EFFECTS OF SINO FDI ON THE GROWTH OF
SUB-SAHARAN AFRICA

ABSTRACT

The past two decades have seen numerous studies at various levels attempting to investigate the effect of Foreign Direct Investments (FDI) on the African region. A great majority of these studies reached the conclusion that FDI accounts for technology transfer across countries thereby increasing the total investment in African countries. However, regarding studies about Chinese investments in Africa, many authors claimed that Chinese investments in Africa bring with it more harm than good to the economies. This study aims to weigh out the effects of Chinese investments in Africa. The study used a dynamic panel regression approach to correct for possible endogeneity problems. It was concluded from the study that, the net of Chinese FDI is positive. Thus, Chinese FDI contributes positively to the economic growth of African countries. By implication, Chinese investments are setting the African economies on the road to achieving economic development through modernization, industrialization and strong economic growth.

Keywords: Foreign Direct Investment, China-Africa Relation, Economic Growth, PMG, Africa, China

JEL Classification: F00, F43

RIASSUNTO

Effetti degli investimenti diretti cinesi sulla crescita dell’Africa Sub-Sahariana

Nelle due decadi passate sono stati effettuati molti studi a diversi livelli al fine di analizzare gli effetti degli investimenti diretti esteri in Africa. La maggioranza di questi studi ha evidenziato che gli IDE spiegano i trasferimenti tecnologici tra paesi, incrementando così gli investimenti totali nei paesi dell’Africa. Per quanto riguarda però gli investimenti cinesi in Africa, molti autori sostengono che questi siano dannosi per l’economia. Lo scopo di questo studio è di quantificare gli effetti degli IDE cinesi in Africa. È stato utilizzato un approccio di regressione panel dinamico
per correggere possibili problemi di endogeneità. Vi sono evidenze che gli IDE cinesi netti sono positivi, il che significa che gli investimenti cinesi contribuiscono positivamente alla crescita economica dei paesi africani. Questo implica che gli tali investimenti pongono le economie dell’Africa sulla strada del raggiungimento dello sviluppo economico attraverso la modernizzazione, l’industrializzazione e la crescita economica elevata.

1. INTRODUCTION

Foreign direct investment (FDI) for many developing countries stands as a major source of external finance. It usually surpasses official development assistance (ODA), portfolio investment flows or remittances. According to UNCTAD (2017), more than 40 percent of the nearly $1.75 trillion of global FDI flows were directed to developing countries in 2016 mostly involving African countries. These huge inflows were deemed to provide a solution for the capital gap faced by the host countries. The benefits of FDI goes beyond attracting needed capital. Foreign direct investment is noted for the transfer of technical know-how and managerial skills and access to foreign markets. Additionally, Arnold et al. (2011), Bijsterbosch and Kolasa (2010), Cantah et al. (2018), Echandi et al. (2015), and Rizvi and Nishat (2009) assert that FDIs potentially transform economies through innovation, enhancing productivity, and creating better-paying and more stable jobs in host countries.

FDI to Sub-Saharan Africa (SSAs) has diverse origins. Over the past two decades, FDI inflows from China to Africa rose to an unprecedented level. These inflows are part of China’s “going out policy” (see: Vhumbunu, 2017). Through this, China has become one of the major sources of FDI to Africa countries. In 2013, seven percent of FDI inflows to Sub-Saharan Africa originated from China with a total of China’s FDI stock in SSA nearing US$24 billion. This figure reflected an annual growth rate of 50 percent between 2004 and 2013 (MOFCOM 2003-2014; Copley et al., 2014). In the wake of the 2008 global financial crisis, Chinese FDI in Africa continued to be diversified. Foreign direct investment took the form of mergers and acquisitions (M&As), commercial lending and other financing arrangements. Also, Oil, minerals and other extractive industries remain the sectors of greatest interest to Chinese investors (at 30 percent of total investment). Chinese FDI has undergone a marked diversification into financial services, construction, manufacturing, and basic infrastructure in the recent past. But not much is known
about the impact of Chinese FDI inflow on growth for the sub-region. This makes this study on
the impact of Sino FDIs on Africa very crucial to academics and policymakers from both fronts.
Studies that have examined the role of Sino-FDI on African economies provided ambiguous
results. On one hand, some studies found a positive effect of Chinese FDI inflows on African
economies. They argued that Sino-FDI led to markets expansions, access to cheaper consumer
products, lower investment cost, improved capital consumption and infrastructure and human
capital development (Ademola et al., 2009; Doku et al., 2017; Soumaré et al., 2016), increased
economic growth rate and provided a hedge against the effect of the global financial crisis
(Weisbrod and Whalley, 2011). On the contrary, it is argued that Chinese FDIs create negative
feedbacks into the host country’s economy. Thus, Chinese Multinationals compete with
industries in the host country which results in their collapse and loss of jobs (Ademola et al.,
2009; Giovannetti and Sanfilippo, 2009). The inflows of FDI from Chinese clustered mostly in
resource-rich countries. These resource-rich countries have weaker institutions and as such
lead to unsustainable development (Kaplinsky et al., 2007). Thus FDI inflows from China have
both negative and positive effects as suggested by Doku et al. (2017). This provides good ground
to further investigate the effect of Chinese FDI on economic growth in Africa.

