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Abstract

This study investigates the effects of aid grants on inclusive growth in 37 Sub-Saharan African countries for the period 1984-2018. Grant aid is decomposed into aid grants and technical cooperation grants. Two inclusive growth indicators are used namely: gross domestic product (GDP) per capita growth and unemployment rate. The dynamic panel autoregressive distributed lag (ARDL) approach which is employed comprises three different estimators; the pooled mean group (PMG), mean group (MG), and dynamic fixed effect (DFE). The Hausman diagnostics were used to assess the efficiency and consistency of the estimators. Based on the PMG estimator, our findings show that aid grants and technical cooperation grants exert a positive influence on GDP per capita growth in the long-run. However, while the observed influence of aid grants is found to be significant, technical cooperation grants display insignificant effects. In the short run, however, the PMG estimates show that aid grants and technical cooperation grants have negative and insignificant effects on GDP per capita growth. On the other hand, results based the DFE estimators reveal that neither of the aid grants has influenced the unemployment rate positively in the short-run. However, whereas aid grants contribute significantly to the reduction of the unemployment rate in the long run, technical cooperation grants do not. This study complements the attendant literature by assessing how aid grants versus technical cooperation grants affect inclusive growth. The findings are relevant to international policy coordination for the attainment of sustainable development goals.

JEL Classification: B20; F35; F50; O10; O55

Keywords: Aid grants, Technical Cooperation grants, Inclusive growth

1. Introduction

Inclusive growth entails sustained output growth across diverse economic sectors, creation of productive employment opportunities, investing in human capital and poverty reduction (Samans, Blanke, Corrigan & Hanouz, 2017; European Commission, 2010; Ranieri & Ramos, 2013). The inclusive growth debate continues to draw attention in a global context of growing economic, political and social instability; high levels of unemployment, inequality and poverty and a daunting challenge of translating economic growth into sustainable well-being (Tchamyou, Erreygers & Cassimon, 2019a; Tchamyou, 2019, 2020). Achieving inclusive growth may involve standard growth strategies such as macroeconomic stability and economic openness (CAFOD, 2014; Anand, Mishra & Peiris, 2013; Tchamyou, Asongu & Odhiambo, 2019b). Hence, attaining high growth rates is considered as the major contributing factor for achieving inclusive growth.

Attainment of inclusive growth involves putting in place effective economic infrastructures and social welfare and foreign aid plays a pivotal role. Foreign aid or official development assistance (ODA) comprises grants or loans to developing countries with the main objective of promoting economic development and welfare (OECD, 2019). Foreign aid has emerged as a dominant strategy in advancing economic development and welfare in developing countries (Yiew & Lau, 2018; Asongu & Nwachukwu, 2017; Alimi, 2018; Ugwuanyi, Ezeaku & Ibe, 2017). The various growth objectives that ODA is expected to achieve are premised on the fundamental assumption that foreign aid is crucial in increasing economic growth and well-being, mitigating the unemployment rate and reducing poverty levels (McGillivray, 2004). However, the effectiveness of foreign aid in achieving these outcomes has been questioned for many decades.

Total net official development assistance and official aid to Sub-Saharan Africa (SSA) between 1984 and 2018 was US$ 952.85 billion (World Development Indicators, 2019). Moreover, 37 SSA countries analysed in this study have jointly received about US$112.75 billion in technical cooperation grants and US$ 573.48 billion in aid grants within the same period (World Development Indicators, 2019). Given the rising volume of development assistance to developing countries, researchers continue to explore their effectiveness (See Burnside & Dollar, 1997; Sabra & Eltalla, 2016; Doucouliagos & Paldam, 2007; Koeda, 2004; Ghimire, Mukherjee & Alvi, 2016; Frot & Perrota, 2011; Easterly, 2003; Hansen & Tarp, 2000; Ssozi, Asongu & Amavilah, 2019). More so, joint effects of grant and loans have jointly been adequately examined in the growth debates (Appiah-Konadu, Shitsi, Eric & Twerefou, 2016; Koch & Schulpen, 2018; Durbarry, Gemmell & Greenaway, 1998). Unfortunately, most of these

studies and other extant literature lump the two types of aid together which may not yield the benefit of disaggregated aid effects. This paper, therefore, examines the "grant" aspect of aid which is further decomposed into "aid grants" and "technical cooperation grants" with the aim of ascertaining their relative effect on inclusive growth in the sub-Saharan Africa (SSA). Specifically, whereas literature on the effect of aid grants on growth has been modest to date, empirical literature on technical cooperation grants is sparse. The neglect remains glaring even though both typologies of foreign aid constitute significant portions of aid to the SSA region. This leaves a gap in knowledge and which this study will attempt to fill.

Grants refer to legally binding commitments that essentially obligate a specific value of funds available for disbursement for which there is no repayment required (WDI, 2019). Whereas technical cooperation grants consist of: (i) free-standing technical cooperation grants projected for financing the transfer of technical as well as managerial skills or of technology with the core aim of building-up general national capacity without reference to any explicit investment projects; and (ii) investment-related technical cooperation grants, which are made available to strengthen the capacity to carry out specific investment projects (WDI, 2019).

Aid generally is considered to be much more volatile (Kumi, Ibrahim & Yeboah, 2017; Asongu & Nnanna, 2019) and unpredictable compared to tax revenues (Mascagni, 2016), and volatility poses an even greater problem in jurisdictions that are aid-dependent (Clements et al., 2004; Asongu, Uduji & Okolo-Obasi, 2020). Grant aid has also been empirically revealed to be more volatile than aid provided by way of loans (Clements et al., 2004). Given the perceived uncertainties and a shift of foreign aid from loans to aid grants and technical cooperation grants; it becomes imperative to determine their implications for recipient countries. While most growth literature on the region analysed foreign aid (or official development assistance) in its aggregate form, literature that specifically seeks to examine the effectiveness of the two main typologies of grant components of foreign aid (aid grants and technical cooperation grants) on key inclusive growth indicators is rare. This is the major gap this study seeks to fill by not only decomposing grants from concessional aids, but by also assessing the disaggregated influence of grants on inclusive growth. Therefore, assessing the respective influence of both grant components on selected inclusive growth indicators will be a contribution to existing knowledge.

