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**THE IMPACT OF FOREIGN AID ON ECONOMIC GROWTH IN AFRICA: EMPIRICAL EVIDENCE FROM LOW-INCOME COUNTRIES**

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# THE IMPACT OF FOREIGN AID ON ECONOMIC GROWTH IN AFRICA: EMPIRICAL EVIDENCE FROM LOW-INCOME COUNTRIES

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***Abstract***

*This paper aims to shed some insights on the ongoing debate on the aid-growth nexus by examining whether sources of aid matters for explaining aid effectiveness. In doing so, we consider three main proxies for bilateral aid based on the three sources of aid such as total aid (TA); Traditional Donors aid (TDA) and Non-Traditional Donors aid (NTDA) as independent variables in a dynamic panel growth model within a system GMM framework. It uses a panel dataset from 25 Low-Income Countries (LICs) in Africa over the period 2000-2017. The main findings show that the impact of aid on growth appears to be negative and significant for TA and TDA proxies while it is positive but insignificant when the aid proxy is NTDA. A relatively larger share of TA and TDA disbursement away from the direct growth-enhancing productive sectors towards the unproductive sectors seem to have contributed to their strong negative impact on growth. The key policy implication is that governments in LICs in Africa and donors should work in collaboration to design effective ways for ensuring that TDA should target the direct growth-enhancing sectors.*

*Keywords: Foreign aid; growth; LICs; system GMM; aid sources; Africa*

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## 1. Introduction

Despite the aid-growth nexus in developing countries being one of the most empirically researched areas in economics, evidence has turned out to be mixed and highly controversial. Paradoxically, foreign aid continues to play a key role in financing the post2015 development agenda in poor developing countries mostly in Africa. Indeed, the common belief among donors is that the effect of aid on growth is positive (Doucouliagos and Paldam, 2010). Since 2000, as reflected in the 2002 Monterrey Conference and 2005 G-8 Gleneagles Summit, the international aid community has been calling for doubling aid for the poorest countries mostly in Africa (UN, 2003; UNAIDS, 2005). The trust was that increasing aid flows to the poorest countries in Africa would stimulate and support the further reduction of aid dependency among these economies (UNAIDS, 2005). As a result, total net bilateral aid flows to developing countries have increased since 2000 and reached 166.8 billion USD in 2016 with Africa receiving a lion's share of it (OECD, 2017). It is also worth mentioning that, since 2000, there has been a rising influence of Non-Traditional Donors (NTDs) alongside Traditional Donors (TDs) (Greenhill et al., 2013[2]).Interestingly, although TDs have remained a dominant source of aid since the 1960s, there has been an increasing aid flow from NTDs since 2000 with a lion's share coming from China. In light of this, some recent literature argues that the rising influence of NTDs not only tends to challenge and complicate how the global aid landscape works (Dreher et al., 2011; Isabela and Virtanen, 2015) but also fuels a renewed debate on the aid-growth nexus. Therefore, extending the long-debated aid-growth nexus by considering total aid from both TDs and NTDs is critical to capturing the true impact of aid on growth. In this regard, the aid-growth nexus in LICs deserves much scholarly interest for empirical investigation.

The analytical and philosophical foundation of foreign aid as a basis for supporting sustained growth in developing countries is traced back to the 1960s linked to the 'Two-Gap' model of Chenery and Strout (1966). Later on, the 'two-gap' model has been extended to the 'three-gap' model by incorporating a 'fiscal-gap' or fiscal deficit as a third financing gap hindering growth

[2] Broadly speaking, as shown in Greenhill et al., 2013, Traditional Donors (TDs) refer to donors which are commonly known as the Organization for Economic Cooperation and Development (OECD) Development Assistant Committee (DAC) members while Non-Traditional Donors (NTDs) stand for those donors outside the OECD DAC system. The list of TDs and NTDs is shown in Section 2, Table 2.2.

in poor countries (Bacha, 1990; Taylor, 1994). Theoretically, therefore, foreign aid is assumed to increase growth through two most important channels by financing investment (i.e. the 'two-gap' model) and government consumption expenditure for productive sectors (i.e. 'three-gap' model). Even though foreign aid continues to play a key role in developing countries, whether or not it works for growth remains controversial and debatable both in academia and policy circles. So far, empirical evidence on the link between foreign aid and growth remains mixed and contradictory, giving two lines of debate on this nexus: aid effectiveness and aid ineffectiveness. The aid effectiveness theses argue that aid positively affects growth without conditions (Arndt et al., 2015; Clemens et al., 2012; Juselius et al., 2013) and under certain policy conditions (Alvi et al., 2008; Burnside and Dollar, 2000; Dutta et al., 2015). On the contrary, a strand of literature on the aid ineffectiveness theses documented that the impact of aid on growth is either negative (Adedokun and Folawewo, 2017; Boone, 1996) or null/insignificant (Dreher and Langlotz, 2017; Rajan and Subramanian, 2008).

A critical review of the recent literature has highlighted at least three important methodological and data issues that can explain why past studies have produced such inconclusive empirical evidence on the aid-growth nexus. Most past aid-growth empirical literature has failed to properly address for, first, aid endogeneity due to the difficulty of finding powerful external instrumental variables for aid (Clemens et al., 2012; Hansen and Tarp, 2001; Juselius et al., 2013; Morrissey, 2015); second, the problem of omitted variables bias due to failing to fully account for the important factors that not only influencing growth alone (determinants of growth) but also jointly influencing both aid and growth (mediating variables) (Herzer, 2015; Herzer and Morrissey, 2013); and third, the typical characteristics of the panel data such as persistency and short panels (Judson and Owen, 1999). Apart from these methodological and data issues, the global aid landscape since 2000 is characterized by the increasing influence of NTDs alongside the TDs which has been dominating the aid system since the 1960s (Greenhill et al., 2013). In the light of this, Morrissey (2015) found that the 'way in which aid is implemented' substantially differs because the types of aid and the procedures vary by donors. Moreover, donors' focus substantially vary across income groups in Africa, where TDs strongly favored LICs while NTDs inclined towards MICs (Mamo and Odhiambo, 2020). The key implication of these studies is that examining the aid-growth nexus by donor groups is imperative to properly identify the true effects of aid on growth. Nonetheless, most of the past studies mentioned above seemed to have focused mainly on aid flows solely from TDs. Thus,

the critical research gaps in the aid-growth nexus rest on employing an appropriate econometric approach to account for the problem of endogeneity and omitted variable bias as well as taking into account total aid from both official donor groups- TDs and NTDs.

In the current rapidly changing global aid landscape, the debate on the aid-growth relationship among LICs in Africa becomes an interesting topic for several reasons. First, foreign aid continues to be a key resource for financing development needs in LICs (Alemu and Lee, 2015; Mamo and Odhiambo, 2020; OECD, 2017). Second, since 2000, there has been a call for doubling aid flows to the poorest countries or LICs mostly in Africa (UN, 2003; UNAIDS, 2005). Third, the majority (27 of the 34) LICs in developing countries are found in Africa, and a specific focus on African LICs could provide typical cases to understand the debate on the aidgrowth nexus. Fourth, donors' focus shows substantial variations across income groups (Greenhill et al., 2013; Mamo and Odhiambo, 2020). Furthermore, the trends of aid flows (by aid sources) to LICs in Africa in the Section 'Foreign Aid Dynamics in LICs: Trend Analysis and Stylized Facts' (see Tables 1–5) support the four main points discussed here. The findings from a descriptive analysis in the Section 'Foreign Aid Dynamics in LICs: Trend Analysis and Stylized Facts' reveal that: i) LICs consumed the lion's share of aid disbursed to Africa; ii) there is an increasing trend in aid dependency in the studied countries; iii) there is a growing relative importance of NTDs alongside TDs; and iv) donors' target/focus in LICS varies substantially. Taken together, these stylized facts make African LICs a typical and very interesting case to examine the aid-growth relationship and provide a fresh empirical insight into the context of both TDs and NTDs, which has been overlooked in most past studies.

The current article, therefore, aims to fill the research gaps highlighted above and contribute to the paucity of empirical evidence on the aid-growth relationship using aid flows from both TDs and NTDs among LICs in Africa during 2000–2017. Given that the aid-growth nexus has been the most extensively studied area, it is crucial to point out the novel contribution of this study. First, the study will use the latest dataset and most advanced econometric techniques, such as a dynamic panel model under the system GMM framework to properly address the recognized problem of aid endogeneity as well as a peculiar feature of panel data (persistency and short-panel). Second, identification of the aid-growth nexus could be confounded by omitted variables bias due to unobserved factors that not only jointly influence both aid and growth (i.e. mediating factors) but also influence only growth (i.e. growth determinants) (Addison and Tarp, 2015; Herzer, 2015; Herzer and Morrissey, 2013). Thus, unlike a bivariate framework,

this study adopts a multivariate analysis by incorporating both the most important mediating factors and traditional growth determinants in the aid-growth regression to minimize omitted variable bias and correctly identify the true impact of aid on growth. Third, unlike previous studies that focused mostly on TD's aid, this study considers total aid flows from both TDs and NTDs to providing new insights on whether disaggregated aid by sources may differently influence the effects of aid on growth. To our knowledge, this study may be the first comprehensive empirical exercise to use disaggregated aid by sources from TDs and NTDs (mostly aligning aid flows from China into the standard DAC definition). In short, this study adopts a dynamic panel multivariate model within a system GMM framework and examines the aid-growth relationship based on a panel dataset from 25 LICs in Africa over the period 2000–2017.

The rest of the article is organized into five sections, including the introduction. The second section presents a descriptive analysis on the dynamics of aid distributions in LICs during 2000–2017. The third section discusses the background to this research based on a critical review of the theoretical and empirical literature on the aid-growth nexus. The fourth section outlines the data source, methodology and the justification for the selection of a dynamic panel estimation technique used to generate the relevant empirical results. The fifth section discusses the empirical estimation results. Finally, the sixth section concludes the article.

## 2. Foreign Aid Dynamics in LICs: Trend Analysis and Stylized Facts

As highlighted in the previous section, the global aid landscape has been rapidly changing since 2000, which is characterized by the 'age of choice' between two main bilateral sources of aid: TDs and NTDs. Furthermore, the Monterrey Consensus in 2002 has come up with an explicit commitments for all donors to ensure that aid allocation should target or prioritize: (i) the poorest countries or LICs mostly in Africa, and (ii) the public infrastructure and productive social sectors which are critical instruments to support growth and development. This section presents a descriptive analysis on the dynamics and patterns of aid disbursements and sectoral compositions in LICs from 2000 to 2017. This analysis focuses on bilateral aid and provides some trend analysis and stylized facts in terms of net aid disbursements and main aid sources; donors' focus/target; aid dependency; and sectoral aid compositions by aid sources.

### 2.1 Trends of net aid disbursements and evolution of main aid sources

Over the last 18 years since the turn of the twenty-first century, bilateral aid flows have increased substantially in Africa in general and LICs in particular. Table 1 presents the volume and share of net bilateral aid disbursements to Africa and LICs by sources of aid from 2000 to 2017.

