3.507	6.815
lnmobsub	4.219	0.551	1.559	5.099
lnelectr	3.581	0.754	0.642	4.605
diff_lngov~p	0.004	0.151	-0.442	1.614
lnindus	3.823	0.211	2.995	4.211
lnctrade_a	6.965	1.721	2.588	10.795

Notes. Data covers the period between 2009 and 2018.

Table 2: Pearson’s Correlation Coefficient Results

	lngdppc (1)	lnaid (2)	lnfdi (3)	lnopeness (4)	goveff (5)	law (6)	lnctfdi (7)	diff_lngfc (8)	lnmobsub (9)	lnelectr (10)	diff_lngovexp (11)	lnindus (12)	lnctrade_a (13)
1	1.00												
2	-0.37	1.00											
3	0.06	-0.06	1.00										
4	0.33	-0.46	0.39	1.00									
5	0.60	-0.13	0.06	0.23	1.00								
6	0.53	-0.15	0.17	0.28	0.93	1.00							
7	-0.07	0.28	0.06	-0.17	0.01	-0.06	1.00						
8	0.21	0.06	0.02	0.00	-0.05	-0.04	-0.03	1.00					
9	0.73	-0.30	0.06	0.33	0.46	0.45	0.11	-0.05	1.00				
10	0.79	-0.18	-0.03	0.17	0.46	0.40	0.23	-0.01	0.73	1.00			
11	-0.09	-0.08	-0.11	0.07	-0.03	-0.04	-0.07	0.09	-0.03	-0.04	1.00		
12	0.41	-0.00	-0.12	0.02	0.56	0.51	-0.05	-0.04	0.33	0.34	-0.07	1.00	
13	0.40	0.34	0.15	-0.01	0.02	-0.05	0.63	-0.03	0.31	0.46	-0.06	-0.00	1.00

Table 3: List of Countries Used in the Study

Algeria	Congo	Madagascar	South Africa
Angola	Egypt	Malawi	Sudan
Benin	Ethiopia	Mauritania	Tanzania
Botswana	Gabon	Mauritius	Togo
Burkina Faso	Gambia	Morocco	Tunisia
Burundi	Ghana	Namibia	Uganda
Cameroon	Guinea	Niger	Zambia
Cape Verde	Guinea Bissau	Nigeria	Zimbabwe
Central African Rep.	Kenya	Rwanda	
Cote D'ivoire	Lesotho	Senegal	
DR Congo	Liberia	Sierra Leone	

Western (15)	Eastern (9)	Central (5)	Southern (6)	Northern (6)
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Table 4: Definition of Variables and Data Sources.

Variable	Proxy/definition	Abbreviation	Data sources
Real GDP per capita	GDP per capita (constant 2010 US\$)	gdppc	World Development Indicators (2019)
Aid	ODA and OAR (constant 2016 US\$)	aid	World Development Indicators (2019)
Trade Openness	Trade (% of GDP)	openness	World Development Indicators (2019)
Foreign Direct Investment (FDI)	Net inflows on FDI (% of GDP)	lnfdi	World Development Indicators (2019)
China FDI	Chinese FDI Flow to African Countries (US\$ mn, unadjusted)	cfdi	Johns Hopkins China-Africa Research Initiative
China Trade with Africa	Annual China Export +Import with Africa (US\$ mn unadjusted)	ctrade_a	Johns Hopkins China-Africa Research Initiative
Tertiary Industry	Services, value added (% of GDP)	tindus	World Development Indicators (2019)
Mobile Cellular	Mobile cellular subscriptions (per 100 people)	mobsb	World Development Indicators (2019)
Government Spending	General government final consumption expenditure (% of GDP)	govexp	World Development Indicators (2019)
Domestic Investment	Gross capital formation (% of GDP)	lngfc	World Development Indicators (2019)
Access to electricity	Access to electricity (% of population)	electr	World Development Indicators (2019)
Government Effectiveness	Government Effectiveness Estimate	goveff	Worldwide Governance Indicators (2019)
Rule of Law	Rule of Law Estimate	law	Worldwide Governance Indicators (2019)

Notes: (a). ODA is Official Development Assistance; OAR is Official Aid Received.

(b). Government Effectiveness and Rule of Law represent the governance measuring for institutions. They estimate the public perception about institutions and range from -2.5 to 2.5