The rest of the study is structured as follows. The theoretical and empirical literature review is covered in Section 2 while the data and methodology are engaged in Section 3. The empirical results are disclosed in Section 4. Section 5 concludes with implications and future research directions.

2. Literature Review

2.1 Empirical Literature

The debate on the possible role of ODA has remained dominant in recent African development literature (Mahembe & Odhiambo, 2019; Asongu & Nnanna, 2018; Quibria, 2014; Asongu & Nwachukwu, 2018; Bwire, Lloyd & Morrissey, 2017; Crivelli & Gupta, 2017; Asongu & Nnanna, 2019; Ezeaku, Egbo, Nwokoby & Onwumere, 2019; Asongu & Leke, 2019; Moyo & Mafuso, 2017; Asongu, 2016; Mascagni & Timmis, 2017). Barring the controversy between statistical reality and political expediency, the underlying definition of ODA is actually anchored on the principle of developmental motivation. Economic research on ODA, or foreign aid effectiveness on growth and development, according to Easterly (2003), often becomes a political football. Irrespective of the contexts of extant literature on aid effectiveness, there is apparently no consensus on the exact outcome as several studies suggest that aid facilitates growth, yet many others argue otherwise (Albiman *et al.* 2014). Pro aid literature notes the importance of aid to the socio-economic development of any country, and argues that aids have indeed impacted positively on growth and social-welfares (Karras, 2006; Ardnt*et al.*, 2015; Bruckner, 2013; Reddy & Minoiu, 2006; Gyimah-Brempong, 1992; Juselius *et al.*, 2014; Ardnt, *et al.*, 2015; Ukpong, 2017). On the contrary, aid critics (Briggs, 2016; Nowak-Lehmann, *et al.*, 2012; Romero-Barrutieta; Djankov, *et al*. 2008; Alesina & Weder, 2002; Walz & Ramachandran, 2011) contend that aid inflows have no positive impact on growth and social outcomes.

Quite a number of studies in the growth literature have taken a broader look at aid effectiveness in the developing economies without decomposing aid flows (Dalgaard & Hansen, 2017; Mekasha & Tarp, 2013; Mascagni, 2016; Elayah, 2016; Addison, Morrissey & Tarp, 2017). However, disintegrating aid flows into grants and concessional loans, Sawada, Kohama, and Kono (2004) found that, on average, aid had no effect on growth irrespective of recipient policies, nor did grants. However, loans to a country with good policies are considered to be related to faster growth (see also Juselius, Reshid & Tarp, 2017; Omotola & Saliu, 2009). Similarly, Djankov, Montalvo, and Reynal-Querol (2005) observed that whereas loans seem to drive growth in a good institutional environment (see also Asongu, 2013; Guillaumont & Chauvet, 2001; Crawford, 1997), grants do not. This outcome does not necessarily entail that grants are ineffective, as Klein and Harford (2005) argue that grants may support projects that are not aimed at enhancing medium-term growth, but suggested that more assessment of grants' effectiveness would be valuable. In a related study, Iimi and Ojima (2005) have assessed the

complementarities between loans and grants and discovered that grants are pivotal in stimulating growth, while concessionality attached to ODA loans was found to stimulate recipient countries' economic development.

Tezanos, Quiñones and Guijarro (2013) analysed aid effectiveness in Latin America and the Caribbean. Using a growth regression model, the paper examined the effectiveness of ODA on the growth rate. The results showed that while aid was effective in aggregated terms, the effect of concessional loans appeared to be greater than the effect of grants.

Juselius, Møller and Tarp, (2014) evaluated the long-run effect of ODA on key macroeconomic variables in the SSA region using a cointegrated VAR model. The results provided evidence of a positive long-run impact of ODA flows on the macro economy. On the other hand, Ekanayake and Chatrna (2010) found that foreign aid was negatively related to economic growth in Latin America and the Caribbean, and Asia, but was positive for the African region. Ezeaku et al. (2017) employed a traditional panel estimation technique to examine the linkage between ODA and growth in the West African Monetary Zone. The result showed that ODA had a significant negative impact on per capita income in the region, where a one unit change in ODA led to 3.6 unit decline in GDP per capita during the period 1986 to 2015.

Juselius, Reshid and Tarp (2017) found a positive influence of aid in the majority of 36 sub-Saharan African countries examined with notable exceptions of Ghana and Tanzania which are two major foreign aid recipients. The authors argued that aid has been key to growth in real GDP contingent on monetary and external factors being properly accounted for.

Besides the debates surrounding aid effectiveness, some extant literature posit that domestic institutions and major creditors should play a significant role in debt sustainability, thereby enabling developing countries to stimulate growth internally, without relying heavily on foreign debt, and by extension, enable the developing countries to boost consumption and fiscal revenue by converting foreign debt into capital formation (see Shuaib & Ndidi, 2015; Ibe & Osuagwu, 2016; Marcelino & Hakobyan, 2014).

In the light of empirical assessments, results may indeed vary depending on the context, data size (Easterly, 2003) or methodology applicable to each study. Thus, the findings of previous literature are mixed as shown in Ekanayake and Chatrna (2010) that analysed the effects of foreign aid on the economic growth using a dataset on 85 developing countries selected from Africa, Asia and Latin America and the Caribbean between 1980 and 2007. The findings revealed that foreign aid exerted

mixed effects on growth. On the other hand, Sabra and Eltalla (2016) adopted the generalized methods of moments (GMM) approach to panel data analysis in assessing aid effectiveness in the Middle East and North African (MENA) countries. It was observed that foreign aid had a significant negative influence on growth in the region. Rajan and Subramanian (2005) applied the same technique to ascertain the effect of aid on growth in selected developing countries, and results provided little evidence of a positive (or negative) association between foreign aid inflows and growth. Similarly, Durbarry, Gemmell and Greenaway (1998) found strong evidence that foreign aid does have a positive impact on growth in the case of a large sample of developing countries.