As shown in Table 1 Column 2, total net aid disbursements to Africa increased nearly two-fold (1.9 times): from $13.7 billion in 2000 to $25.6 billion in 2017. On average, the largest share (89 percent) of this aid came from TDs while NTDs also contributed about 11 percent suggesting a modest rising influence of NTDs in Africa. Regarding to LICs (see Column 4), total net aid disbursements increased by slightly two-fold (2.3 times): from $7.4 billion in 2000 to $16.7 billion in 2017, representing a 126 percent increase. In real terms, total net aid to LICs increased by $9.3 billion between 2000 and 2017. In absolute value, total net aid disbursement reached its peak in 2011 ($18.8 billion) and the falling trend since 2011 seems to have shown a slight recovery in 2017.

The same increasing trend is observed when aid is evaluated by main sources with TDs contributing a lion's share (94 percent) of aid to LICs with NTDs contributing about 6 percent (see Columns 10 and 11). Although the contribution of NTDs is marginal compared to TDs, a relative importance of NTDs has shown a modest rising trend over time since 2000. As shown in Columns 5 and 6, aid from NTDs increased by slightly higher magnitude (2.4 times) than aid from TDs (2.3 times) from 2000 to 2017. Between 2000 and 2017, total net aid flows from NTDs have shown a 138 percent increase while aid flows from TDs increased by 125 percent. Similarly, as shown in Columns 10 and 11, the share of NTD's aid to total aid flows to LICs increased by 5.5 percent while the share of TD's aid increased only by 0.4 percent during the same period.

**Table 1: Trends in net aid flows[3] to Africa and LICs, in volume and share by aid sources during 2000-2017 (Constant 2017 $ billion; excluding unspecified aid flows)**

| | Total net aid disbursements by sources | | | | | | Share of aid by sources (%) | | | | | Aid to GDP (%) by sources | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Africa | | | LICs | | | LICs to Africa | | | Within LICs | | Within LICs | | |
| | *Total* | *TDs* | *NTDs* | *Total* | *TDs* | *NTDs* | *Total* | *TDs* | *NTDs* | *TDs* | *NTDs* | *Total* | *TDs* | *NTDs* |
| 2000 | 13.7 | 12.8 | 0.95 | 7.4 | 7.15 | 0.21 | 54.0 | 55.9 | 22.11 | 96.6 | 2.84 | 5.93 | 5.76 | 0.18 |
| 2001 | 13.1 | 12.6 | 0.48 | 7.2 | 7.1 | 0.17 | 55.0 | 56.4 | 35.42 | 98.6 | 2.36 | 5.95 | 5.74 | 0.21 |
| 2002 | 17 | 16.4 | 0.65 | 9.3 | 9.2 | 0.13 | 54.7 | 56.1 | 20.00 | 98.9 | 1.40 | 7.02 | 6.89 | 0.12 |
| 2003 | 21.3 | 20.6 | 0.72 | 14.5 | 14.2 | 0.26 | 68.1 | 68.9 | 36.11 | 97.9 | 1.79 | 7.62 | 7.23 | 0.39 |
| 2004 | 19.6 | 18.7 | 0.89 | 10.7 | 10.2 | 0.42 | 54.6 | 54.6 | 47.19 | 95.3 | 3.93 | 6.52 | 6.34 | 0.18 |
| 2005 | 24.8 | 23.5 | 1.29 | 9.6 | 9.4 | 0.14 | 38.7 | 40.0 | 10.85 | 97.9 | 1.46 | 5.89 | 5.80 | 0.09 |
| 2006 | 32 | 29.4 | 2.56 | 10.5 | 10.2 | 0.31 | 32.8 | 34.7 | 12.11 | 97.1 | 2.95 | 6.25 | 5.99 | 0.27 |
| 2007 | 22 | 20.4 | 1.64 | 11.2 | 10.7 | 0.51 | 50.9 | 52.5 | 31.10 | 95.5 | 4.55 | 6.55 | 5.99 | 0.56 |
| 2008 | 23.4 | 21.2 | 2.16 | 12.7 | 12.3 | 0.4 | 54.3 | 58.0 | 18.52 | 96.6 | 3.15 | 8.15 | 7.83 | 0.32 |
| 2009 | 25.1 | 22.9 | 2.27 | 13.5 | 12.6 | 0.93 | 53.8 | 55.0 | 40.97 | 93.3 | 6.89 | 7.34 | 7.05 | 0.29 |
| 2010 | 24.9 | 23.4 | 1.44 | 14.4 | 14.1 | 0.3 | 57.8 | 60.3 | 20.83 | 97.9 | 2.08 | 7.05 | 6.72 | 0.33 |
| 2011 | 29.4 | 25.6 | 3.78 | 18.8 | 16.3 | 2.43 | 64.0 | 63.7 | 64.29 | 86.7 | 12.9 | 8.45 | 7.38 | 1.07 |
| 2012 | 29.8 | 23.9 | 5.88 | 17 | 14.2 | 2.87 | 57.1 | 59.3 | 48.81 | 83.3 | 16.9 | 8.27 | 7.51 | 0.75 |
| 2013 | 30 | 23.6 | 6.45 | 15.4 | 14.2 | 1.16 | 51.3 | 60.3 | 17.98 | 92.4 | 7.53 | 7.91 | 7.30 | 0.62 |
| 2014 | 27.5 | 21.3 | 6.17 | 15.7 | 14.2 | 1.52 | 57.1 | 66.7 | 24.64 | 90.5 | 9.68 | 8.05 | 7.51 | 0.54 |
| 2015 | 25.4 | 21.8 | 3.62 | 15.5 | 14.8 | 0.73 | 61.0 | 67.9 | 20.17 | 95.5 | 4.71 | 8.59 | 7.60 | 0.99 |
| 2016 | 25.4 | 22.3 | 3.14 | 15.6 | 14.9 | 0.66 | 61.4 | 66.8 | 21.02 | 95.5 | 4.23 | 8.74 | 8.16 | 0.58 |
| 2017 | 25.6 | 24.4 | 1.27 | 16.7 | 16.2 | 0.5 | 65.2 | 66.4 | 39.37 | 97.0 | 2.99 | 9.27 | 8.88 | 0.38 |
| ***Total,2000-2017*** | ***430*** | ***385*** | ***45.4*** | ***236*** | ***222*** | ***13.7*** | ***54.8*** | ***57.7*** | ***30.12*** | ***94.2*** | ***5.80*** | ***-*** | ***-*** | ***-*** |
| ***Average, 2000-2017*** | ***23.9*** | ***21.4*** | ***2.52*** | ***13.1*** | ***12.3*** | ***0.76*** | ***55.1*** | ***57.9*** | ***29.56*** | ***94.8*** | ***5.17*** | ***7.42*** | ***6.98*** | ***0.44*** |

**Source: Own elaboration**. *Aid data for South Sudan covers the period 2011-2017. Aid data for China covers the period 2000-2014 and expressed in Constant 2014 USD.*

[3] South Africa is excluded as aid recipient because it belongs to NTDs.

Furthermore, a gradual emergence of NTDs in the global aid system seems to have influenced the composition of top donors in LICs. This is shown in Table 2 which presents the breakdown and distribution of aid flows to LICs in volume and share by aid sources and individual donors along with their primary target aid recipient countries during 2000–2017.

Based on the volume of aid given to LICs (see Columns 2 and 6), USA (Column 1) and China (Column 5) have been the first top donors to LICs from TDs and NTDs, respectively. When all donors are considered together, USA remains the first top donor while China becomes the 9th top donor after Canada (8th) and before Belgium (10th). This means that the emergence of China as one of the top 10 donors to LICs seems to have influenced the composition of the first 10 top donors to LICs (see Belgium & Norway). Besides, Korea, the second top NTD, became the 18th top donor after Finland. Moreover, 5 among the top 10 NTDs (i.e. 3rd to 7th) delivered a relatively higher volume of aid to LICs compared to the volume of aid delivered by the first 8 bottom TDs. Perhaps, this may suggest that a relative growing presence of NTDs in LICs has been prevailing over time which could no longer be ignored.

### 2.2 The patterns of aid distributions: donor's focus in LICs

The patterns of aid distributions are presented by aid sources (see Table 1 Columns 7–9) and individual donors (see Table 2). As shown in Table 1 Column 7, LICs received a relatively higher average share (55 percent) of total aid disbursed to Africa from all donors (both TDs & NTDs) during 2000–2017. The share of total aid increased by 20 percent: from 54 percent in 2000 to 65.2 percent in 2017. It seems that the patterns of aid distributions in LICs reveal inconsistencies or variations when aid is evaluated by sources (TDs and NTDs). Column 8 shows that LICs received a relatively larger share (57.7 percent) of total TD's aid disbursed to Africa during 2000–2017. On the contrary, as shown in Column 9, LICs received a relatively lower share (30 percent) of total NTD's aid disbursed to Africa during the same period. Overall, the main results show that total aid and TDs' aid allocations have targeted LICs consistent with the aid convention and the Monterrey Consensus in 2002 while aid allocations by NTDs did not do so.

The same story goes on when the analysis is done for individual donors which have shown substantial inconsistencies (see Table 2 Columns 3 and 7). As shown in Table 2 (Column 3), of the total net aid disbursed to Africa between 2000 and 2017, LICs received 50 and above

percent of aid from the majority (19 out of 28) of TDs with six of them delivering over 75 percent. On the other hand, 9 TDs disbursed lower than 50 percent of their total aid to LICs and 2 of them were among the top 10 TDs: France (3rd) and Germany (4th). On the contrary, Column 7 shows that only 9 of the 20 NTDs disbursed more than 50% of their aid to LICs with three of them contributing over 75 percent. It is shown that LICs received lower than 50 percent of total net aid given to Africa by a relatively large number of NTDs (11 out of 20). Furthermore, the characteristics of donor's primary target/focus in terms of aid allocation to a specific country show some interesting insights (see Table 2). In one way or another, the overall result shows that Ethiopia and Tanzania have been among the top 3 aid recipients for most of the donors found in the first top 10 donors list in both groups – TDs (see Column 4) and NTDs (see Column 8). Apart from this, the study found some variations not only between aid sources (TDs & NTDs) but also between individual donors within aid source. The main findings are that: (i) the top 10 TDs seem to have been following similar patterns where their share of aid given to the first top aid recipient countries did not exceed 20 percent while it shows substantial differences within NTDs' top 10 donors ranging from 19.8 percent to 80.7 percent; (ii) DRC was among the first 3 top aid recipients for most of the TDs while this was not the case for any of the NTDs; (iii) Somalia, Eritrea and Guinea were among the first 3 top aid recipients for at least two NTDs while that was not the case for any of the TDs; and (iv) Rwanda and Burundi were favored at least by one TD top 10 donor, while none of the NTDs in the first top 10 donors list considered them.