The direction of causation remains a problem in related literature. Most panel studies settled on
regression results without paying attention to causality between FDI and economic growth.
Studies that have examined causality between FDI and economic growth do so in the generic
sense. They turn to focus on FDI inflows without recourse to the source country or region.
Fofana et al. (2018) found no causal relationship between FDI inflows and economic growth.
Sunde (2017) found a unidirectional causality between FDI and growth for South Africa. The
knowledge about the causal relationship between Sino-FDI flows and economic growth will help
policy makers to know the best policy measures needed to enhance the benefit of FDIs to SSAs.

The study by Doku et al. (2017) attempts to provide an answer to this question but failed to
consider the dynamic nature of foreign direct investment flows. Though they controlled for time
effect and country heterogeneity, their estimation suffers from endogeneity problems. It is
evident that FDI may flow to places where there are economic stability and market. These
factors are directly linked to economic growth. Thus, high performing markets may attract
foreign direct investment. The reverse is true where FDI has a possible effect on economic
growth (Alfaro et al., 2004; Alguacil et al., 2011; Mourao, 2018; Tung and Cho, 2001). Considering
this, we modeled the relationship between FDI from China and economic growth in dynamic form accounting for endogeneity from possible feedback effect and we also examined the direction of causation between Sino-FDI and economic growth of SSAs. Many studies have examined the effect of Chinese FDI on economic growth. However, our work differs from other studies in the following ways: 1) Our study includes more countries (33 countries from SSA) which give more coverage and more data point compared to previous studies. 2) Again, this study addresses possible endogeneity problems using dynamic panel models like Pool Mean Regression and system GMM. These methods provide a superior way of dealing with omitted variables and possible feedback effects. 3) Lastly, this study is among the few studies that examine the direction of causality between Sino-FDI inflow and the economic growth of Sub-Saharan African countries.

The remaining of the paper is organized as follows: section 2 presents the literature review of the study. In this section, we discuss theories and empirical works related to FDI and growth and patterns of FDI flow from China. The methodology of the study is presented in section three (3). Data, model and estimation techniques are presented. The fourth section (4) presents the results of the study. Unit root analysis results from regression and causality test results are presented and discussed in section four (4). In the last section (5), we provide conclusions and policy recommendations for stakeholders.

2. LITERATURE REVIEW

The need for investment is seated in growth models. The Harrod and Domar (H-D) models present that for equilibrium to be established, the rate of growth should match the rate of capital formation and capital productivity (Hsiao and Shen, 2003). Thus, the H-D model emphasizes the need for investment to propel growth. The undertone for the need for investment is explicit in the Solow models at least in the short run. Temple (1998) demonstrated that returns to scale on investment are high due to externalities. Secondly, his theoretical framework establishes a relation between steady-state per capita income and investment. This sort of relationship makes inflow of capital in the form of foreign direct investment good for developing economies at least on the theoretical grounds. There is also an agreement in the literature that links savings to investment. Given the special conditions in developing countries, there exists a gap between saving and investment (Adom and Elbahnasawy, 2014; Gocer et al., 2005). This gap has a
negative effect on economic growth. Therefore, to ensure growth, there must be FDIs domestic capital in ensuring the growth of the economies. Hence FDI augments the gap between savings and investment in developing countries. This implies a positive linkage between FDI and economic growth.

Empirical studies on the impact of FDI on economic growth abound. Studies have found a positive correlation between FDI and economic growth in developing nations (Hsiao and Shen, 2003; Nunnenkamp and Spatz, 2004; Prüfer and Tondl, 2008). The scoping study of Alfaro and Chauvin (2016) suggests that less financially developed economies experience more inflow of FDI rather than developed ones. And the effect of FDI on development is more pronounced on GDP growth, aggregate productivity among others. In this, one cannot neglect the role of financial development as a vehicle in terms of FDI contribution to the microeconomic and macroeconomic benefits of the host economies. The cointegration relationship has been examined for FDI and economic growth (Ahmad et al., 2018; Antwi and Zhao, 2013). These studies established a long-run cointegrating relationship between the two variables. They affirm the assertion of a long-run relationship. It is therefore argued that FDI has a long-run effect on economic growth. In the short run period, the same could be said. Bermejo Carbonell and Werner (2018) investigated for new evidence of FDI-growth nexus. The result from their study confirmed the hypothesized positive impact of FDI on economic growth for Spain. The authors called for a rethinking of economic methodology in the face of studying for the linkages between FDI and economic growth.