Bruckner (2013) used the instrumental variable (IV) technique to examine the simultaneity concerns in the aid and growth debate in the context of 47 less developed countries. The results showed that a 1 percent increase in aid was associated with just 0.1 percent increase in per capita GDP growth. Quibria (2014) contend that aid has in many instances been associated with rapid economic growth, but in others, it has been linked to deteriorating economic outcomes. Given the vast mix of empirical economic outcomes across regions and countries, it has often proven contentious and difficult to summarise these diverse perspectives in the form of a robust statistical relationship (Quibria, 2014).

Table 2.1 Summary of Empirical Literature

Authors	**Countries/Regions**	**Objectives**	**Methodologies**	**Findings**
Dalgaard *et al.* (2004).	Sub-Saharan Africa and East Asia	re-examines the effectiveness of foreign aid on growth	Panel ordinary least squares (OLS)	Aid has been effective in stimulating growth, but the degree of the effect depends on climate-related circumstances
Wako (2011)	Sub-Saharan Africa	effectiveness of bilateral and multilateral aids on economic growth	system generalized method of moments (GMM)	Multilateral and bilateral aid are ineffective at enhancing economic growth
Rajan & Subramanian (2005)	Selected countries	effects of aid on growth	GMM	There is little evidence of a positive (or negative) relation between aid inflows and growth
Hansen & Tarp (1999)	Developing countries	Effect of aid inflows on growth rate of GDP per capita	Panel OLS	a positive picture of the aid-growth link emerged
Bruckner (2013)	47 least developed countries (LDCs)	simultaneity issues in the aid and growth debate	Instrument variable (IV) Estimation	a 1 percent increase in foreign aid led to 0.1 percent increase in real per capita GDP growth.
Karras (2006)	Developing	relationship between	Panel OLS	aid has a positive and

	Countries	foreign aid and growth in per capita GDP		statistically significant impact on growth
Gyimah-Brempong (1992)	Sub-Saharan Africa	Effect of aid on economic growth	Panel OLS	Aid has significant positive effect on economic growth
Juselius *et al.* (2014)	Sub-Saharan Africa	long-run effect of ODA on key macroeconomic variables	Cointegrated VAR model	Positive long-run impact of ODA flows on the macroeconomy
Sabra & Eltalla (2016)	8 MENA countries	Foreign aid effectiveness	GMM	Foreign aid has significant negative effect on growth
Rajan & Subramanian (2005)	47 developing countries	Aid, Dutch Disease, and Manufacturing Growth	OLS and IV estimates	aid inflows have adverse effect on the growth rate of labour intensive and exporting industries, as well as the manufacturing sector
Ekanayake & Chatrna (2010)	Asia, Africa, and Latin America and the Caribbean	effects of foreign aid on the growth of developing countries	Panel OLS	Foreign aid has negative effect on economic growth in the three out of four cases, but positive for the African region
Romero-Barrutieta *et al.* (2015)	low-income countries	implications of debt relief for growth	dynamic stochastic general equilibrium model	debt-relief may have a lasting effect on the size of the economy and could lower GDP growth.
Iimi & Ojima (2005)	Low income countries, lower-middle income countries, and upper-middle countries	Assessing the complementarities between Grants and Loans	OLS and Instrumental Variables (IV) techniques	concessionality attached to ODA loans can stimulate recipient countries' economic development. Grants seem not to be useful in stimulating growth.
Nowak-Lehmann *et al.* (2012)	Developing Countries	relationship between per capita income and foreign aid	dynamic feasible generalized least-squares (DFGLS)	Aid has minute and insignificant impact on per capita income and little positive impact on investment
Reddy & Minoiu (2006).	Developing countries	Growth impact of official development assistance	GMM	Developmental aid promotes long-run growth
Briggs (2016)	Africa	examine the extent to which foreign aid reaches people at different levels of wealth in Africa	Panel Regression	Aid does not favor regions with more of the poorest people.
Mekasha &	Selected	assesses what meta-	Meta-Analysis	effect of aid on growth

Tarp (2013)	Countries	analysis has to contribute to the literature on the effectiveness of foreign aid in terms of growth impact		is positive and statistically significant
Mascagni (2016)	Ethiopia	Aid and Taxation in Ethiopia	ECM	a positive relation between aid and tax
Asongu (2013)	53 African countries	The effect of foreign aid on corruption	Quantile regression	Based on the hypothesis of institutional thresholds for foreign aid effectiveness, the perilous character of development assistance to institutional quality is broadly confirmed
Djankov, Montalvo, &Reynal-querol (2008)	108 recipient countries	Aid Effectiveness	Panel OLS and GMM	foreign aid has a negative impact on institutions
Durbarry, Gemmell, & Greenaway, (1998)	Developing Countries	impact of foreign aid on growth	Generalized least squares (GLS) Regression	The results strongly support the view that foreign aid does have some positive impact on growth
Tezanos, Quiñones, & Guijarro (2013)	Latin America and the Caribbean	Aid effectiveness	GMM	Aid is effective, in aggregated terms; the impact of concessional loans seems to be greater than the impact of grants; and, aid may be more effective in less corrupt countries.
Ardnt *et al.* (2015)	Developing countries	Assessed long-run effect of aid on growth and economic development	Panel OLS	Aid positively impacts growth, poverty rate and the industrial sector.

2.2 Theoretical Framework

Theoretically, the supporting structure of this study will be anchored on the dual gap theory. The primary article (Chenery & Strout, 1965), and recent empirical discourses (Shimeles, 2009; Yakama, 2013; Taylor, 1994; Easterly, 1999, among others) have analysed the two gap theory and how problems of resource gap can be plugged, putting into perspective the ever dynamic frontiers of development economics (Meier & Stiglitz, 2001). The two gap model suggests that economic development is a derivative of investment, but investment that is dependent only on domestic savings cannot be sufficient

in driving growth and development. The theory highlight that for sustainable economic development to be attained, domestic savings have to be supplemented with external financing, by way of borrowing or development assistance.