**Table 2: The distribution of individual donor's aid disbursements to LICs, in volume, share and top 3 recipients during 2000-2017 (Constant 2017 $ millions).**

| **Traditional Donors (TDs) aid to LICs** | | | | **Non-Traditional Donors (NTDs) aid to LICs** | | | |
|---|---|---|---|---|---|---|---|
| **Donors** | Total aid, million $ | LICs/Africa (%) | Top 3 aid recipients | **Donors** | Total aid million $ | LICs/Africa (%) | Top 3 aid recipients |
| **USA** | 69128 | 59.1 | Ethiopia-DRC-Uganda | **China** | 9003 | 44.3 | ZBW-Ethiopia-TNZ |
| **UK** | 26243 | 60.2 | Ethiopia-TNZ-DRC | **Korea** | 1825 | 64.0 | TNZ-Ethiopia-MZQ |
| **France** | 19729 | 38.7 | Senegal-DRC-MDR | **Turkey** | 929 | 76.1 | Somalia-Niger-Ethiopia |
| **Germany** | 15778 | 45.6 | DRC-Ethiopia-MZQ | **UAE** | 747 | 4.33 | Somalia-Eritrea-TNZ |
| **Japan** | 12616 | 56.6 | TNZ-DRC-Ethiopia | **Kuwait** | 478 | 18.3 | Ethiopia-Senegal-Malawi |
| **Netherland** | 10803 | 68.2 | TNZ-DRC-MZQ | **Israel** | 417 | 84.3 | Ethiopia-Eritrea-Uganda |
| **Sweden** | 9457 | 75.8 | TNZ-MZQ-DRC | **Saudi Arabia** | 248 | 14.5 | Somalia-Guinea-Ethiopia |
| **Canada** | 9173 | 67.4 | Ethiopia-Mali-TNZ | **Russia** | 143 | 64.5 | MZQ-Guinea-MDR |
| **Belgium** | 8606 | 79.1 | DRC-Rwanda-Burundi | **Thailand** | 9.17 | 62.8 | MDR-Senegal-MZQ |
| **Norway** | 8286 | 75.1 | TNZ-MZQ-Uganda | **Cyprus** | 3.12 | 43.3 | Mali-Guinea-Liberia |
| **Denmark** | 7252 | 66.3 | TNZ-MZQ-Uganda | **Estonia** | 2.23 | 67.4 | South S-CAR-Somalia |
| **Italy** | 5282 | 62.3 | DRC-MZQ-Ethiopia | **Malta** | 1.94 | 60.4 | Somalia-Eritrea-Ethiopia |
| **Switzerland** | 4892 | 75.7 | MZQ-TNZ-Burkina Faso | **Romania** | 1.46 | 10.8 | Senegal-Benin-ZBW |
| **Ireland** | 4167 | 79.4 | MZQ-Ethiopia-Uganda | **Timor-Leste** | 0.64 | 18.3 | Guinea-Bissau only |
| **Spain** | 3097 | 45.7 | MZQ-DRC-Senegal | **Lithuania** | 0.31 | 51.7 | Somalia-Mali-Eritrea |
| **Finland** | 2035 | 66.8 | TNZ-MZQ-Ethiopia | **Kazakhstan** | 0.05 | 100 | CAR only |
| **Luxembourg** | 1361 | 72.8 | Burkina F-Mali-Senegal | **Bulgaria** | 0.03 | 0.46 | Somalia only |
| **Austria** | 1265 | 40.7 | Uganda-DRC-Ethiopia | **Latvia** | 0.03 | 7.69 | Mali only |
| **Portugal** | 1203 | 32.0 | MZQ-Guinea Bissau-DRC | **Azerbaijan** | 0.01 | 2.33 | Togo only |
| **Australia** | 1169 | 65.3 | ZBW-MZQ-Somalia | **Croatia** | 0.01 | 2.27 | Gambia only |
| **Iceland** | 192 | 87.4 | Malawi-Uganda-MZQ | **Overall: Average share of aggregated aid in LICs to Africa, in total & by sources (%)** | | | |
| **Poland** | 158 | 43.6 | Ethiopia-TNZ-Rwanda | | | | |
| **New Zealand** | 104 | 56.4 | TNZ-ZBW-Somalia | | | | |
| **Czech Rep.** | 54 | 50.1 | Ethiopia-Mali-DRC | | | | |
| **Greece** | 51 | 30.6 | Ethiopia-DRC-ZBW | ***Total aid (TDs + NTDs): LICs/Africa (%)*** | | | ***54.67*** |
| **Hungary** | 29 | 64.5 | MZQ-TNZ-Ethiopia | ***TDs aid to LICs/TDs aid to Africa (%)*** | | | ***57.71*** |
| **Slovak Rep.** | 27 | 26.6 | Liberia-South S-MZQ | ***NTDs aid to LICs/NTDs aid to Africa (%)*** | | | ***29.56*** |
| **Slovenia** | 3 | 48.4 | Burundi-Uganda-Rwanda | | | | |

Source: Own elaboration. *Country Abbreviations: USA- United States of America; UK- United Kingdom; UAE- United Arab Emirates; DRC- Democratic Republic of Congo ; TNZ- Tanzania; MDR- Madagascar; MZQ- Mozambique ; ZBW- Zimbabwe; and CAR- Central African Republic.*

## 2.3 Trends of aid dependency

Another striking observation is that aid dependency (as measured in real aid –to- real GDP, in constant 2017$) has shown increasing trends in the majority of LICs over the study period. The trends of aid dependency by aid sources is shown in Table 1 Columns 12–14 while country-level aid dependency is presented in Table 3. Column 12 in Table 1 shows that total aid contributed to about 7.4 percent of GDP, which is 2.5 higher than the average for Africa (5 percent) during 2000–2017. The share of total aid to GDP in LICs increased from 5.98 percent in 2000 to 9.27 percent in 2017. Similarly, further analysis by aid sources (TDs and NTDs) has shown rising trends of aid dependency but with some variations between TDs (see Column 13) and NTDs (see column 14). Despite the lower average share of aid to GDP for NTDs (0.44 percent) compared to TDs' share (7 percent), the share of NTDs' aid to GDP increased by higher magnitude (2.2 times) than the share of TDs' aid (1.5 times) during 2000–2017. Perhaps, this may suggest that a modest evolving importance of NTD's aid has been prevailing in LICs.

Furthermore, country level analysis provides very useful insights in support of a growing trend of aid dependency in LICs. Table 3 presents the list of 27 LICs in the order of their average aid dependency by aid sources during 2000–2017.

**Table 3: Average share of aid to GDP in LICs by aid sources, 2000-2017 (constant, $2017).**

| Average share of total aid (TDs + NTDs) to GDP (%) | | Average share of TDs aid to GDP (%) | | Average share of NTDs aid to GDP (%) | |
|---|---|---|---|---|---|
| Somalia | 36.92 | Somalia | 32.95 | Somalia | 3.97 |
| Mozambique | 17.31 | South Sudan | 25.07 | Mozambique | 0.91 |
| South Sudan | 13.99 | Mozambique | 16.40 | Guinea-Bissau | 0.90 |
| Liberia | 13.01 | Liberia | 12.55 | Eritrea | 0.56 |
| Malawi | 10.60 | Malawi | 10.28 | Chad | 0.55 |
| Sierra Leone | 9.91 | Sierra Leone | 9.63 | Zimbabwe | 0.54 |
| Burundi | 8.11 | Burundi | 7.97 | Liberia | 0.46 |
| Rwanda | 7.53 | Rwanda | 7.35 | Comoros | 0.39 |
| Congo, Dem. Rep. | 6.82 | Congo, Dem. Rep. | 6.78 | Ethiopia | 0.345 |
| Central African Republic | 6.05 | Central African Republic | 5.82 | Gambia | 0.344 |
| Eritrea | 5.88 | Eritrea | 5.32 | Malawi | 0.32 |
| Guinea-Bissau | 5.48 | Mali | 4.95 | Tanzania | 0.30 |
| Mali | 5.08 | Uganda | 4.76 | Sierra Leone | 0.28 |
| Uganda | 4.94 | Burkina Faso | 4.61 | Niger | 0.27 |
| Burkina Faso | 4.68 | Guinea-Bissau | 4.58 | Central Africa Republic | 0.23 |
| Tanzania | 4.64 | Tanzania | 4.34 | Uganda | 0.19 |
| Ethiopia | 4.21 | Niger | 3.93 | Rwanda | 0.18 |
| Niger | 4.20 | Ethiopia | 3.87 | Guinea | 0.17 |
| Senegal | 3.71 | Senegal | 3.60 | Burundi | 0.14 |

| | | | | | |
|---|---|---|---|---|---|
| **Togo** | **3.43** | **Togo** | **3.35** | **Mali** | **0.13** |
| **Chad** | **3.34** | **Benin** | **2.94** | **Senegal** | **0.11** |
| **Benin** | **3.00** | **Madagascar** | **2.80** | **South Sudan** | **0.11** |
| **Zimbabwe** | **2.88** | **Chad** | **2.79** | **Togo** | **0.08** |
| **Madagascar** | **2.85** | **Comoros** | **2.44** | **Burkina Faso** | **0.07** |
| **Comoros** | **2.82** | **Guinea** | **2.37** | **Benin** | **0.06** |
| **Guinea** | **2.55** | **Zimbabwe** | **2.34** | **Madagascar** | **0.04** |
| **Gambia** | **2.27** | **Gambia** | **1.93** | **Congo, Dem. Rep.** | **0.04** |

**Source: Own elaboration**.

In general, on average, total aid constituted over 2 percent of GDP in all 27 LICs during 2000–2017 (see Columns 1 and 2). The average share of aid to GDP shows substantial variations ranging from 36.9 percent in Somalia[4] to 2.3 percent in Gambia. Following Somalia, Mozambique (17.3 percent), South Sudan (14 percent), Liberia (13 percent) and Malawi (10.6 percent) are the top five aid-dependent countries with aid contributed over 10 percent of their real GDP. On average, the share of total aid to real GDP was more than 5 percent for the majority (16 out of 27 or 59 percent) of LICs. The same story is observed when aid dependency is assessed by aid sources: TDs and NTDs. As Column 4 shows, the average share of aid to GDP for TDs varies from 33 percent in Somalia to 1.9 percent in Gambia. For NTDs, as shown in Column 6, the average share of aid to GDP varies from 3.9 percent in Somalia to 0.04 percent in Democratic Republic of Congo (DRC). A striking results is that the compositions of top 10 aid dependent countries between aid sources vary substantially. It is shown that only 3 countries (Somalia, Mozambique and Liberia) are among the top 10 aid-dependent countries in both aid sources with Somalia standing in the first top list. Equally interesting is that DRC is the least aid dependent country for NTDs while it appears to be the 9th top aid dependent for TDs.

Furthermore, a bit dive into the result reveals that the most aid dependent countries are not necessarily the top aid recipient countries. Table 4 presents the top and bottom 10 aid recipient countries along with their level of aid dependency by aid sources during 2000–2017.