Specifically on Africa and China relations, only a few attempts to examine the effect of China’s investment impact on growth and economic development. Doku et al. (2017) examine the effect of China’s investment on the growth of African nations. The study found that there is a positive impact of Chinese FDI on the economic growth of African countries. Yet, their result did not account for the feedback effect of FDI and growth, hence the need for correcting for possible endogeneity. Like Donou-Adonsou and Lim (2018) argue that Chinese investment in Africa contributes more to the per capita growth in their comparative analysis. This somewhat supports the already existing claim of a win-win benefit of investment from China. Weisbrod and Whalley (2011) showed a novelty in their work by using growth accounting techniques to evaluate the contribution of Chinese inward FDI to Sub-Saharan Africa’s growth before the financial crisis of 2008. Given the data used in the framework of Solow (1957), Denison (1962),
Weisbrod and Whalley (2011), the counterfactual experiment that there are varied responses to Chinese inward FDI. Most of the countries experience a boost to their economic growth as a result of Chinese investment. In more certain terms, the results suggest that a significant portion of the propelled growth in Sub-Saharan Africa in the three years before the period of the financial crisis and in the two years afterward (2008-2009) can be attributed to Chinese inward investment.

Utilizing the Pesaran autoregressive distributive lag (ARDL) framework to test the short-run and long-run relationship of indicators, Koomson-Abeka and Nwaba (2018), investigate China-Africa Investment link using over two decades of FDI’s data. Further administering the Granger causality test to check the causality between growth and macroeconomic indicators, their study findings revealed that the link between China’s FDI and African economic growth reported a negative/declining effect in both the short and long run. In the long run, the effect of world FDI on growth was significant but not in the short run. However, US FDI to Africa, China Export and Import from Africa reported an insignificant effect on growth. They found no evidence of Okun’s law, as a decrease in Africa unemployment does not increase growth. Overall, China’s FDI in flows to Africa is allocated to capital-intensive activities that have less labor employability. This is expected to result in economic growth but not inclusive growth and employment. 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 socioeconomic and infrastructure challenges militating against growth in the region, the African economy is likely to perform better, if more FDIs are channeled into labor-intensive activities because it has a reductive effect on unemployment.

Other works had focused on the developed impact of Chinese FDI. For example, Koumou and Manyi (2016) investigated the effect of Chinese investments in Africa. Their findings revealed that far from being all negative as voiced by most studies, Chinese investments are setting the African economy on the road to achieving economic development. This is because Chinese FDIs aid African economies to move on the path of modernization and industrialization which lead to strong economic growth. In contrast, it was observed from their study that China predates raw materials from Africa. The effect of such activities is a negative and consequential effect of collapsing domestic companies. Hence, it was concluded that the harmonization and the improvement of Chinese investments in Africa should pass by the respect for rules dictated by
the governments (institutions) and the respect for international standards. Ademola et al. (2009) work also shed interesting revelations on the role of Chinese investment in key issues such as employment citing Ghana, Kenya, Madagascar, and South Africa as examples of countries where Chinese engagement threatens employment. In the same vein, the work of Giovannetti and Sanfilippo (2009) showed a similar effect on the countries they studied.

2.1. The Pattern of Chinese FDI to Africa

Monetary FDI flows to Africa slumped to $42 billion in 2017, a 21 percent decline from 2016. Over the years, FDI from China to the continent has experienced the greatest inflow. Weak oil prices and harmful ongoing macroeconomic effects from the commodity bust saw flows contract in Egypt, Mozambique, the Congo, Nigeria, and Angola. In addition, foreign investment in South Africa continued to underperform. FDI inflows to diversified exporters, including Ethiopia and Morocco, were more resilient. The beginnings of a commodity price recovery, as well as advances in interregional cooperation through the signing of the African Continental Free Trade Area (AfCFTA) agreement, should encourage stronger FDI flows to about $50 billion in the last quartile of 2018, provided the global policy environment remains supportive.

**Figure 1 - Total Chinese FDI Inflow to Africa**

![Graph showing FDI inflow to Africa from 2011 to 2017](image)

*Source: UNCTAD (2017)*.