3. Data and Methodology

3.1 Data

This study examines historical events and as a result relies on secondary data. We analyse a panel of 37 SSA countries[1]. The data, as described in Table 1 are from the World Bank's World Development Indicators (WDI) for the period 1984 to 2018.Our dependent variables include the GDP per capita growth and unemployment rates. The two variables are at the core of inclusive growth indicators (European Commission, 2014a; OECD, 2014, 2018; Samans et al., 2017), and form part of the first pillar of the inclusive growth framework indicators (see Joshi, 2013).GDP per capita growth reflects the distributional impact of growth (European Commission, 2014b, 2014) which, in recent times, has become more prominent in economic development policies (McKinley, 2010). Lee (2018) argues that the distributional influence of growth can benefit those on low-incomes, but not inevitable. Employment on the other hand is yet an aspect of inclusiveness that has largely been neglected. Unlike growth distribution, the available indicators to measure the progress on productive employment have generally not been adequate (McKinley, 2010). Moreover, unemployment data for SSA represent the percentage of the total labour force not productively employed, while gross domestic savings and population growth enter the model exogenously as adjustment variables.

"Insert Table 1 here"

The model variables are summarised in Table 2. The comparability of our panel series is shown in the descriptive statistics. Aid grants and technical cooperation grants are defined in natural logarithms to enable comparisons in both means and standard deviations. Figure 1 is a graphical representation of model variables which indicates that average annual aid grants and technical cooperation grants to the

[1] "Angola; Benin; Botswana; Burkina Faso; Burundi; Cameroon; Central African Republic; Chad; Comoros; Congo Democratic Republic; Congo Republic; Cote d'Ivoire; Eswatini; Gabon; Gambia; Ghana; Guinea; Guinea-Bissau; Kenya; Madagascar; Malawi; Mali; Mauritania ; Mauritius ; Mozambique ; Namibia; Niger; Nigeria; Rwanda; Senegal; Sierra Leone; South Africa; Sudan; Tanzania; Togo; Uganda and Zimbabwe".

37 SSA countries between 1984 and 2018 was US$ 438 million and US$ 81.98 million, respectively. It can be observed that while aid grants ranged between US$ 1.26 million and 11.40 billion, technical cooperation grants ranged between US$ 50,000 and US$ 377 million within the period. Furthermore, GDP per capita growth rate and unemployment rate averaged 1.48% and 8.44%, respectively. Whereas GDP per capita growth rate was observed to have peaked at 37.54% and lowest at -47.50%, unemployment rate was minimum at 0.27% and maximum at 37.94% over the period. Also, gross domestic savings (% of GDP) and population growth, respectively averaged 11.64% and 2.58% annually.

"Insert Table 2 here"

"Insert Figure 1 here"

3.2 Methodology

Our data will be analysed using the panel ARDL model based on the three estimators: the mean group (MG) of Pesaran and Smith (1995), pooled mean group (PMG), and dynamic fixed effect (DFE) estimators proposed by Pesaran, Shin and Smith (1999). According to Pesaran, Shin and Smith (1997, 1999), the MG and PMG are dynamic panel estimators which are consistent when both *T* (time) and *N* (cross-sections) are large. The difference between MG and PMG is that MG estimator seems to be more constant under the presumption that both the slope and intercepts can vary across the cross-sections, whereas the PMG estimator is constant under the assumption that long-run slope homogeneity exists. The dynamic fixed effect (DFE) is yet an alternative estimator which is proposed under the presumption of the homogeneous slop in which the slopes are fixed and the intercepts can change across cross-sections (Megaravalli & Sampagnaro, 2017). Moreover, these methods do not require for pre-testing and order-of-integration compliance given that they are valid whether the variables of interest are I(0) or I(1) (Loayza & Ranciere, 2005).

The use of these techniques allows us to take into account the country-specific heterogeneity issues (Samargandi, Fidrmuc & Ghos, 2014; Gemmell and Kneller, 2003). As proposed by Pesaran, Shin and Smith (1999), the dynamic heterogeneous panel estimate can be incorporated into the error correction model. Thus, the pooled-mean group estimator restricts the long-run coefficients to be identical in an error correction framework, but allow the short-run parameter estimate and error

variances to vary across groups. Pesaran *et al.* (1999), therefore, propose estimating the following autoregressive distributed lag (ARDL) model of order (p, q):

$$\Delta y_{it} = \theta y_{it-1} + \beta_i' x_{it} + \sum_{j=1}^{pi-1} \lambda_{ij} + \Delta y_{it-j} + \sum_{j=0}^{qi-1} \delta_{ij}' \Delta x_{it-j} + \alpha_i + \gamma_i t + \varepsilon_{it} \quad , \qquad (1)$$

where y_{it} is the dependent variable, x_{it} is a $m \times 1$ vector of explanatory variables, α_i and γ_i represent the country-specific intercepts and time trend parameters respectively, λ_{ij} and δ_{ij} are the country-specific coefficients of the short-term dynamics, θ is the error correction parameters (or speed of adjustment towards long-run relationship), and ε_{it} is a white noise error term. The long-run coefficients β are defined to be homogenous across countries. If θ_I is negative and significant, there exists a long-run association between y_{it} and x_{it}, while all the dynamics and the error correction terms are free to vary (Asteriou, 2009). p is the lag of the response variable, and q is the lag of the explanatory variables.

The three different estimators (MG, PMG and DFE) can be used to estimate Equation (1). All three estimators are computed by maximum likelihood and also consider the long-run equilibrium and the heterogeneity of the dynamic adjustment process. However, Pesaran and Shin (1999) contend that panel ARDL can be applied even when variables have different orders of integration regardless of whether the variables of interest are purely I (0) or I (1). Both the short-run and long-run effects can be estimated simultaneously from a dataset with large time dimensions and cross-section (Samargandi, Fidrmuc & Ghos, 2014).

Finally, Pesaran, Shin and Smith (1999) assert that the ARDL model, especially PMG and MG, provides consistent coefficients in spite of the possible presence of endogeneity since it includes lags of dependent and independent variables, p and q, respectively.

4. Empirical Results

Tables 3-6 present the specification results for the three alternative dynamic panel data estimation procedures namely PMG, MG, and DFE which were applied to explore dynamic effects from a general ARDL model. This method represents a special case of analysing both short-run and long-run effects of parameter linking the dependent variable and the dynamic regressors; and the error correction model where the coefficient in the error correction term depicts the speed of adjustment. The long-run coefficients (or equations) are of primary interest since these are the ones considered with greater

relevance in growth studies (See Tait *et al.* 2016; Wako, 2018; Chavula, 2016; Alimi, 2018; Iheonu *et al*. 2017). The results show that dynamic stability exists as the parameter estimate of the error correction terms are negative and significant thus, indicating that long-run effects of aid grants on inclusive growth exist.