[4] Somalia appears to have an exceptionally higher degree of aid dependency even exceeded 85 % in 2017 (86.4%): about a 9.1-fold increase from 9.5 % in 2000 to 86.4% in 2017. It shows a substantial variation across aid sources where it significantly increased about 32-fold for NTD's aid from 0.2 % in 2000 to 6.1 % in 2017 while it increased about 8.7-fold for TD's aid between 2000 (9.3 %) and 2017 (8.3 %). When Somalia is excluded, the average aid dependency for the 26 LICs becomes 6.1 % (total aid), 5.9 % (TD's aid) and 0.3 % (NTD's aid) during 2000-2017.

**Table 4: Top and bottom ten aid recipient LICs during 2000-2017 (both aid and GDP are in real values based on constant $2017).**

| Total aid (TDs + NTDs), million $ | | | TDs aid, million $ | | | NTDs aid, million $ | | |
|---|---|---|---|---|---|---|---|---|
| Top 10 aid recipient LICs | | | | | | | | |
| Country | Total aid | Share of aid to GDP (%) | Country | Total aid | Share of aid to GDP (%) | Country | Total aid | Share of aid to GDP (%) |
| Ethiopia | 28701 | 3.89 | DRC | 27166 | 6.18 | Ethiopia | 2455 | 0.333 |
| DRC | 27335 | 6.22 | Ethiopia | 26246 | 3.56 | Tanzania | 1969 | 0.332 |
| Tanzania | 25949 | 4.37 | Tanzania | 23981 | 4.04 | Zimbabwe | 1798 | 0.572 |
| Mozambique | 23096 | 15.55 | Mozambique | 21498 | 14.48 | Mozambique | 1598 | 1.076 |
| Uganda | 16886 | 4.68 | Uganda | 16098 | 4.46 | Somalia | 1023 | 4.501 |
| Mali | 9875 | 5.09 | Mali | 9603 | 4.95 | Chad | 841 | 0.626 |
| Senegal | 9408 | 3.64 | Senegal | 9076 | 3.51 | Uganda | 788 | 0.218 |
| Somalia | 9042 | 39.80 | South Sudan | 8234 | 22.32 | Niger | 366 | 0.276 |
| Zimbabwe | 8795 | 2.80 | Malawi | 8159 | 10.28 | Senegal | 332 | 0.128 |
| Malawi | 8402 | 10.59 | Somalia | 8019 | 35.30 | Mali | 272 | 0.140 |
| Bottom 10 aid recipient LICs | | | | | | | | |
| Sierra Leone | 4594 | 9.45 | Sierra Leone | 4411 | 9.07 | Guinea-B. | 144 | 0.802 |
| Chad | 4415 | 3.28 | Burundi | 3837 | 8.10 | Benin | 102 | 0.062 |
| Burundi | 3899 | 8.23 | Chad | 3574 | 2.66 | Burkina Faso | 97 | 0.058 |
| Guinea | 3055 | 2.48 | Guinea | 2838 | 2.31 | Madagascar | 93 | 0.050 |
| CAR | 2243 | 5.79 | CAR | 2161 | 5.58 | CAR | 82 | 0.212 |
| Togo | 2007 | 3.33 | Togo | 1961 | 3.25 | Gambia | 77 | 0.345 |
| Eritrea | 1745 | 5.45 | Eritrea | 1562 | 4.88 | Burundi | 61 | 0.130 |
| Guinea-B. | 952 | 5.31 | Guinea-B. | 808 | 4.51 | Comoros | 61 | 0.399 |
| Gambia | 506 | 2.28 | Gambia | 429 | 1.93 | Togo | 46 | 0.077 |
| Comoros | 436 | 2.86 | Comoros | 375 | 2.46 | South Sudan | 39 | 0.105 |

Source: Own elaboration.

Based on the results shown in Table 3 (the first top 10 aid dependent countries) and Table 4 (top & bottom 10 aid recipients), the main findings are that (i) only half of the countries are both top 10 aid recipients and aid dependents in both aid sources (TDs & NTDs); (ii) three countries among bottom 10 aid recipients in TDs (Sierra Leone, Burundi and CAR) and NTDs (Guinea-Bissau, Gambia and Comoros) are among the top 10 aid-dependent countries; (iii) two countries among the top 10 aid-dependent countries in TDs (Liberia and Rwanda) and NTDs (Liberia and Eritrea) are neither among the top nor bottom 10 aid-recipient lists; and (iv) although Ethiopia is the first and second top aid recipient of aid from NTDs and TDs respectively, it is among the top 10 (ninth) aid dependent countries in NTDs group but not the case for TDs.

## 2.4 Sectoral aid distributions

This sub-section analysed how sectoral aid compositions in the major sectors (as defined by the OECD CRS3 database) have evolved in LICs over the course of the study. Table 5 presents the average share of sectoral aid allocations in the different sectors to the total aid committed to LICs for all sectors by aid sources (TDs & NTDs) during 2000–2017.

**Table 5: Average share of sectoral aid commitments to total aid commitments to all sectors in LICs by aid sources- TDs & NTDs, 2000-2017 (%).**

| Main sectors | Total aid (TDs + NTDs) | | TD's aid | | NTD's aid | |
|---|---|---|---|---|---|---|
| | 2009-2017 | 2000-2017 | 2009-2017 | 2000-2017 | 2009-2017 | 2000-17 |
| **Social sector** | 45.29 | 40.53 | 47.18 | 41.60 | 28.32 | 36.58 |
| **Economic sector** | 14.03 | 11.22 | 9.65 | 8.13 | 58.83 | 49.08 |
| **Productive sector** | 9.51 | 7.85 | 8.98 | 7.49 | 9.92 | 11.62 |
| **Multi-sectors** | 5.78 | 5.36 | 5.24 | 5.12 | 2.46 | 5.21 |
| **Humanitarian aid** | 13.52 | 12.31 | 14.52 | 13.00 | 3.11 | 2.06 |
| **Debt relief aid** | 4.51 | 12.00 | 5.21 | 12.70 | NA | NA |
| **Commodity aid** | 7.21 | 9.83 | 7.84 | 10.37 | 0.86 | 0.86 |

Source: Own elaboration.

*Note: Data on sectoral aid allocations was available from OECD CRS database (2020) during 2000-17 for all TDs and NTDs reporting to OECD (i.e. Korea) while for other NTDs reporting to OECD, data was available only for 2009-17. For NTDs that doesn't report to OECD such as China, aid commitments is obtained from AidData online database for 2000-14 (constant 2014 USD). AidData (2017) compiles aid commitments from China based on OECD CRS sector code and classification. Data for debt relief aid was unbailable for all NTDs. Abbreviations for aid sources: TDs- Traditional Donors; and NTDs- Non-Traditional Donors. Total aid is the sum of aid from TDs & NTDs.*

As shown in Column 3, the social sector received a relatively higher average share (40.5 percent) of total sectoral aid commitments to LICs followed by humanitarian aid (12.3 percent) and debt relief (12 percent) during 2000–2017. Interestingly, a relatively lower share of aid was allocated to the two key productive sectors: economic sector (11.2 percent) and productive sector (7.9 percent). Furthermore, a disaggregated data analysis by main aid sources (TDs & NTDs) reveals inconsistencies or variations. Indeed, given TDs' aid constitutes a dominant sources of aid to LICs, the sectoral aid commitments follow the same pattern for total aid (sum of aid from TDs & NTDs). For TDs' aid, as shown in Column 5, the social sector received a relatively larger average share (41.6 percent) of the total TDs' aid commitments to LICs followed by humanitarian assistance (13 percent), debt-relief (12 percent) and commodity aid (10.4 percent). The average share of TDs' aid went to the economic and productive sectors were (8.1 percent) and (7.5 percent) respectively. In both total aid and TDs' aid cases, the two direct growth-enhancing sectors received lower share of aid than the unproductive sectors (i.e.

humanitarian support & debt relief). On the contrary, Column 7 shows that about 60 percent of NTDs' aid commitment goes to the two key growth-enhancing sectors: the economic sector (49.1 percent) and productive sector (11.6 percent). The social sector received the second largest share (36.6 percent) of NTDs' aid while the share of aid commitments for humanitarian purpose was very low (2.1 percent).

In theory, the financing-gap' model (Bacha, 1990; Chenery and Strout, 1966) has argued that aid allocation should target the productive sectors both in physical capital (i.e. public investment) and human capital (i.e. education and health) to boost growth and development. In this regard, sectoral aid allocations for total aid and TDs' aid seem to have been inconsistent with this aid convention while NTDs' sectoral aid allocations tend to be consistent with the aid convention.

In summary, the findings from this descriptive analysis reveal that: i) total net aid disbursements to LICs increased significantly since 2000 with a relative growing modest importance of NTDs alongside TDs; ii) LICs consumed the lion's share of total aid disbursed to Africa with variations by aid sources; iii) there is an increasing trend of aid dependency among some of the studied countries; and iv) there is substantial inconsistency of donors' target or focus for aid allocations (both net disbursements & sectoral commitments) in LICs. Taken together, these stylized facts have motivated the current study to undertake further empirical inquiry to examine whether aid sources really matter for explaining the aid-growth nexus in LICs.

## 3. The Link between Aid and Growth: Review of Empirical Literature

Although the aid-growth nexus in developing countries is one of the most empirically researched areas in economics, the evidence on the aid-growth nexus remains mixed and highly controversial. For brevity, this section presents a critical review of the most recent panel data empirical aid-growth studies that have growth as an outcome variable. It is organized along the two lines of debate in the aid-growth nexus - aid effectiveness (i.e. positive effect of aid on growth) and aid ineffectiveness (i.e. zero or null and negative effects of aid on growth). The aid effectiveness literature is discussed first and the literature on aid ineffectiveness follows.

### 3.1 Aid works for growth in recipient countries: aid is effective for growth

This section presents a review of empirical literature that reports a positive impact of aid on growth unconditionally and under certain conditions (i.e. aid conditionality). Following Easterly (2003), it seems reasonable to discuss this conditionality argument along with literature on the positive aid-growth relationship that provides justification for aid proponents. Easterly (2003) states that the aid conditionality argument serves as another 'less optimistic thesis' for justifying more flow of aid to recipient countries. According to Easterly (2003:2), the findings from Burnside and Dollar (2000) that aid works under good policies 'was passed on from one media report to another and was cited by international agencies advocating an increase in foreign aid'.

#### *3.1.1 Aid positively affects growth unconditionally*

Based on findings of a positive impact of aid on growth, a strand of recent empirical literature has demonstrated that foreign aid has been very instrumental in stimulating economic growth in recipient countries over the last four decades. In essence, such positive impacts of aid on growth have been evident across recipients in developing countries in general (Clemens et al., 2012; Galiani et al., 2017; Lof et al., 2015; Magesan, 2016), in Africa (Gillander, 2016; Jones, 2013; Juselius et al., 2013; Reidy, 2016; Tait et al., 2015), and in transition economies in particular (Askarov and Doucouliasgos, 2015). Surprisingly, these studies have adopted different estimation approaches such as the inclusion of instrumental variables (Arndt et al., 2015; Galiani et al., 2017; Magesan, 2016; Reidy, 2016), dynamic panel estimators such as GMM (Gillander, 2016; Lof et al., 2015), a panel co-integration estimation technique (Jones, 2013; Juselius et al., 2013), and lagged values (Clemens et al., 2012). Employing panel co-integration estimation procedure, recent studies have found a positive impact of aid on growth among West African countries (Jones, 2013) and 36 SSA countries from the mid-1960s to 2007 (Juselius et al., 2013). Clemens et al. (2012) found an average positive impact of aid on growth mostly for 'early impact aid' using lagged and first-difference values in the regression model. Similar evidence has been documented among recent studies that rely on different instrumental variable approaches such as income threshold (Galiani et al., 2017), participation in the UN Human Rights Treaties (Magesan, 2016), and aid per capita interaction with population size and colonial ties with donors (Arndt et al., 2015). Indeed, the magnitude of the impact varies across studies.