The United Nations Conference on Trade and Development (UNCTAD) data indicate that amongst the countries selected from the North African region (i.e. Algeria, Egypt, Morocco and Sudan), Algeria received a chunk of China's FDI flows (21 percent, US$246m) in 2012
whilst Egypt received 10 percent, which represented US$119m. Morocco and Sudan however, received approximately 0 percent, which was the lowest. Algeria receiving the largest Chinese FDI flows in the North Africa region is attributed to the reason that she is endowed with oil resources as well as has low political risk (Buckley et al., 2007 cited in Doku et al., 2017). A similar pattern could be observed for the West African partners of China, Central Africa, southern African, and Eastern African economics. In the sample period, FDI stock to Africa varied widely. Some countries had 0 amount of FDI inflows while the highest country average is $4722.97 million. These investments are predominantly in countries where natural resources abound like Ghana, South Africa, and Nigeria, among others. Others like Kenya and Zambia had experienced massive support in infrastructural development. The industrial distribution of FDI flows to China attest to that fact.

Figure 2 - Industrial Distribution of FDI in 2015


3.0. Methodology

The data for the study was taken from UNCTAD trade statistics published by John Hopkins China-Africa Research Initiative on bilateral FDI inflow for China-SSA countries. The time limit for the study is due to consistent and reliable documented sources for panel time series flow for the respective countries involved in the study. By far, the John Hopkins provides a consistent source of FDI data of bilateral FDI inflows from China DPR to the respective African nations. The other related data for economic growth, labor, capital, exchange rate, inflation, and trade
were obtained from the World Development Indicators for the same period. The study used 33 Sub-Saharan African countries.

3.1. Model

In this study, we formulate a Cobb-Douglas production function as is done in Ho & Iyke (2018) following the Solow (1956) growth model. This takes the form of

\[ Y_{it} = A_i K_{it}^\alpha L_{it}^\beta \]  

In equation 1, \( \alpha \) and \( \beta \) are the share of labor and capital, K is capital, L labor and Y is aggregate out for country ‘i’ at a time ‘t’. As mentioned in the existing literature, the total factor productivity (TFP) for a specific country ‘i’ at time ‘t’ could be explained by several factors (Ho and Iyke, 2018). Following Ho and Iyke (2018) and Takumah and Iyke (2017), we augment equation (1) and write the TFP as a function of foreign direct investment (FDI), inflation, government expenditure, human capital, foreign aid, trade liberation, debt, consumption, and financial development. Thus,

\[ A_i = \phi{FDI}_{i}^{\nu_{FDI}}{INF}_{i}^{\nu_{INF}}{GOV}_{i}^{\nu_{GOV}}{HC}_{i}^{\nu_{HC}}{AID}_{i}^{\nu_{AID}}{DEB}_{i}^{\nu_{DEB}}{C}_{i}^{\nu_{C}}{OPN}_{i}^{\nu_{OPN}}{FIN}_{i}^{\nu_{FIN}} \]  

This \( \phi \) is a constant. Substituting equation 2 into 1 and finding linear approximation by taking the log of equation 2 gives equation (3)

\[
\ln Y_{it} = \phi + \nu_1 \ln FDI_{it} + \nu_2 \ln INF_{it} + \nu_3 \ln GOV_{it} + \nu_4 \ln HC_{it} + \nu_5 \ln AID_{it} + \nu_6 \ln DEB_{it} + \\
\nu_7 \ln C_{it} + \nu_8 \ln OPN_{it} + \nu_9 \ln FIN_{it} + \alpha \ln K_{it} + \beta \ln L_{it} + \epsilon_{it}
\]  

The dynamic form of equation 3 is written as equation four (4)

\[
\ln Y_{it} = \phi + \nu_0 \ln Y_{i,t-1} + \nu_1 \ln FDI_{it} + \nu_2 \ln INF_{it} + \nu_3 \ln GOV_{it} + \nu_4 \ln HC_{it} + \nu_5 \ln AID_{it} + \nu_6 \ln DEB_{it} + \\
\nu_7 \ln C_{it} + \nu_8 \ln OPN_{it} + \nu_9 \ln FIN_{it} + \alpha \ln K_{it} + \beta \ln L_{it} + \epsilon_{it}
\]
3.2. Estimation Technique

Panel data is advocated for estimating growth equations. Despite the advantages of panel data, panel regression may suffer from biases emanating from omitted country-specific characteristics (Islam, 1995). In such cases, it is better to apply panel estimation which imposes homogeneity assumption on all parameters but allows country-specific intercepts. Moreover, we cannot apply pooled OLS due to the presence of lag dependence variables on the right-hand side of the equation. In one instance, we following the recommendation proposed in the literature by doing away with individual heterogeneous effect through the first difference transformation and eliminating individual fixed effect in estimating equation 4. By so doing, the variations in the dependent variable could then be attributed to the independent variables.