The null hypothesis of homogeneity through a Hausman test was explored based on the comparison between the PMG, MG and DFE estimators with the purpose of selecting the most efficient and consistent estimator. For instance, between MG and DFE, if the long-run coefficients are not equal across groups, then the DFE estimator is inconsistent; in which case the MG estimator provides a consistent estimate of the mean of long-run coefficients across groups (Chen & Hsu, 2014). Under such outcome, following the dynamic process of model validation, the MG and the PMG are compared and the null hypothesis that coefficients are not systematic is rejected at above 5% level of significance in which case the PMG is a more appropriate estimator compared to the MG and the DFE.

Following the estimated models, each of the grant variables is connected to GDP per capita growth and unemployment rate, respectively. Whereas Tables 3and 4 analyse the relative effect of aid grants on GDP per capita growth and unemployment rate, respectively, Tables 5 and 6 explore the effectiveness of technical cooperation grants on GDP per capita growth and unemployment in the SSA region.

In Table 3, the parameter estimate is shown to be within the dynamically stable range for PMG and DFE, and where the PMG is chosen to be more efficient and consistent over the MG and the DFE estimators. The PMG estimates show that aid grants do not have a significant effect on GDP per capita growth in the short-run. In contrast, the long-run coefficient reveals that aid grants exert positive and significant influence on GDP per capita growth. This may be due to the fact that the effects of grants are non-contemporaneous such that the effects of grants are only apparent in the long term. This is apparent when grants are invested in long term projects which have obvious short term unfavorable externalities on economic prosperity. The results show that a 1 percent increase in aid grants is associated with 1.5 unit increase in GDP per capita growth in the long-run. In respect to the adjustment variables, gross domestic savings and population growth both have long-run significant influence on the response variable. The results also indicate that convergence to the long-run equilibrium path occurs at the speed of 8.9 percent annually.

Furthermore, Table 4presents the responsiveness of unemployment rate to aid grants where the DFE is found to be more consistent and efficient over the PMG and the MG based on the Hausman

diagnostics. The results reveal that whereas aid grants are positively and significantly related to unemployment rate in the short-run, the long-run estimation shows that aid grants are negatively associated with unemployment rate in the SSA. It can be observed that when aid grants increase by 1 percent, unemployment rate decreased by 3.5 units in the long-run. The long-run coefficient indicates that deviations from long-run equilibrium are corrected at the speed of 6.5 percent on annual basis.

Table 5analyses the effectiveness of technical aid grants on growth with results based on the PMG which is shown to be a more appropriate estimator compared to the MG and the DFE. The long-run coefficient discerns a positive but insignificant association between the two variables of interest. It is found that when technical aid grants increase by 1 percent, GDP per capita growth increases by 0.65 unit. Moreover, gross domestic savings and population both exert significant influence growth. The convergence coefficient confirms a long-run cointegration between GDP per capita growth and the dynamic regressors. The error correction term indicated that convergence to long-run equilibrium adjusts at the speed of 88.4% annually.

Table 6 presents the estimates of the effect of technical cooperation grants on unemployment rate in the SSA. The diagnostic model selection procedure chooses the DFE over the PMG and the MG as the most appropriate estimator; hence, the analyses are anchored on the DFE. The long-run estimations show that technical cooperation grants are positively related to unemployment; 1 percent increase in technical cooperation grants brings about 1.03 unit increases in unemployment rate. Thus, we can infer that increase in technical cooperation grants to the SSA have not improved the unemployment situation in the region during the period. The results further show that while gross domestic savings have contributed significantly to the reduction of unemployment rate in the SSA region, population growth seem to have a positive association with the unemployment rate in the long-run. This implies population growth can be associated with rising unemployment in the region. There is however, a positive outlook in the short-run but the observed effect is not significant. Expectedly, the convergence coefficient is negative and significant, which is a necessary condition for the existence of a long run association between the variables. Based on the DFE estimates, the adjustment to the long-run equilibrium relationship is at the speed of 6.4% on an annual basis.

"Insert Table 3 here"

"Insert Table 4 here"

"Insert Table 5 here"

"Insert Table 6 here"

5. **Discussion**

In respect of the best estimators for our analyses, the dynamic effects of aid grants and technical cooperation grants on GDP per capita growth is based on the PMG estimator whereas their effects on unemployment rate is based on the DFE estimator. Generally, evidence from the results suggests that the two analysed grant aid components have negative effects on GDP per capita growth in the short term. However, the long term outlook reveals that both aid grants and technical cooperation grants have positive effects on GDP per capita growth. While the magnitude of effect exerted by aid grant in Table 3 was significant, technical cooperation grants have displayed an insignificant effect in Table 5. Moreover, gross domestic savings and population growth have relatively shown to have a significant influence on the inclusive growth variables. Specifically, the PMG estimations in Tables 3 and 5 reveal that even though population growth is positively related to increase in GDP per capita growth in the short run, it is inversely and significantly associated with a decrease in GDP per capita growth in the long-run. Similarly, while the DFE results in Tables 4 and 6 show that population growth is positively associated with a reduction in unemployment rate in the short term, the long run dynamics suggest that population growth is directly related to an increase in the unemployment rate in SSA. This is consistent with the findings in Peterson (2017) that high population growth in developing countries may slow their developmental progress.