Apart from the positive relationship, some of the studies found evidence of a nonlinear relationship (Clemens et al., 2012; Lof et al., 2015) while others found little evidence on this non-linearity (Askarov and Doucouliasgos, 2015). Others also reported that the positive impact of aid on growth exists both in the short run (Galiani et al., 2017, Martinez, 2015) as well as in the long run (Arndt et al., 2015; Jones, 2013; Juselius et al., 2013; Lof et al., 2015; Tait et al., 2015). Regarding the transmission mechanism, most studies have shown that aid positively affects growth in recipient countries through increasing domestic physical investment (Alemu and Lee, 2015; Clemens et al., 2012; Galiani et al., 2017; Lof et al., 2015) and productive public consumption (Arndt et al., 2015; Juselius et al., 2013).

Furthermore, a strand of literature has shown that aid works differently across different circumstances. These include studies that found: first, the positive effect of aid on growth differs across countries with aid exhibiting diminishing returns at higher level due to 'timing aid effect' and types of aid (Clemens et al., 2012; Doucouliagos and Paldam, 2010; Dutta et al., 2015). Second, the effect of aid on growth differs when disaggregating the sample into different regions/sub-regions where aid has a significant positive impact on growth in Africa but not in Asia, Latin America and the Caribbean (Ekanayake and Chatrna, 2010). Eregha and Oziegbe (2016) found a significant positive impact of ODA on growth for South Africa and Central Africa while it was not significant for West Africa and East Africa. Third, the aid effect on growth differs across income groups. A significant positive impact of aid on growth was found in lower middle- and upper middle-income countries (Ekanayake and Chatrna, 2010), and low income groups in Africa (Alemu and Lee 2015). Fourth, the positive effect of aid on growth differs across resource endowment where a significant positive aid-growth link was notice among oil-exporting countries while it was not significant for non-oil exporting countries in SSA (Eregha and Oziegbe, 2016).

### *3.1.2 Aid positively affects growth only under certain conditions: aid conditionally*

While the average positive impact of aid on growth is fairly recognized, the contrasting view that the positive impact of aid on growth depends on certain conditions or good policies in recipient countries should not be ignored. The aid conditionality argument is believed to be fairly propagated by Burnside and Dollar (2000) and subsequent studies (Alvi et al, 2008; Dutta et al., 2015). Burnside and Dollar (2000) tested the aid conditionality hypothesis using panel data form 56 major aid-recipient countries over the 1970–1993 period. They found that aid works for growth in developing countries only under good policies such as fiscal, monetary

and trade policies. They argued that aid-recipient countries needed to pursue a certain package of good policies if they wanted to boost and sustain growth through aid. In light of this, they concluded that it is important to condition aid on these good policies to ensure that aid works better for growth. Later on, Alvi et al (2008) also partially confirmed that aid positively affects growth in good policy conditions but with some degree of diminishing returns to aid. Employing a dynamic panel GMM estimator on panel data from 120 countries over the period of 1979–2008, the study found that a stable political condition supports economic growth by boosting investment in recipient countries. The strong assumption in this study is that a stable political environment positively influences government's policy choice which encourages effective use of public resources such as aid for the desired purpose. Above all, the study promotes aid conditionality on political stability so as to improve good governance in recipient countries.

Nonetheless, it is worth noting here that the aid conditionality argument is not free from criticism. To say the least, for instance, Easterly et al. (2003) extended the period from 1970 to 1993 (as in Burnside and Dollar, 2000) to 1970–1997 and found that aid does not affect growth in good policy conditions. More recently, Askarov and Doucouliasgos (2015) revisited the same data set in Burnside and Dollar (2000) with time lag and found that the positive impact of growth does not depend on good policy package in transition economies.

### 3.2 Aid does not Support Growth: Aid is Ineffective for Growth

In essence, lack of evidence on aid effectiveness for stimulating growth implies that either aid harms growth (i.e. negative impact of aid) or aid has a null or a zero impact on growth.

#### *3.2.1 Foreign aid affects growth negatively*

The most widely cited study that ignites the discussion on this aid ineffectiveness argument is Boone (1996). Using panel data from 96 countries over the 1971–1990 period and employing an instrumental variable approach (such as population size and dummy for political ties to DAC donors), Boone (1996) empirically found no effect of aid on investment which is the main driver of growth. Contrary to what aid proponents have argued for, Boone found that aid adversely affects investment because a greater proportion of aid has been used for consumption. Furthermore, recent studies have also demonstrated the negative relationship between aid and growth (Arawomo et al., 2015; Adedokun & Folawewo, 2017). Arawomo et al. (2015), employing GMM techniques, investigated if aid complemented savings as a driver

of growth in the West African Monetary Zone (WAMZ) over the 1980–2012 period. The study found a significant negative impact of aid on growth while savings positively affected growth in WAMZ. The study concluded that aid does not complement domestic savings in driving growth across countries in WAMZ. Employing the same estimation approach, Adedokun and Folawewo (2017) found a negative but not significant relationship between aid and growth for the full sample in SSA over the years 1996 to 2012.

In addition to these evidences from the full sample, as noted above, disaggregated data analysis by income level found similar negative impacts of aid on growth among low income group of developing countries (Rahnama et al., 2017) and middle-income countries in Africa (Alemu and Lee, 2015). According to Rahnama et al (2017), aid harms growth at the early stage of development and providing some 'traction' is critical before a country can make use of aid. The study concluded that the main hindering factors for aid effectiveness are corruption and inefficient institutions in recipient countries.

### *3.2.2 There is no impact of aid on growth*

Some empirical studies have found a null or a zero effect of foreign aid on growth (Dreher and Langlotz, 2017; Phiri, 2017; Rajan and Subramanian, 2008). The most widely cited study in this regard is Rajan and Subramanian (2008) which investigated the aid-growth nexus using both cross-sectional and panel data. Based on traditional IV approach (using instrumental variables such as population size, dummies for language, colonial relationship and some interaction variables), this study found no evidence not only on the impact of aid (be it positive or negative) on growth but also on the fact that 'aid works better in better policy or geographical environment or that certain forms of aid work better than others' (Rajan and Subramanian, 2008: 643). Indeed, the study suggested a rethinking of the aid apparatus if aid were to be supportive for growth in recipient countries. More recently, using donor fractionalization as an excludable instrument on a panel data on a sample of 96 developing countries over the time period 1974–2009, Dreher and Langlotz (2017) reported no significant positive impact of aid, not only on growth but also for the whole sample or the different components of GDP (savings, investment and consumption). Similarly, Phiri (2017) adopted a fixed effects instrumental variable approach and found no significant negative impact of aid on growth in SSA. As a result, Phiri (2017) concluded that aid ineffectiveness may suggest that aid flows into these SSA countries were either misallocated or insufficiently used.

In summary, the main conclusion from this selective review of most recent literature (having growth as an outcome variable) is that the impact of aid on growth remains mixed and highly controversial. Given that different aid types affect growth differently, it is essential that all aid sources are given equal attention, especially given the rising influence of NTDs alongside TDs since 2000. However, the aforementioned reviewed literature seemed to have overlooked the role of NTD's aid for growth as they focus on only aid flows from TDs. To the best of our knowledge, no study has empirically investigated the impact of aid on growth among LICs using both aid sources– TDs and NTDs. The current study attempts to fill such research gap and examine whether aid sources matter to explain the aid-growth nexus using data from LICs in Africa over the period 2000–2017.

## 4. Data and Methodology

### 4.1 Data Sources and Variables Definition

#### *4.1.1 Data sources*

This study uses a strongly balanced panel dataset of LICs in Africa for the period 2000–2017. 25 out of the 27 LICs are considered excluding South Sudan due to data unavailability before 2011 and Somalia due to missing data for some of the control variables. The main data sources for the variables of interest are publicly available open online databases. Annual data for all variables of interest (except foreign aid) is accessed from the World Bank World Development Indicator (WDI, 2019) and the United Nations statistics division (2019). The OECD DAC (2019) online system is used to access aid flows from TDs and NTDs reporting to this system, while AidData (2017) online database is used to access aid flows from NTDs (China[5]) that do not report to the OECD DAC system. We, as mentioned in the introduction section, deviate from most past studies and consider aid flows from all official bilateral donors and disaggregated by main aid sources (i.e. TDA and NTDA), while the majority of past studies

[5] Among 10 NTDs (Brazil, Chile, China, Colombia, Costa Rica, India, Indonesia, Mexico, Qatar, and South Africa) that don't report to the OECD system, 9 of them are excluded from the study due to unavailability of the required dataset from any credible sources. Data on aid from China is extracted from *AidData* online database, which is increasingly becoming the most credible source of data for Chinese global aid flows since 2000. *AidData* has compiled "ODA-like" (such as grants, interest-free loans and concessional loans) flows from China since 2000 and the latest to 2014 (constant 2014 USD). Unlike other studies that have used "ODA-like" flows as foreign aid, we excluded interest-free loans as it doesn't qualify the DAC aid definition. Only the type of aid flows that qualify DAC ODA criteria (grants and concessional loans with a grant element of at least 25%) are extracted from *AidData* and included in this study. Moreover, concessional loans with no information on the grant element are excluded.

solely focused on aid flows from TDS. We follow the recent literature and define TD's aid as aid flows from 28 DAC member countries while NTD's aid refers to aid flows from newly emerging donors outside the DAC system. NTDs include 31 donors where 20 of them report their aid flows to the OECD DAC system while 10 of them (such as China[6]) do not. A brief note on the definition and measurement of these variables is presented below.

### *4.1.2 Definition and measurement of variables*

This study follows the common approach pursued among most empirical studies on the aidgrowth nexus to measure our variables of interest. The dependent variable is economic growth in aid-recipient LICs in Africa. It is expressed as real GDP per capita (in real terms based on constant 2017 USD) where a log-difference of real GDP per capita stands for economic growth (Arndt et al., 2015; Burnside and Dollar, 2000; Dreher and Langlotz, 2017; Galiani et al., 2017).

Foreign aid is the key variable of interest in this study. Following the OECD-DAC standard definition, it is defined as the flow of foreign resources from official sources (donor governments) to governments in the developing countries primarily for supporting economic development and welfare and has concessional nature composed of grants and soft loans with grant elements of at least 25 percent. Consistent with recent literature, aid is measured as overall net aid disbursements (in real terms in constant 2017 USD) as percentage of GDP). The study considers only bilateral aid (both grants and loans) excluding aid for military purposes and aid by multilateral institutions.