However, the standard approach of applying first difference transformation removes the fixed effect at the expense of introducing a correlation between the lag of the dependent variable and the error term, creating an endogeneity in the model given its dynamic nature. To avoid the tendency of biasedness due to the problem of endogeneity an alternative estimator may be necessary for estimating the model in equation (4). Due to this, the available options are the GMM instrumental variable (IV) estimator and direct bias-corrected estimators (Bai and Ng, 2010). In the case of endogenous predetermined regressors, the system-estimator proposed by Blundell and Bond (1998) is unbiased and most efficient, while the direct biased corrected estimators perform like the GMM-estimator proposed by Arellano and Bond in 1991. The idea of IV estimations requires identifying an instrument that will be able to mitigate the problem of endogeneity in the model. However, a major drawback in the basic IV model has to do with the ease with which a valid and relevant instrument can be located and used (Wooldridge, 2002). To minimize the task of searching for an appropriate instrument several authors have developed a variant of the IV estimator that uses the lags of the variables in the models (Arellano and Bond, 1991; Blundell and Bond, 1998; Cantah et al., 2018).

Therefore, following Pesaran et al. (1999), we rewrite the equation 4 as:

\[ y_{it} = \sum_{j=1}^{p} \lambda_{ij} y_{i,t-j} + \sum_{j=0}^{q} \delta_{ij} X_{i,t-j} + \mu_{i} + \epsilon_{it} \]  

(5)
It must be noted that $X_{it}$ is the vector that contains all the explanatory variables from individual countries (i), $\mu_i$ is the fixed effect and $\lambda_{ij}$, $\delta_{ij}$ are coefficient. And equation four (4) could be re-written and simplified so that the cointegrating relations between the dependent and independent variables is written as in equation 6:

$$\Delta y_{it} = \phi_{it} \Delta y_{it-1} + B^j X_{it} + \sum_{j=1}^{p-1} \lambda_{ij} \Delta y_{jt-1} + \sum_{j=q}^{q-1} \delta_{ij} \Delta X_{jt-1} + \mu_i + \varepsilon_{it}$$  \hspace{1cm} (6)

It is noted that $\varepsilon_{it}$ is independently distributed across space and time, had zero mean and the variance is greater than 0 and finite fourth-order moment.

Pesaran et al. (1999) offered two estimating techniques, the Mean Group (MG) and the Pooled Mean Group (PMG), which allows for a higher degree of parameter heterogeneity in growth regressions. This is done by the MG estimator allowance for heterogeneity of all coefficients, intercepts, and slopes, and estimating a separate equation for each country. The whole panel coefficients, however, are estimated through unweighted averages of the individual coefficients. In the case of the Pooled Mean Group (PMG) estimator, a lower degree of heterogeneity is allowed by imposing homogeneity in the long-run coefficients. Yet, it allows heterogeneity in the short-run coefficients and the error variances. The basic assumptions of the PMG estimator are (see: Pesaran et al., 1999): i) the error terms are serially uncorrelated and are distributed independently of the regressors, i.e., the explanatory variables can be treated as exogenous; ii) there is a long-run relationship between the dependent and explanatory variables; iii) the long-run parameters are the same across countries. This estimator is also flexible enough to allow for long run coefficient homogeneity over a single subset of regressors and/or countries. We acknowledge that due to a short time period, the long-run estimate may be biased, therefore, we follow Pesaran and Zhao (1999) to adjust the long-run coefficient to reduce the level of biases in the estimation. We also estimate a dynamic panel regression based on Blundell and Bond estimation. In this case, we estimate a regression of equation 6. In equation 6, the lag of the dependent variables is included as an explanatory variable.
3.3. Causality Test

Panel regressions show an association among variables but do not give the direction of causal relationships among variables in the regression model. In light of this, we modeled the causal relationship within a dynamic error correction model (see: Engel and Granger, 1987; Abbes et al., 2015). The causality test between GDP and FDI will be based on the regression equation 7 below:

\[(1 - L)X_{it} = \alpha_i X + \sum_{t=1}^{P} (1 - L)\delta_{rc} X_{i,t-p} + \delta_{p} ECT_{t-1} + \epsilon_{it}\]  

(7)

Where the \( ECT_{t-1} \) is the error correction term derived from the long-run estimated regression, \( p \) denotes the lag length and \((1-L)\) is the first difference operator.