While connecting grant aid variables to unemployment rate in Tables 4 and 6,it can be observed from the DFE results that aid grants and technical cooperation grants are positively related to unemployment rate in the short-run, which implies that they have not contributed to reducing unemployment rate in SSA in the short term. In the long-run, however, only aid grants contribute significantly in mitigating the unemployment situation in the region. Similarly, the PMG estimates in Tables 3 and 5 also indicate that while aid grants are negatively associated with GDP per capita growth in the short term, the long term effect is found to be positive. Based on the findings, it can be established that grant aid generally, as an incentive for inclusive growth, appears only valid in the long-run, not in the short-run. Moreover, the finding is consistent with the perspective of Iimi and Ojima (2005) that grants are pivotal in stimulating growth. Taking a broader perspective, Minoiu and Reddy (2009) found that development aids promote long-run growth. In contrast, Sawada, Kohama, and Kono (2004) and Djankov, Montalvo, and Reynal-Querol (2005) contend that grants have no effect on

growth. In general, while, the positive role of aid grants is consistent with the perspectives of recent pro-aid literature (see Ardnt *et al.*, 2015; Juselius *et al.*, 2014; Ukpong, 2017; Birchler & Michaelowa, 2016), it contradicts the submissions of aid critics who argue that aid has not contributed positively to growth and social outcomes in developing countries (see Riddell& Nino-Zarazua, 2016; Ilorah, 2011; Briggs, 2016; Nowak-Lehmann *et al.*, 2012; Wright & Winters, 2010; Djankov*et al*., 2008; Easterly, 2003; Walz & Ramachandran, 2011). Although empirical studies that disaggregate aid grants into the typologies examined in this paper seem to be rare, few studies that took the aggregate view have differed in conclusions. For instance, Tezanos, Quiñones and Guijarro (2013) find that although aid was effective in aggregated terms, the effect of concessional loans appeared to be greater than the effect of grants.

In view of the fact that Sub-Saharan African counties are largely aid-dependent, the outcomes of this study have some implications on the bilateral and multilateral donor agencies since the findings do not necessarily suggest that grants to the region are ineffective. Thus, coordination between donors and beneficiaries is imperative to ensure that aid grants support projects that are designed to enhance medium-term growth. The relative ineffectiveness of technical cooperation grants in contributing significantly to the inclusive growth agenda is noteworthy. First, in the long run, GDP per capita growth in the PMG estimator responded positively but insignificantly to increase in technical cooperation grants while the short run effect is negative. Second, technical cooperation grants is positively related to increase in unemployment rate both in the long and short runs as shown in the DFE estimation. This implies that the intended purpose for which they are given such as to strengthen general national capacity and to enhance capacity to execute specific investment projects, have not been realised. The implication of this touches directly on the need for a policy agenda which must ensure that both typologies of aid grants are used among other things to (i) pursue aggressive human capital development, (ii) foster the knowledge economy by investing in education, skill, technology and research, and (iii) stimulate the productive sector through investment in the real sectors as well as infrastructures that contribute to increase in the national output.

6. Concluding Implications and Future Research Directions

In conclusion, the inclusive growth approach has to take a longer term perspective to improving the productive capacity of the growing African population as well as creating conducive environment for employment as a means of ensuring that incomes and living standards for excluded groups in the

region are enhanced. Due to this longer term perspective, there should be a clear focus on structural transformation; economic rationality and internal migration in the sustainable and inclusive growth agenda (see Ianchovichina & Lundstrom, 2009). Moreover, given the time lag associated with reforms and outcome, it is important that future constraints to inclusive growth are identified, and their possible solutions articulated in order to achieve the desired outcome.

Future studies can focus on assessing whether the established findings withstand empirical scrutiny from country-specific frameworks. This further research recommendation builds on the fact that while a general perspective has been provided in this study for continental specific policies, country-specific policies are also worthwhile in order to take into account more heterogeneity. Moreover, given the unbalanced dataset used in the present study, future studies can also leverage on a balanced panel dataset for a threshold analysis. As argued in contemporary threshold literature (Asongu & Odhiambo, 2020), it is not appropriate to use an unbalanced panel dataset to explore nonlinear regressions techniques such as the Panel Threshold Regression (PTR) of Hansen (1999) and the Panel Smooth Transition Regression (PSTR) of González et al. (2005) which was recently improved by González et al. (2017).

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Table 1. Variables' Descriptions

Variables	Descriptions	Measures	Designations	Sources
InAIDGRT	Aid Grants excluding Technical Cooperation	Natural Logarithm	Independent Variable	WDI
InTCGTR	Technical Cooperation Grant	Natural Logarithm	Independent Variable	WDI
GDPPCGR	GDP per capita growth	Annual %	Dependent Variable	WDI
UER	Unemployment Rate	% of total labour force	Dependent Variable	WDI
GDS	Gross Domestic Savings	% of GDP	Control Variable	WDI
POPGR	Population growth	Annual %	Control Variable	WDI

Source: World Bank's World Development Indicators (WDI). AIDGRT: aid grants. TCGRT: technical cooperation grants. GDPPCGR: gross domestic product per capita growth. UER: unemployment rate: GDS: gross domestic savings. POPGR: population growth.

Table 2. Descriptive Statistics

Variables	Descriptions	Measures	Mean	Max.	Min.	SDs	Obs.
InAIDGRT	Aid Grants excluding Technical Cooperation	Natural Logarithm	8.17	10.06	5.62	0.63	1483
InTCGTR	Technical Cooperation Grant	Natural Logarithm	7.68	8.58	4.60	0.50	1476
GDPPCGR	GDP per capita growth	Annual %	1.48	140.37	-47.50	6.80	1499
UER	Unemployment Rate	% of total labour force	8.44	37.94	0.27	7.62	1232
GDS	Gross Domestic Savings	% of GDP	11.64	83.29	-141.97	19.13	1334
POPGR	Population growth	Annual %	2.58	8.12	-6.77	1.08	1533

Source: World Bank World Development Indicators (WDI). SDs: standard deviations. Min: minimum. Max: maximum. Obs: observations. InAIDGRT: log of aid grants. InTCGRT: log of technical cooperation grants. GDPPCGR: gross domestic product per capita growth. UER: unemployment rate: GDS: gross domestic savings. POPGR: population growth.