To minimize omitted variable bias in the aid-growth regressions, the most important control variables are included. Following the recent literature (Addison and Tarp, 2015; Herzer, 2015; Herzer and Morrissey, 2013), the control variables include the numerous factors that not only influence growth alone (i.e. determinant of growth) but also jointly influence both aid and growth (i.e. mediating factors through which aid affects growth). The two key mediating

[6] Among 10 NTDs (Brazil, Chile, China, Colombia, Costa Rica, India, Indonesia, Mexico, Qatar, and South Africa) that don't report to the OECD system, 9 of them are excluded from the study due to unavailability of the required dataset from any credible sources. Data on aid from China is extracted from *AidData* online database, which is increasingly becoming the most credible source of data for Chinese global aid flows since 2000. *AidData* has compiled "ODA-like" (such as grants, interest-free loans and concessional loans) flows from China since 2000 and the latest to 2014 (constant 2014 USD). Unlike other studies that have used "ODA-like" flows as foreign aid, we excluded interest-free loans as it doesn't qualify the DAC aid definition. Only the type of aid flows that qualify DAC ODA criteria (grants and concessional loans with a grant element of at least 25%) are extracted from *AidData* and included in this study. Moreover, concessional loans with no information on the grant element are excluded.

variables are domestic investment measured as gross capital formation (as percent of GDP) and government consumption measured by the general government consumption expenditure (as percent of GDP). Other control variables include the three policy variables related to macroeconomic stability conditions such as inflation rate (measured as annual percentage change of CPI), budget balance (measured as percent of GDP), and trade openness (measured as percent of GDP). Money supply (measured as broad money/M2 as percentage of GDP) is also included as a proxy for financial development. Population growth is used as a measure of the labor force growth in the economy.

Appendix 1 presents the list of LICs and donors classified under the two main aid sources. The definition of variables and data sources is displayed in Appendix 2. The summary statistics are displayed in Appendix 3 while the Pearson correlation matrix is presented in Appendix 4.

## 4.2 Methodology and Estimation Strategy

### *4.2.1 Empirical model specification*

Our empirical model follows the recent aid-growth empirical literature (such as Adedokun and Folawewo, 2017; Hansen and Tarp, 2001; Rahnama et al., 2017; Wamboye et al., 2013) that applies a dynamic panel model for the aid-growth estimation and considers aid as endogenous. Therefore, taking into account the growth dynamics, the key mediating factors (such as investment and consumption) and additional conventional control variables (i.e. growth determinants), the main estimation model is given by the following dynamic multivariate panel model specification:

$$\boldsymbol{Y_{it} = \beta_0 + \beta_1 Y_{it-1} + \beta_2 INT_{it} + \beta_3 CON_{it} + \beta_4 AID_{it} + \beta_5 INF_{it} + \beta_6 TOP_{it} + \beta_7 BBL_{it} + \beta_8 M2_{it} + \beta_9 POPG_{it} + \mu_i + \varepsilon_{it}} \quad \textbf{(1)}$$

where the subscripts $\boldsymbol{i}$ and $\boldsymbol{t}$ are indexed for countries (25 LICs in Africa) and time period (2000-2017) considered in the study. $\boldsymbol{Y_{it}}$ is the dependent variable representing economic growth. It is measured by annual real GDP per capita growth (i.e. log difference of annual real GDP per capita). $\boldsymbol{Y_{it-1}}$ is the lagged dependent variable to account the persistent effects in the dynamic growth process. $\boldsymbol{AID_{it}}$ is the main variable of interest and refers to real net bilateral aid disbursement (% of GDP). In this study, $AID_{it}$ represents three proxies of aid: total aid- TA (both TDs and NTDs aid flows); TD's aid (TDA) and NTD's aid (NTDA). $\mu_i$, is the unobservable or time-invariant country-specific effects, and $\varepsilon_{it}$ is the idiosyncratic error term.

To minimize omitted variable bias and properly capture the real effects of aid on growth, the study includes the most relevant control variables. Indeed, a preliminary data analysis shows that we cannot include more than 7 control variables including the lagged dependent variable due to concern for instrument proliferation. Given all the determinants of growth cannot be included, therefore, the selection of control variables is restricted to the key mediating factors which jointly influence both aid and growth and the most important conventional growth determinants commonly used in the aid-growth literature (Durray et al., 1998; Adedokun & Folawewo, 2017; Wamboye et al., 2013). These include the two important intermittent variables (i.e. investment ($\boldsymbol{INT_{it}}$) and government consumption ($\boldsymbol{CON_{it}}$)), the three macroeconomic policy variables[7] (inflation rate- $\boldsymbol{INF_{it}}$, budget balance- $\boldsymbol{BBL_{it}}$, and trade openness- $\boldsymbol{TOP_{it}}$ ), financial development proxy (Money supply- $\boldsymbol{M2_{it}}$); and labour force growth (population growth- $\boldsymbol{POPG_{it}}$ ). Consistent to Adedokun and Folawewo (2017), control variables on good policy or rule of law (good governance) prescribed in Burnside and Dollar (2000) are not included as they are relevant for multilateral aid but not for bilateral aid flows (like ours).

### *4.2.2 Estimation technique and procedure*

Based on the recent empirical literature, a system GMM method appears to be the preferred estimation approach over other potential dynamic panel estimators, such as the standard Ordinary Least Square (OLS) and Fixed Effects (FE) estimations; the traditional Instrumental Variable (IV) Anderson and Hsaio (1982); and first-differenced GMM (Arellano and Bond, 1991). The OLS and FE are inconsistent in the presence of lagged-dependent variable as a regressor and persistent growth data (dependent variable). While the extent of persistency is overestimated by OLS, it is underestimated by FE. The traditional IV approach suffers from weak instruments and the difficulty of finding valid external instruments to account for aid endogeneity. Although the first-differenced GMM relies on internal instrumentation to control aid endogeneity, it suffers from the problem of weak instruments and finite sample bias (Blundell et al., 2000; Blundell and Bond, 1998; Bond et al., 2001).

[7] Consistent with recent literature (Herzer & Morrissey, 2013; Wamboye et al., 2013), we use the three macroeconomic policy variables separately rather than a policy index (or interaction term between aid and policy index) used in Burnside and Dollar (2000) at least for two reasons. *First*, it is hardly possible to empirically disentangle which variable drives the effects as the policy index may hide the different effects of each policy component. *Second*, available empirical evidence on the relationship between interactive terms and aid effectiveness is highly inconclusive.

To resolve the weak instrument problems associated with both the traditional IV and the first-differenced GMM estimators, Blundell and Bond (1998) proposed a system GMM dynamic estimator for a highly persistent and short panel. It is based on simultaneous estimation of two system equations in first differences and levels. Consequently, two instrument sets are used where the equation in levels is instrumented by lagged first differences and the equation in first difference is instrumented by lagged levels. As nicely summarized in Bond et al (2001), a system GMM with a two-step option is used as a better option for empirical growth models to control for endogeneity, unobserved country-specific factors, omitted variable bias and measurement error. To be specific, the main reasons why such an estimation approach is preferred in this study include the following. First, it works relatively better for accounting for the problem of aid endogeneity by controlling for simultaneity bias or reverse causality in the aid-growth regression. To tackle endogeneity, it uses suitable lagged values of the explanatory variables as 'internal' instruments, and avoids the necessity of searching for external instruments.

Second, it works well for a dynamic panel model with highly persistent series such as growth and short panels like ours. As shown in Appendix 4, the correlation coefficient (0.98) associated with the lagged dependent variable is higher than the rule of thumb 0.8 which implies that the dependent variable is persistent over time and this estimation technic is appropriate. Third, a two-step system GMM exploits the finite sample correction techniques proposed by Windmeijer (2005), which makes the two-step GMM estimator superior to the one-step GMM estimator in the presence of autocorrelation and heteroscedasticity (Roodman, 2009b). Fourth, it is suitable for a dataset with larger N than T (i.e.N>T), which is the case in this study having N (25) and T (18). Fifth, it controls for unobserved cross-country factors, measurement error and works better for a dynamic multivariate panel data analysis such as ours (Blundell et al., 2000; Bond et al., 2001).

The identification, simultaneity/instrumentation strategy and exclusion restrictions linked to the system GMM specification follow the recent literature (Asongu and Nwachukwu, 2018; Boateng et al., 2018; Love and Zicchino, 2006; Mahembe and Odhiambo, 2018; Roodman, 2009a, 2009b). As a standard treatment, all the independent variables are treated as predetermined or suspected endogenous and treated as a gmmstyle instrument while the time-invariant variables or time/year dummies are assumed to be strictly exogenous and treated as ivstyle instrument or iv(years, eq (diff)). The year or time dummy is considered exogenous

because it is less likely for this time-invariant variable to become endogenous in the first difference (Roodman, 2009b). Thus, a full set of time dummies are included in a system regression to control for cross-individual correlation in the idiosyncratic disturbances. To tackle endogeneity, the instrumentation strategy used lagged independent variables as instruments and all regressors are included in the instrument set. By and large, such internal instrumentation strategy avoids the difficulty of finding of valid external instrumental variables[8] to properly address for aid endogeneity in the aid-growth nexus (Bond et al., 2001; Wamboye et al., 2013). Furthermore, as highlighted in Labra and Torrecillas (2018), the instrumentation strategy exploits all available methods to tackle the problem of instrument proliferation as the number of instruments appears to explode with the time (T). Among others, this study considers: (i) both collapse and lag limit options built-in the xtabond2 Stata command (Roodman, 2009b), (ii) all explanatory variables as predetermined where the maximum lag of dependent and independent variables to be used as instrument is limited to one (Wamboye et al., 2013), (iii) a 3 years non-overlapping averaged data rather than annual data as averaged data reduces the time (T) (Asiedu and Nandwa, 2007; Wamboye et al., 2013); and (iv) restrict the number of control variables to enter in the system estimation (Asongu and Nwachukwu, 2018; Mahembe and Odhiambo, 2018).

## 5. Empirical Results and Analysis

### 5.1 System GMM model estimations and diagnostic tests

Table 6 presents estimation results from the OLS, FE, and a two-step system GMM estimators for the three aid proxies: Panel A (TA), Panel B (TDA) and Panel C (NTDA). As shown in Table 6, for all aid proxies, a positive and strongly significant lagged dependent variable (real GDP per capita) implies a highly persistent nature of real GDP per capita series over time. This justifies that dynamic panel data models are the appropriate econometric approach to capture the persistent nature of the growth series in the aid-growth regression. However, the OLS and FE estimations are inconsistent in the presence of lagged dependent variable as a regressor and they can only be used as a benchmark to check the consistent estimates of a dynamic panel

[8] The traditional IV approach that relies on 'external' instruments using OLS/2SLS and fixed-effects model has been highly criticized for failing to find a valid 'external' instrument to control aid endogeneity in the aid-growth regression. After carefully reviewing the existing standard external instruments for aid (such as lagged aid, population, rainfall, colonial legacy, primary exports, arms imports, policy, policy interactions, GDP per capita, Egypt dummy) commonly used among past studies, recent literature (Werek et al., 2008; Armah, 2010) has argued that these instruments have been hardly valid. This is because these instruments have either: failed to satisfy the main requirement for instrument validity which is exogeneity, or tended to be time-invariant.

system GMM estimation (Bond et al., 2001; Mahembe and Odhiambo, 2018). Indeed, a consistent estimation of a dynamic panel model requires that the coefficient of the dependent variable be below 1.00 and lies within the range of OLS and FE estimations. Thus, this study relies on the results from a two-step system GMM estimation which is consistent and valid in the presence of highly persistent real GDP per capita as well as the recognized problem of aid endogeneity.