4.0. RESULTS OF THE STUDY

4.1. Unit Root Test

The first point of call is to examine the stationarity properties of the panel time series used for this data. To do this, we employed the IPS panel unit root approach which gives good and robust results in the face of an unbalanced panel which are Im et al. (2003), and Fisher-type (Choi, 2001).

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>IPS at level</th>
<th>Fist difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>L.LNGDP</td>
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<td>-4.5891***</td>
</tr>
<tr>
<td>LNFDI</td>
<td>3.9864</td>
<td>-13.0167***</td>
</tr>
<tr>
<td>LNGOV</td>
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<td>-8.2926***</td>
</tr>
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<td>LOGDCP</td>
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</tr>
<tr>
<td>LOGOPEN</td>
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<td>-6.5958***</td>
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<td>LOGCONS</td>
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<td>LOGDEBT</td>
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<td>LOGINF</td>
<td>-</td>
<td>-2.1648*</td>
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<tr>
<td>LOGK</td>
<td>-0.1675</td>
<td>-6.8413***</td>
</tr>
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</table>

Source: Authors’ estimate (2018).
*** p<0.01, ** p<0.05, * p<0.1.
The unit root test for the panel indicates that all variables used are stationary at first difference. This provides some level of assurance for the appropriateness of the use of the choice of estimations in this study.

4.2. Regression Results

Though our focus was not on the static analysis of Sino-FDI to Africa we, however, reported results of random and fixed effect regression results. The test of model selection between the two using the Hausman test revealed that the random effect model provides an efficient result. This is because the test statistics were found to be insignificant at less than 5%. By this, we went ahead to report the result from the random effect regression. For the dynamic GMM estimation, the model passed the joint null hypothesis that the instruments are valid instruments. From the test statistics, it was found to be statistically insignificant. Thus, the instruments used for the regression were valid. Similarly, the higher-order serial correlation test was found to be insignificant, this suggested that there is no serial correlation and overidentification of the regression estimates. The results of the study are presented in Table 2. The pooled mean group regression presented had also passed all the diagnostic tests for the regression. We presented the normality test, homogeneity test and LM test for serial correlation (see: Table 2).

The results suggest that FDI from China to African economies has a positive and significant relationship across all the models estimated. Comparing the results from the random effect and the PMG long run, the results seem to have an inelastic coefficient. This corroborates studies that found a positive impact of FDI on economic growth in general and studies that affirm the good of Sino-FDI (Ahmad et al., 2018; Alfaro et al., 2004; Doku et al., 2017; Weisbrod and Whalley, 2011). When controlled for the lag effect of growth and possible feedback through instrumentation, in the case of dynamic GMM, the coefficient was found to be higher and still positive. The results suggest FDI from China to Sub-Saharan Africa might have a positive development. This may be so since most of the FDI from China is channeled to infrastructure development. Such infrastructure developments open-up the economy and propel it for growth and development. From the PMG regression, Sino-FDI was found to be positively related to economic growth in the long run. This was found to be statistically significant at less than 1%. The result indicates that a percentage change in Sino-FDI inflows leads to an increase in the economic growth of Sub-Saharan African economies by 0.037 percentage points. This indicates a
<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>1 Fixed effect</th>
<th>2 Random effect</th>
<th>4 GMM (1)</th>
<th>3 PMG long run</th>
<th>5 PMG short run</th>
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<td>(0.0219)</td>
<td>(0.0120)</td>
<td>(0.0053)</td>
<td>(0.0252)</td>
<td>(0.0140)</td>
</tr>
<tr>
<td>LOGCONS</td>
<td>-0.159***</td>
<td>-0.0728*</td>
<td>-0.102***</td>
<td>-0.546***</td>
<td>0.00285</td>
</tr>
<tr>
<td></td>
<td>(0.0437)</td>
<td>(0.0427)</td>
<td>(0.0242)</td>
<td>(0.128)</td>
<td>(0.0229)</td>
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<tr>
<td>LOGDEBT</td>
<td>0.0109</td>
<td>0.0227**</td>
<td>0.00348</td>
<td>0.0209</td>
<td>0.00494**</td>
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<tr>
<td></td>
<td>(0.00828)</td>
<td>(0.00992)</td>
<td>(0.00595)</td>
<td>(0.0176)</td>
<td>(0.00219)</td>
</tr>
<tr>
<td>LOGINF</td>
<td>-0.00991**</td>
<td>-0.00671</td>
<td>-0.00246</td>
<td>-0.0407***</td>
<td>-0.0621**</td>
</tr>
<tr>
<td></td>
<td>(0.00498)</td>
<td>(0.00299)</td>
<td>(0.00223)</td>
<td>(0.0156)</td>
<td>(0.0290)</td>
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<tr>
<td>LOGODA</td>
<td>0.00411</td>
<td>-9.44e-05</td>
<td>0.000342</td>
<td>0.00989***</td>
<td>-0.707</td>
</tr>
<tr>
<td></td>
<td>(0.00824)</td>
<td>(0.00998)</td>
<td>(0.00399)</td>
<td>(0.00156)</td>
<td>(0.448)</td>
</tr>
<tr>
<td>LOGPOP</td>
<td>0.131***</td>
<td>0.360***</td>
<td>-0.0820**</td>
<td>0.175*</td>
<td>-0.220***</td>
</tr>
<tr>
<td></td>
<td>(0.0439)</td>
<td>(0.0434)</td>
<td>(0.0323)</td>
<td>(0.103)</td>
<td>(0.0274)</td>
</tr>
<tr>
<td>LOGLIFE</td>
<td>-4.043***</td>
<td>-4.290***</td>
<td>0.427***</td>
<td>0.860**</td>
<td>-0.00609*</td>
</tr>
<tr>
<td></td>
<td>(0.815)</td>
<td>(0.976)</td>
<td>(0.108)</td>
<td>(0.381)</td>
<td>(0.00318)</td>
</tr>
<tr>
<td>LOGK</td>
<td>0.0593***</td>
<td>0.0667***</td>
<td>0.000657</td>
<td>0.351**</td>
<td>0.0313**</td>
</tr>
</tbody>
</table>
rather inelastic coefficient of Sino-FDI on the economy of SSA countries. Though positive, the inflows of the FDI from China to SSA countries may only have a minimal effect on the growth of such economies. In general, across all the estimations, it was found that Sino-FDI has a weak positive effect on the economic growth of SSA countries.