Table 3. Aid Grants and inclusive growth
Response Variable: GDP per capita growth

	Pooled Mean group (PMG)	Mean Group (MG)	Dynamic Fixed Effect (DFE)
Variables	**Coefficient. (p-value)**	**Coefficient. (p-value)**	**Coefficient. (p-value)**
Long-Run Coef.			
InAIDGRT	1.506***	1.739**	2.297***
	(0.000)	(0.020)	(0.0000
GDS	0.117	0.157***	0.058***
	(0.000)***	(0.001)	(0.004)
POPGR	-0.569	-0.072	0.315*
	(0.001)***	(0.941)	(0.082)
Adj. Speed	-0.892	-1.056***	-0.974***
	(0.000)***	(0.000)	(0.000)
Short-Run Coef.			
InAIDGRT	-0.311	-0.896	-1.072**
	(0.423)	(0.241)	(0.022)
GDS	0.087*	0.027	0.133***
	(0.068)	(0.542)	(0.000)
POPGR	3.984	3.340	0.665
	(0.219)	(0.195)	(0.119)
Intercept	-0.983***	-15.401**	-18.679***
	(0.000)	(0.018)	(0.000)
Log Likelihood	-3010.571		
Hausman	0.060[a],0.681[b]		
No. of groups	37		
Period included	33		
No. Obs.	1173		

[a]***Hausman,MG, DFE:*** *If p-value > 5%, then use DFE; If p-value < 5%, then use MG*
[b]***Hausman,PMG, DFE:*** *If p-value > 5%, then use PMG; If p-value < 5%, then use DFE*

Note: *{DFE is chosen over MG (0.060>0,05), and PMG is chosen over DFE (0.681>0.05)}*
Decision: *PMG is an efficient and consistent estimator.*

InAIDGRT: log of aid grants. InTCGRT: log of technical cooperation grants. GDPPCGR: gross domestic product per capita growth. UER: unemployment rate: GDS: gross domestic savings. POPGR: population growth. Adj. speed: adjustment speed. Obs: observations. Coef: coefficient. MG: mean group. PMG: pooled mean group. DFE: dynamic fixed effect.

Table 4. Aid Grants and Inclusive Growth
Response Variable: Unemployment rate

	Pooled Mean group (PMG)	Mean Group (MG)	Dynamic Fixed Effect (DFE)
Variables	**Coefficient. (p-value)**	**Coefficient. (p-value)**	**Coefficient. (p-value)**
Long-Run Coef.			
InAIDGRT	-4.834***	2.403	-3.548***
	(0.000)	(0.556)	(0.001)
GDS	-0.014	0.034	-0.116**
	(0.577)	(0.748)	(0.031)
POPGR	-0.370	2.504	0.393
	(0.247)	(0.258)	(0.359)
Adj. Speed	-0.058***	-0.264***	-0.065***
	(0.010)	(0.000)	(0.000)
Short-Run Coef.			
InAIDGRT	0.245***	0.343	0.221***
	(0.001)	(0.104)	(0.002)
GDS	-0.006***	0.005	-0.003
	(0.001)	(0.599)	(0.375)
POPGR	-2.407	-1.456	-0.060
	(0.141)	(0.223)	(0.361)
Intercept	3.260**	5.421**	2.460***
	(0.015)	(0.023)	(0.000)
Log Likelihood	-198.031		
Hausman	0.977[a],0.020[b]		
No. of groups	37		
Period included	26		
No. Obs.	945		

[a]***Hausman, MG, DFE:*** *If p-value > 5%, then use DFE; If p-value < 5%, then use MG*
[b]***Hausman, PMG, DFE:*** *If p-value > 5%, then use PMG; If p-value < 5%, then use DFE*

Note: *{DFE is chosen over MG (0.060>0,05), and DFE is chosen over PMG (0.020<0.05)}*
Decision:*DFE is an efficient and consistent estimator.*

InAIDGRT: log of aid grants. InTCGRT: log of technical cooperation grants. GDPPCGR: gross domestic product per capita growth. UER: unemployment rate: GDS: gross domestic savings. POPGR: population growth. Adj. speed: adjustment speed. Obs: observations. Coef: coefficient. MG: mean group. PMG: pooled mean group. DFE: dynamic fixed effect.

Table 5. Technical Cooperation Grants and inclusive growth
Response Variable: GDP per capita growth

	Pooled Mean group (PMG)	Mean Group (MG)	Dynamic Fixed Effect (DFE)	
Variables	**Coefficient. (p-value)**	**Coefficient. (p-value)**	**Coefficient. (p-value)**	
Long-Run Coef.				
InTCGRT	0.650	0.860	1.715**	0.841
	(0.350)	(0.534)	(0.039)	
GDS	1.135	0.179***	0.060***	0.021
	(0.000)***	(0.000)	(0.004)	
POPGR	-0.787	-0.319	0.181	0.191
	(0.001)***	(0.738)	(0.342)	
Adj. Speed	-0.884	-1.043***	-0.945***	0.029
	(0.000)***	(0.000)	(0.000)	
Short-Run Coef.				
InTCGRT	-0.194	-0.428	-1.037	0.885
	(0.629)	(0.781)	(0.242)	
GDS	0.085*	0.049	0.138***	0.024
	(0.073)	(0.284)	(0.000)	
POPGR	4.174	3.967	0.890**	0.433
	(0.181)	(0.188)	(0.040)	
Intercept	-2.900***	-5.420	-12.657**	6.174
	(0.000)	(0.656)	(0.040)	
Log Likelihood	-3017.701			
Hausman	0.051[a],0.628[b]			
No. of groups	37			
Period included	33			
No. Obs.	1171			

[a]***Hausman, MG, DFE:*** *If p-value > 5%, then use DFE; If p-value < 5%, then use MG*
[b]***Hausman, PMG, DFE:*** *If p-value > 5%, then use PMG; If p-value < 5%, then use DFE*

Note: *{DFE is chosen over MG (0.051>0,05), and PMG is chosen over DFE (0.628>0.05)}*
Decision: *PMG is an efficient and consistent estimator.*

InAIDGRT: log of aid grants. InTCGRT: log of technical cooperation grants. GDPPCGR: gross domestic product per capita growth. UER: unemployment rate: GDS: gross domestic savings. POPGR: population growth. Adj. speed: adjustment speed. Obs: observations. Coef: coefficient. MG: mean group. PMG: pooled mean group. DFE: dynamic fixed effect.