Before presenting the main estimation results from a two-step system GMM, the validity of instruments and estimations is evaluated using four information criteria (Asongu and Nwachulkwu, 2018; Boateng et al., 2018). First, the Arellano and Bond AR(2) test in difference with a null hypothesis of 'no second-order autocorrelation' in the residuals is checked. The non-rejection of this hypothesis implies the absence of second-order autocorrelation and consistency of GMM estimates. Second, the null hypothesis that 'instruments used are valid' is checked by the Sargan and Hansen tests for Over-Identification Restrictions (OIRs). The nonrejection of this hypothesis confirms that the instruments are valid. Besides, we ensure that the number of instruments used in each estimation is lower than the number of countries (N) so as to avoid the problem of instrument proliferation. Third, the Difference-in-Hansen Test (DHT) is an important information criteria to evaluate the assumption of the exclusion restriction with the null hypothesis of 'exogeneity' of the time-invariant variables (i.e. time dummies). The assumption of the exclusion restriction is satisfied when the null hypothesis of the DHT associated with IV(year, eq(diff)) is not rejected. Fourth, the Fisher test is employed to examine the joint validity of estimated coefficients associated with the system GMM model. Furthermore, a positive and strongly significant coefficient of the lagged dependent variables in all aid proxies indicates that real GDP per capita is persistent and a dynamic panel system GMM estimation is an appropriate econometric approach. For brevity, the main result on the effect of aid on growth is discussed first and the other result for the effect of control variables on growth is discussed next.

### 5.2 The main empirical analysis: the effects of aid on growth (system GMM)

As shown in Table 6, the main result shows that foreign aid does not appear to be effective for growth among LICs in Africa over the study period. This applies irrespective of the different aid proxies used: TA (Panel A), TDA (Panel B) and NTDA (Panel C).

**Table 6: The effects of aid on growth among LICs in Africa by aid sources**

| Variables | *Dependent variable: Growth ( log of real GDP per capital)* | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | **Panel A:Total Aid** | | | **Panel B: TD's Aid** | | | **Panel C: NTD's Aid** | | |
| | **OLS** | **FE** | **SGMM** | **OLS** | **FE** | **SGMM** | **OLS** | **FE** | ***SGMM*** |
| **L.lnrgdpc** | 0.94*** | 0.70*** | *0.899**** | 0.937*** | 0.698*** | *0.916**** | 0.944*** | 0.741*** | *0.931**** |
| | (46.50) | (7.51) | *(13.35)* | (46.52) | (7.56) | *(19.51)* | (53.54) | (8.60) | *(21.57)* |
| **lntaid** | -0.003 | -0.049* | *-0.088*** | - | - | - | - | - | - |
| | (-0.21) | (-1.77) | *(-2.14)* | | | | | | |
| **lntdaid** | - | - | - | -0.009 | -0.053** | *-0.087*** | - | - | - |
| | | | | (-0.63) | (-2.16) | *(-2.40)* | | | |
| **lnntdaid** | - | - | - | - | - | - | 0.049 | 0.034 | *0.031* |
| | | | | | | | (1.39) | (1.25) | *(0.84)* |
| **lninvst** | 0.06*** | 0.031 | *0.131*** | 0.057*** | 0.034 | *0.161*** | 0.058*** | 0.032 | *0.094*** |
| | (3.23) | (1.36) | *(2.23)* | (3.24) | (1.41) | *(2.57)* | (3.31) | (1.55) | *(2.18)* |
| **lncons** | 0.003 | 0.013 | *-0.017* | 0.006 | 0.012 | *0.001* | 0.003 | 0.006 | *0.009* |
| | (0.13) | (0.49) | *(-0.21)* | (0.27) | (0.47) | *(0.01)* | (0.13) | (0.22) | *(0.22)* |
| **lntop** | -0.029 | 0.009 | *-0.031* | -0.027 | 0.008 | *-0.096* | -0.033* | -0.024 | *-0.097*** |
| | (-1.43) | (0.15) | *(-0.23)* | (-1.35) | (0.14) | *(-1.17)* | (-1.70) | (-0.44) | *(-2.24)* |
| **lnm2** | 0.008 | -0.010 | *-0.003* | 0.005 | -0.007 | *-0.023* | 0.007 | -0.001 | *-0.007* |
| | (0.40) | (-0.17) | *(-0.06)* | (0.23) | (-0.11) | *(-0.69)* | (0.35) | (-0.02) | *(-0.16)* |
| **lnpopg** | 0.039* | 0.11*** | *0.120*** | 0.039* | 0.115*** | *0.105** | 0.041* | 0.100** | *0.100** |
| | (1.80) | (4.11) | *(2.14)* | (1.80) | (5.33) | *(1.95)* | (1.88) | (2.76) | *(1.76)* |
| **Infl** | -0.001 | -0.001 | *-.0005* | -0.001 | -0.001 | *-0.001* | -0.001 | -0.001 | *-0.001** |
| | (-1.36) | (-1.53) | *(-1.22)* | (-1.38) | (-1.52) | *(-1.22)* | (-1.38) | (-1.61) | *(-2.03)* |
| **bbnc** | 0.006** | 0.004* | *0.008** | 0.005** | 0.003 | *0.006* | 0.006*** | 0.005** | *0.008*** |
| | (2.75) | (1.78) | *(1.73)* | (2.65) | (1.57) | *(1.31)* | (2.93) | (2.59) | *(2.10)* |
| **Constant** | 0.303* | 1.76*** | *0.521* | 0.330* | 1.761*** | *0.622* | 0.292* | 1.559** | *0.545* |
| | (1.79) | (3.15) | *(1.09)* | (1.97) | (3.24) | *(1.55)* | (1.91) | (2.95) | *(1.42)* |
| **AR(1)** | | | *0.030* | | | *0.041* | | | *0.017* |
| **AR(2)** | | | ***0.826*** | | | ***0.415*** | | | ***0.279*** |
| **Sargan** | | | *0.440* | | | *0.358* | | | *0.655* |
| **Hansen** | | | ***0.592*** | | | ***0.519*** | | | ***0.717*** |
| **DHT** | | | ***0.694*** | | | ***0.623*** | | | ***0.458*** |
| **Fisher** | 385*** | 36.0*** | ***380**** | 386*** | 58.2*** | ***509**** | 391*** | 18.1*** | ***199**** |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **$R^2$** | 0.9607 | 0.820 | - | 0.9608 | 0.823 | | 0.961 | 0.811 | |
| **Obs.** | 150 | 150 | *150* | 150 | 150 | *150* | 150 | 150 | *150* |
| **N** | | 25 | *25* | | 25 | *25* | | 25 | *25* |
| **Inst.** | | | *24* | | | *24* | | | *24* |

*Note: All variables are measured as a non-overlapping 3-year averaged. ***, **, and * indicate a 1%, 5% and 10* significant level respectively. The t-statistics are in parenthesis. The main model is a dynamic panel system GMM based on a two-step estimator (using xtabond2 Stata command) with Windmeijer's (2005) finite sample correction and first-differencing (FD) option. A maximum of 1 lag is used for the dependent and predetermined explanatory variables as gmmstyle instruments. While both F-statistics and p-values are reported for Fisher test, only the p-values are reported for the three misspecification tests: autocorrelation tests (AR(1) & AR(2)); Over-Identifying Restrictions Tests(Sargan and Hansen); and Difference-in-Hansen Test (DHT) associated with iv(i.year, eq(diff)). Adjusted and within $R^2$ are reported for OLS and FE models respectively. Obs= observations; N= number of countries; and Inst= number of Instruments. Time effects (year dummies) are included in each estimation but not reported for the sake of space.*

However, the result reveals variations in terms of the sign, level of significance and magnitude across the three aid proxies. It shows that aid has a significant negative impact on growth (measured in real GDP per capita) among LICs in Africa when the aid proxies are TA (Panel A) and TDA (Panel B). In Panel A, when TA is used as a proxy for aid, aid affects growth negatively at a 5 percent level of significance. In terms of magnitude, a 1 percent increase in the average share of total aid to GDP decreases the average growth by 0.088 percent. In Panel B, aid negatively influences growth at a 5 percent level of significance when the aid proxy is TDA. In terms of magnitude, a 1 percent increase in the average share of TD's aid to GDP makes growth fall by 0.087 percent. Given TDA constitutes the dominant share (94.8 percent) of total net aid disbursement to LICs, the total aid proxy follows similar patterns as the TDA proxy and a negative significant effect is expected. On the other hand, the effect of aid on growth appears to be positive but insignificant when NTDA is used as a proxy of aid (Panel C).

Overall, the main result shows that the impacts of aid on growth among LICs in Africa differ when the different sources of foreign aid are considered. While the impact of TA and TDA on growth is significant negative, the impact of NTDA on growth is insignificant positive (i.e. the impact is zero). Given other things remain constant, the findings of this study could be strongly linked to whether a larger share of each aid proxy goes to finance the direct growth-enhancing productive sectors or the non-productive sectors. In this regard, the findings of a descriptive analysis (presented in the second section Table 5) on sectoral aid compositions could provide some insights to explain the empirical results. The strong negative impacts of aid on growth for the two aid proxies (TA & TDA) could be associated with the shift of a large share of TDA away from the productive sectors towards non-productive sectors. As shown in Column 5, the two key growth-enhancing sectors as such the economic (8.1 percent) and productive (7.5 percent) sectors received a lower average share of TDA than the unproductive sectors, including humanitarian support (13 percent), debt-relief purposes (12.7 percent) and commodity aid (10.4 percent). Although the social sector received the largest share (41.6 percent) of TDA, it might have been used to finance unproductive government social spending. The same story goes on for TA aid proxy as shown in Column 3. Although the social sector received a relatively higher share of this aid, the two key sectors such as the economic (11.2 percent) and productive (7.9 percent) sectors received a lower share of aid commitments to the unproductive sectors- humanitarian support (12.3 percent) and debt-relief (12 percent).

Indeed, the main finding of this study is in contrast to the preposition of the 'financing-gap' model (Bacha, 1990; Chenery and Strout, 1966) and empirical literature on aid effectiveness which has found a significant positive impact of aid on growth (Clemens et al., 2012; Jones, 2013; Juselius et al., 2013). However, they are comparable to most of the past empirical literature on aid ineffectiveness where the impact of aid on growth is either significantly negative or null/zero. In this study, for instance, the results of a significant negative impact of aid on growth for TA and TDA aid proxies are in line with the recent studies which have reported a similar significant negative impact of aid on growth in developing countries (Boone, 1996; Rahnama et al., 2017) and West African Monetary Zone (WAMZ) (Arawomo et al., 2015). Rahnama et al (2017) concluded that the main hindering factors for aid effectiveness among LICs in developing countries are corruption and insufficient institutions in aid recipient countries. Boone (1996) has argued that aid does not work for growth since a greater proportion of aid has been used for unproductive consumption.