However, in the short run, the effect of Sino-FDI to Africa had a negative effect. This might be for the fact that, in the short run, FDI may have brought technologies where African economies do not have the absorptive capacity to utilize. Thus, the huge investment may seem to impact the economy negatively. Secondly, this short-run negative effect may be attributed to the fact that FDI is channeled to areas that may not have a direct effect on the productivity of the economy. It is a recorded fact that large sums of FDI to Sub-Saharan African countries were in the form of mergers and acquisitions. It is being argued that FDIs in the form of mergers and acquisitions

### TABLE 2 - continued

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>Fixed effect</th>
<th>Random effect</th>
<th>GMM (1)</th>
<th>PMG long run</th>
<th>PMG short run</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>31.76***</td>
<td>28.36***</td>
<td>12.17***</td>
<td>4.099***</td>
<td>4.099***</td>
</tr>
<tr>
<td></td>
<td>(2.651)</td>
<td>(3.143)</td>
<td>(1.406)</td>
<td>(0.610)</td>
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</tr>
<tr>
<td>Observations</td>
<td>374</td>
<td>374</td>
<td>357</td>
<td>357</td>
<td></td>
</tr>
<tr>
<td>R-squared</td>
<td>0.891</td>
<td></td>
<td></td>
<td>0.46</td>
<td></td>
</tr>
<tr>
<td>Hausman test</td>
<td>1.321a</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sargan test</td>
<td></td>
<td>1.918a</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AR test</td>
<td></td>
<td></td>
<td>0.895a</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Homogeneity test</td>
<td></td>
<td></td>
<td></td>
<td>0.29 {0.5101}</td>
<td></td>
</tr>
<tr>
<td>LM Test</td>
<td></td>
<td></td>
<td></td>
<td>0.24{0.5121}</td>
<td></td>
</tr>
<tr>
<td>Normality test</td>
<td></td>
<td></td>
<td></td>
<td>0.18 {0.328}</td>
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</tr>
<tr>
<td>Number of countries</td>
<td>33</td>
<td>33</td>
<td>33</td>
<td>33</td>
<td>33</td>
</tr>
</tbody>
</table>

*Source: Authors’ estimate (2018) Standard errors in parentheses, P values are in curly brackets, {} are probability values, a means statistically insignificant (P>0.05)

*** p<0.01, ** p<0.05, * p<0.1,
may lead to a negative effect on economic growth in the short run. In this regard, it is expected to have a negative short-run effect of FDI on economic growth. These investments are predominantly in infrastructure or areas where there is a lack of skilled persons in the host country, a low spillover of technology among others. Thus, without the requisite human capital, FDIs may not benefit the host country in the short term. Other factors that could account for such a negative phenomenon will be the transfer of inappropriate technology and the lack of a well-developed financial system to ensure efficient resource allocation. The impact is very small compared to the long-run effect. In that stead, it could be seen that the net effect of FDI on the economy, in the long run, would be positive based on the regression estimates.