Table 6. Technical Cooperation Grants and inclusive growth
Response Variable: Unemployment rate

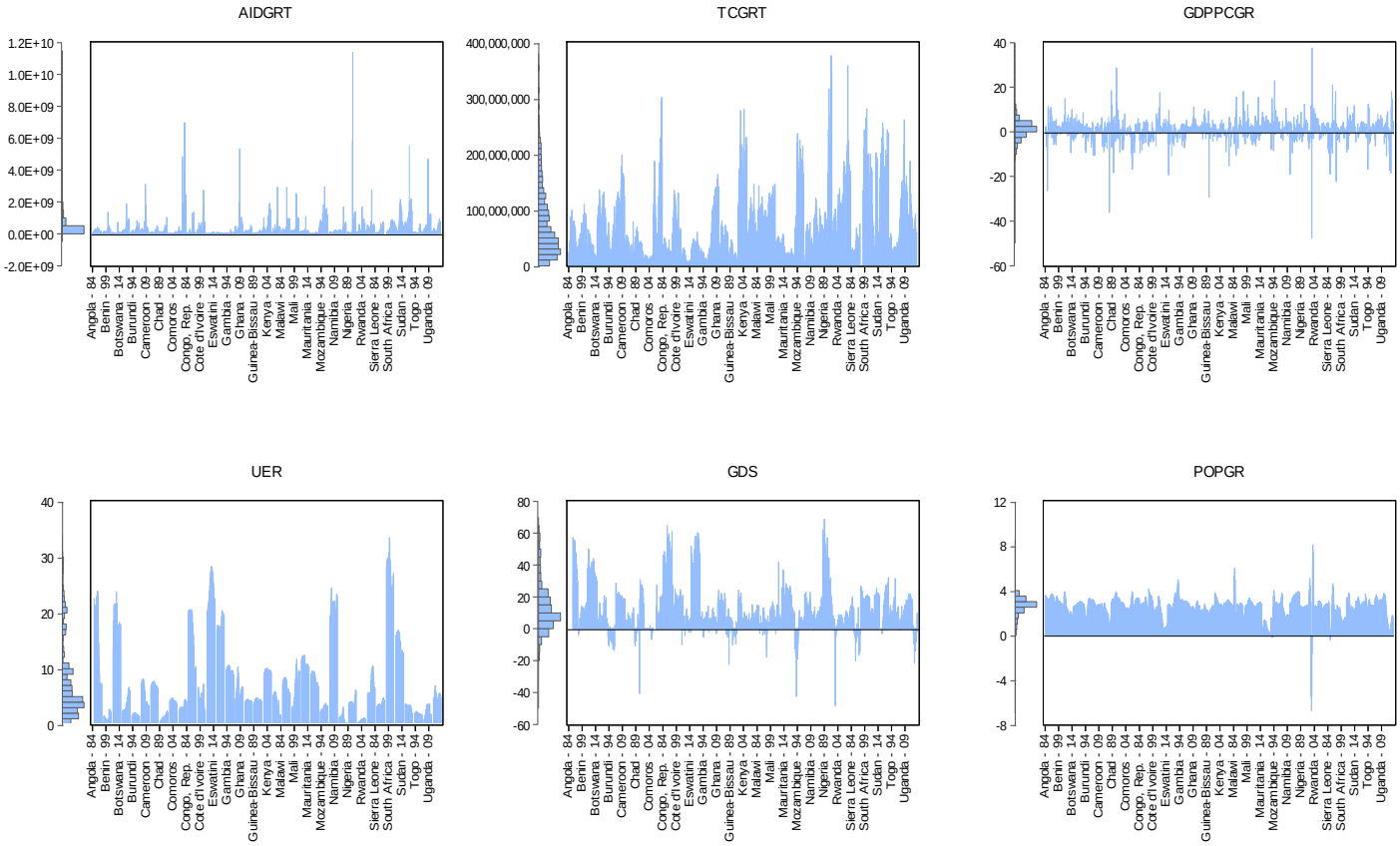
	Pooled Mean group (PMG)	Mean Group (MG)	Dynamic Fixed Effect (DFE)
Variables	**Coefficient. (p-value)**	**Coefficient. (p-value)**	**Coefficient. (p-value)**
Long-Run Coef.			
InTCGRT	-5.474***	1.231	1.027
	(0.000)	(0.646)	(0.604)
GDS	0.008	-1.146***	-0.118**
	(0.641)	(0.007)	(0.033)
POPGR	-4.384***	0.930	0.246
	(0.00)	(0.757)	(0.575)
Adj. Speed	-0.041**	-0.228***	-0.064***
	(0.047)	(0.000)	(0.000)
Short-Run Coef.			
InTCGRT	0.363***	0.029	0.028
	(0.004)	(0.899)	(0.839)
GDS	-0.008	0.006	-0.003
	(0.226)	(0.526)	(0.464)
POPGR	-2.459	-1.478	-0.067
	(0.120)	(0.151)	(0.308)
Intercept	2.629*	2.299	0.042
	(0.058)	(0.287)	(0.966)
Log Likelihood	-212.284		
Hausman	0.998[a],0.006[b]		
No. of groups	37		
Period included	26		
No. Obs.	943		

[a]***Hausman, MG, DFE:*** *If p-value > 5%, then use DFE; If p-value < 5%, then use MG*
[b]***Hausman, PMG, DFE:*** *If p-value > 5%, then use PMG; If p-value < 5%, then use DFE*

Note: *{DFE is chosen over MG (0.998>0,05), and DFE is chosen over PMG (0.006<0.05)}*
Decision: *DFE is an efficient and consistent estimator.*

InAIDGRT: log of aid grants. InTCGRT: log of technical cooperation grants. GDPPCGR: gross domestic product per capita growth. UER: unemployment rate: GDS: gross domestic savings. POPGR: population growth. Adj. speed: adjustment speed. Obs: observations. Coef: coefficient. MG: mean group. PMG: pooled mean group. DFE: dynamic fixed effect.

Figure 1. Graphical Representation of Variables of interest



AIDGRT: aid grants. TCGRT: technical cooperation grants. GDPPCGR: gross domestic product per capita growth. UER: unemployment rate: GDS: gross domestic savings. POPGR: population growth.