Regarding the NTDA aid proxy, the result of no significant impact of NTDA on growth is consistent to the findings of recent studies (Adedokun and Folawewo, 2017; Dreher and Langlotz, 2017; Phiri, 2017). Dreher and Langlotz (2017) found no significant positive impact of aid on growth in developing countries, while Adedokun and Folawewo (2017) and Phiri (2017) found no significant negative impact of aid on growth in SSA. Phiri (2017) further noted that such aid ineffectiveness might suggest that aid flows to SSA were either misallocated or insufficiently used.

### 5.3 Other results- control variables

Other results show that when foreign aid is proxied by total aid (TA) in Panel A, (i) investment has a positive and significant impact on growth; (ii) population growth has a positive and significant impact on economic growth; and (iii) budget balance influences growth positively and significantly at a 10 percent level. In Panel B, when the aid proxy is TDA, the results show that: (i) investment has a positive and significant (at a 5 percent level) impact on growth; and (ii) population growth has a positive and significant impact on economic growth. In Panel C, for NTDA, the results show that: (i) investment has a positive and significant impact on growth; (ii) trade openness has a negative and significant effect on growth; (iii) population growth has a positive and significant effect on growth; and (iv) inflation negatively and significantly (at a 10 percent level) affects growth; and (v) budget balance influences growth positively and significantly at a 5 percent level. The overall result shows that only domestic investment and

population growth have shown a consistently positive and significant effect on growth across all aid proxies. Perhaps, the negative impacts of trade openness on growth for NTDA proxy may imply the low level of openness to trade in these economies. On the hand, government consumption and broad money have shown no significant effect (neither positive nor negative) on growth in all aid proxies.

## 6. Conclusion and Policy Implications

The principal objective of this study is to investigate the effects of aid on growth among 25 LICs in Africa over the period 2000–2017. Foreign aid continues to play a key role in financing the post-2015 development agenda in poor developing countries mostly in Africa. Since 2000, as reflected in the 2002 Monterrey Conference and 2005 G-8 Gleneagles Summit, the international aid community has been calling for doubling aid for the poorest countries mostly in Africa. The trust was that increasing aid flows to the poorest countries in Africa would stimulate and support the further reduction of aid dependency among these economies. Indeed, the common belief among donors is that the effect of aid on growth is positive. As a result, total net bilateral aid flows to developing countries have increased since 2000 and reached 166.8 billion USD in 2016 with Africa receiving a lion's share of it. Moreover, since different aid types affect growth differently, it is essential that all aid sources are given equal attention, especially given the rising influence of NTDs alongside TDs, which has dominated the global aid landscape since the 1960s. This study aims at extending the long-debated aid-growth nexus by considering total aid from both TDs and NTDs and capturing the true impacts of aid on growth among LICs in Africa.

The study adopts the most advanced dynamic panel econometric approach to properly address the main concerns in the aid-growth estimations related to methodological issues (such as endogeneity of aid and other regressors) as well as and panel data characteristics (persistent series and short panels). The main findings from this study show that the impact of aid on economic growth among LICs differ when the different sources of foreign aid are considered. The impact of aid on growth turned out to be significantly negative when TA and TDA are used as aid proxy, while it is positive but insignificant when NTDA is used as a proxy. Presumably, the shift of more share of such aid away from the productive sectors towards non-productive sectors such as humanitarian and debt relief may explain part of the reason why we

found a negative impact of aid on growth when the aid proxies are TDA and TA. By and large, this result of significant negative impact of aid on growth is consistent with the recent studies on aid ineffectiveness (Arawomo et al., 2015; Boone, 1996; Rahnama et al., 2017). Besides, the findings of this study on the insignificant positive impact of NTDs' aid on growth are consistent with the findings of recent studies (Adedokun and Folawewo, 2017; Dreher and Langlotz, 2017; Phiri, 2017). The main policy implication of this study is that both the governments in LICs and donors should design more effective strategies to re-direct substantial aid flows from TDs towards the growth-enhancing productive sectors mostly to finance physical investment and foster growth. Doing so would have the possibility to revert the significant negative impacts of aid on growth among these economies.

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## APPENDICES

### *Appendix I: Lists of LICs and donors by aid sources*

| List of LICs in Africa (26) | List of bilateral donor's | |
|---|---|---|
| | **Traditional Donors (28)** | **Non-Traditional Donors (22)** |
| Benin<br>Burkina Faso<br>Burundi<br>CAR<br>Chad<br>Comoros<br>Congo, DR<br>Eritrea<br>Ethiopia<br>Gambia<br>Guinea<br>Guinea-Bissau<br>Liberia<br>Madagascar<br>Malawi<br>Mali<br>Mozambique<br>Niger<br>Rwanda<br>Senegal<br>Sierra Leone<br>Tanzania<br>Togo<br>Uganda<br>Zimbabwe | Australia<br>Austria<br>Belgium<br>Canada<br>Czech Republic<br>Denmark<br>Finland<br>France<br>Germany<br>Greece<br>Hungary<br>Iceland<br>Ireland<br>Italy<br>Japan<br>Luxembourg<br>Netherland<br>New Zealand<br>Norway<br>Poland<br>Portugal<br>Slovak Republic<br>Slovenia<br>Spain<br>Sweden<br>Switzerland<br>United Kingdom<br>United States of America | Azerbaijan<br>Bulgaria<br>Chinese Taipei<br>Croatia<br>Cyprus<br>Estonia<br>Israel<br>Kazakhstan<br>Korea<br>Kuwait<br>Lativa<br>Liechtenstein<br>Lithuania<br>Malta<br>Romania<br>Russia<br>Saudi Arabia<br>Thailand<br>Timor-Leste<br>Turkey<br>United Arab Emirates<br>China |

*Note: The LICs grouping is based on the World Bank country income classification for 2017.*

### *Appendix II: Definition of variables and their corresponding sources*

| Variables | Symbols | Measurement | Data sources |
|---|---|---|---|
| Economic growth | RGDPPC | the log difference of real GDP per capita | WDI (2019) and UNdata (2019). The data is expressed in constant 2017 USD. |
| Foreign aid | TA | Net bilateral aid disbursement as percentage of real GDP (%) | OECD DAC (2019). AidData (2017) for China. Net aid is divided by real GDP (both in constant 2017 USD). |
| Domestic investment | INT | Gross capital formation as a ratio of GDP (%) | WDI (2019) and UNdata (2019). |
| Government consumption | CON | General Government final consumption as a ratio of GDP (%) | WDI (2019) and UNdata (2019). |
| Inflation | INF | Annual inflation growth rate (%) | WDI (2019) and UNdata (2019). |
| Trade openness | ToP | the ratio of exports plus imports (as % of GDP) | WDI (2019) and UNdata (2019). |
| Money supply | M2 | Broad money (M2 as % of GDP) | WDI (2019) and UNdata (2019). |
| Budget surplus | BBNC | Budget surplus (as % of GDP) | WDI (2019) and UNdata (2019). |

| | | | |
|---|---|---|---|
| Population growth | POPGR | Annual population growth rate (%) | WDI (2019) and UNdata (2019). |

Source: Own compilation.

## *Appendix III: Summary statistics*

| Variables | Observations | Mean | SD | Min | Max |
|---|---|---|---|---|---|
| **RGDPC** | 175 | 6.38 | 0.43 | 5.42 | 7.48 |
| **TA** | 175 | 1.49 | 0.66 | -0.104 | 3.29 |
| **TDA** | 175 | 1.43 | 0.69 | -0.53 | 3.28 |
| **NTDA** | 175 | 0.18 | 0.21 | -0.25 | 1.01 |
| **INV** | 175 | 2.88 | 0.53 | 0.09 | 3.92 |
| **COM** | 175 | 2.55 | 0.46 | 0.72 | 4.23 |
| **TOP** | 175 | 3.99 | 0.37 | 3.11 | 5.63 |
| **FDV** | 175 | 3.11 | 0.61 | 1.09 | 5.48 |
| **POG** | 175 | 0.97 | 0.40 | -1.28 | 1.75 |
| **INF** | 175 | 10.69 | 40.17 | -26.74 | 513.91 |
| **BBN** | 175 | -3.19 | 4.90 | -36.48 | 11.61 |

Source: Own compilation.

*The variables are: RGDPC- Real GDP per capita (dependent variable- growth); TA (Total aid); TDA (Traditional Donor's aid); Non-Traditional Donor's aid (NTDA); INV (domestic investment); COM (government consumption); TOP (Trade Openness); FDV (Financial depth-M2); POG (population growth); INF (Inflation); and BBNC(budget balance).*

## *Appendix IV: Pearson Correlation Matrix*

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1. RGDPC** | 1.000 | | | | | | | | | | | |
| **2. L.RGDPC** | 0.97* | 1.000 | | | | | | | | | | |
| **3. TA** | -0.51* | -0.544* | 1.000 | | | | | | | | | |
| **4. TDA** | -0.52* | -0.543* | 0.99* | 1.000 | | | | | | | | |
| **5. NTDA** | 0.06 | 0.02 | 0.21 | 0.09 | 1.000 | | | | | | | |
| **6. INV** | 0.05 | -0.09 | 0.10 | 0.12 | 0.02 | 1.000 | | | | | | |
| **7. COM** | -0.02 | -0.06 | 0.24 | 0.22 | 0.10 | 0.07 | 1.000 | | | | | |
| **8. TOP** | 0.15 | 0.08 | 0.13 | 0.14 | 0.13 | 0.25 | 0.03 | 1.000 | | | | |
| **9. FDV** | 0.18 | 0.18 | -0.09 | -0.13 | 0.21 | 0.05 | 0.65* | 0.01 | 1.000 | | | |
| **10. POG** | -0.28* | -0.32* | 0.23 | 0.26* | -0.09 | 0.36* | -0.06 | 0.04 | -0.23 | 1.000 | | |
| **11. INF** | -0.18 | -0.24 | -0.11 | -0.09 | -0.05 | -0.07 | -0.35* | -0.14 | -0.3* | -0.01 | 1.000 | |
| **12. BBNC** | 0.09 | -0.05 | -0.16 | -0.15 | -0.15 | -0.02 | -0.45* | -0.03 | -0.5* | -0.03 | -0.03 | 1.000 |

Note: Own compilation.

*Variable abbreviations is the same as in Table 4.2. The asterisk (*) associated with each coefficient shows the correlation is significant at 5 percent or below. The correlation between TA and TDA is strong and significant at a 5 and below percent level of significance. This may suggest that the aid-growth regression should include each aid proxy separately rather than including all three measurements of aid at a time because the latter may bias the estimates due to a potential multicollinearity problem.*