Other variables that were included in the models showed up to be significant. Government expenditure was found to be significant in influencing the economic growth of African countries. This turn to emphasize the role of the Central government expenditure in African economies (Ho and Iyke, 2018). Inflation was found to have a negative effect on economic growth. This confirms the negative and troubling effect of macroeconomic instability on the growth potentials of an economy. In line with existing theories that support trade openness, this study’s result corroborates such findings. Other variables that were found to be important in explaining economic growth included population as a proxy labor force that was found to be significant. Capital and domestic credit to the private sector as a ration to GDP were also found to be important in generating growth. It is clear that a low domestic credit to the private sector could have a detrimental effect (Bermejo Carbonell and Werner, 2018; Ho and Iyke, 2018).

4.3. Causality between Growth and Chinese-FDI

Since the error correction term was found to be statistically significant, it could be said that there is long-run causality between FDI and the economic growth of the selected Sub-Saharan African countries. However, the causality test was conducted. The test results are presented in Table 3.
TABLE 3 - Causality Test

<table>
<thead>
<tr>
<th>Lag levels</th>
<th>1</th>
<th>2</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>statistic</td>
<td>3.2189</td>
<td>1.5227</td>
<td>4.4785</td>
<td>4.4536</td>
</tr>
<tr>
<td>Probability</td>
<td>0.000</td>
<td>0.1278</td>
<td>0.000</td>
<td>0.000</td>
</tr>
</tbody>
</table>

*Source: Author’s estimate.*

The null hypothesis of Granger non-causality test of no causality between the log of economic growth and FDI was rejected. This indicated that, in the panel, economic growth Granger causes FDI. Thus, the changes in the forecast error variance of FDI could be partly attributed to economic growth. There is also a reverse causality where causality flows from FDI to economic growth. In this case, variation in economic growth could be attributed to FDI inflows from China. This indicates a feedback effect between Sino-FDI and the economic growth of Sub-Saharan African countries.

5.0 CONCLUSIONS

From the results, it was found that Sino-FDI has a positive effect on the economic growth of African economies. This notwithstanding, the growth effect of Sino-FDI is small across models that do not account for endogeneity problems. The GMM estimates show a much higher coefficient compared to random effect models and the PMG models. Though, the coefficients are still low. One thing that is sure, is that FDI from China could foster development as measured by economic growth. The effect of FDI to Africa, as preached by others, is not wholly negative. We understand that the heavy dependency of Sub-Saharan African economies on China may come with an attendant negative effect, this was not the focus of the study. However, this alone cannot lead to the growth that is required. Prudent macroeconomic management is necessary and to be coupled with good policies that ensure opened economies. Since macroeconomic instability could affect the effect that could be derived from the Sino-FDIs into Africa, we also examined the direction of causality between FDI and economic growth of Sub-Saharan African economies. It was found that there exists a bi-causal relationship between economic growth and Sino-FDI inflows. Thus, FDIs will help propel economic growth in one instance but higher levels of
economic growth will also attract Chinese investment. In this light, the governments that intend to attract more Chinese FDIs should endeavor to expand their economy through growth engendered policies. In one breath, higher economic growth signals a good business environment and market for investors to operate.

REFERENCE


APPENDIX 1
List of Countries used for the study

<table>
<thead>
<tr>
<th>Country</th>
<th>Country</th>
<th>Country</th>
</tr>
</thead>
<tbody>
<tr>
<td>Algeria</td>
<td>Mozambique</td>
<td>Cote d'Ivoire</td>
</tr>
<tr>
<td>Angola</td>
<td>Niger</td>
<td>Egypt</td>
</tr>
<tr>
<td>Benin</td>
<td>Nigeria</td>
<td>Gabon</td>
</tr>
<tr>
<td>Botswana</td>
<td>Rwanda</td>
<td>Ghana</td>
</tr>
<tr>
<td>Cameroon</td>
<td>Senegal</td>
<td>Guinea</td>
</tr>
<tr>
<td>Cape Verde</td>
<td>South Africa</td>
<td>Kenya</td>
</tr>
<tr>
<td>Chad</td>
<td>Sudan</td>
<td>Liberia</td>
</tr>
<tr>
<td>Congo, Dem. Rep</td>
<td>Tanzania</td>
<td>Madagascar</td>
</tr>
<tr>
<td>Congo, Rep</td>
<td>The Gambia</td>
<td>Malawi</td>
</tr>
<tr>
<td>Morocco</td>
<td>Togo</td>
<td>Mali</td>
</tr>
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<td>Uganda</td>
<td>Mauritania</td>
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