

EFFECT OF FOREIGN AID DEPENDENCY ON TAXATION REVENUE IN SUB-SAHARAN AFRICA

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Abstract

There is an ongoing debate in the literature on the effect of foreign aid—i.e., concessional loans and grants—on fiscal tax revenues. Most scholars argue that loans have a positive effect on taxation revenue because of the obligation to repay them, whereas grants have a negative effect because the recipient treats them as ‘free’ money and as a substitute for taxation.

This study focuses on the impact of foreign loans and grants on tax revenues for 42 Sub-Saharan Africa countries for the period covering 1990-2014. We test the above hypothesis for these African countries, but divide them into different income groups to account for underlying structural differences.

Our results show that both concessional loans and grants have a negative effect on taxation revenue when all countries are pooled, and similarly for low-income and lower-middle income levels. As most of these countries received debt relief under the HIPC Initiative (highly indebted poor countries), we argue that recipient governments formulate an expectation of always receiving debt forgiveness and therefore treated both loans and grants as a ‘free’ source of funds. This creates a disincentive to tax citizens who demand accountability for their taxes. However, upper-middle income countries responded differently; loans and grants demonstrated a positive effect on tax revenue. The effect of loans is a result of the upper-income level being ineligible for debt relief and are obligated to repay their loans, which creates an incentive to raise taxes. The positive relationship between grants and tax revenue is explained by the fact that, upper-middle income countries have achieved a significant level of development which translates to increased levels of efficiency and accountability in revenue systems from additional resources added to the fiscal.

As a policy recommendation to address the disincentive created by grants, we argue that they should be channeled through Non-Governmental Organisations (NGOs) or the private sector rather than given directly to the government.

JEL Categories: Y40, E62, F35

Keywords: Foreign aid, Tax Revenue, Grants, Concessional loans, Fixed/Random Effect, Fixed/Random Effects 2SLS

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Chapter One

1 Introduction

To meet Millennium Development goals, donor countries have been asked to increase their official development assistance (ODA) up to 0.7 percent of their GNP. There is an ongoing debate on the form in which foreign aid flow to low-income and lower-middle income levels should take-either loans or grants. This debate was necessitated by unsustainable debts in these countries as a result of receiving foreign aid in the form of loans. This led to the evolution of the initiative to shifting foreign aid towards grants.

This study analyses the effect of foreign aid, more specifically, concessional loans and grants, on taxation revenue. Based on the literature review, we conclude that there is no consensus on the effect of foreign loans and grants on tax revenue. Scholars have found different responses of tax revenue as a result of changes in either foreign loans or grants to recipient countries. Many scholars argue that foreign loans have positive effects on tax revenue due to the obligation to repay these loans, whereas foreign grants tend to have a negative effect since they are treated as ‘free’ money by the recipient governments in lieu of taxation (Gupta et al., 2004; Benedek et al., 2012). Although researchers have suggested that concessional loans are positively related to revenue performance, excessive reliance on foreign loans may lead to problems of debt sustainability in the long run.

Foreign aid is provided to recipient countries through government fiscal budget either as project support or budget support. Project support implies that the funds are earmarked for a particular project that is agreed upon by both the donor and the recipient country. It requires a high level of accountability, achievement of deliverables and may run a few years. On the other hand, if given as budget support, funds are channeled into the national treasury and decisions on spending are unrestricted by the donor and only depend on the country’s list of priorities. In the past, most aid was provided in the form of project support, whereas today, where more aid is provided in the form of budget support and the recipient countries, are granted more autonomy in spending it.

The primary objective of donors in channeling foreign aid to Africa and other developing countries is mainly to boost economic development. Statistics show that Africa receives the highest amount of foreign aid relative to GDP as compared to the rest of the world, but the

results appear to be dismal. Something seems to be going wrong with donor aid, which raises numerous interesting questions. Among the questions, we must ask: what are the critical sources of effective and sustainable development funding—foreign inflows or domestic revenue mobilization?

In 2002, the Monterrey Consensus highlighted the importance of mobilizing domestic resources to finance the Millennium Development Goals (MDGs), and since then, the donor community has increasingly acknowledged the importance of Domestic Revenue Mobilization (DRM); for example, through the support of African Tax Administration Forum (ATAF) initiatives. Further emphasis on increasing domestic revenue mobilization was made during the formulation of Sustainable Development Goals (SDGs) which target to end poverty, less inequality, and injustice, as well as combating climate change, among others, by 2030. The UN and world leaders endorsed the SDGs as the underlying development goals for the next generation. These goals can be achieved faster if developing countries receive the needed development financing. Increasing domestic revenue not only creates additional fiscal space for supporting high-priority spending but it also allows a country to maintain spending levels, consistent with its policy priorities when aid is phased out. Part of this strategy is working towards improving tax system administration by developing a simple, fair and efficient tax system. Moreover, as low-income countries in Africa develop into emerging market countries, they need to strengthen their revenue collection to sustain higher tax burdens. At the same time, volatility and uncertainty of aid flows can adversely impact budgetary management of the recipient countries. Increasing the domestic revenues is the only best way to mitigate such effects and create a more stable and reliable revenue stream (Sanjeev Gupta and Shamsuddin Tareq, 2008)

The global financial crisis (2008-9) made it clear that Africa was overly dependent on external aid flows because foreign aid was one of the first items to be cut in donors' budgets, which hit low-income African countries very hard. This made it increasingly clear that foreign aid was an undependable source of government revenue due to its uncertainty and volatility. Furthermore, over-dependence on grant aid leads developing countries to postpone reaching their full tax-collection potential (Gupta 2003).

Domestic revenue mobilization, mostly taxation offers the potential for achieving greater independence and sustainable economic growth and development. Taxation not only reduces over-dependence on aid but also reinforces social contracts between the state and its citizens which foster accountability by the government. According to the African Economic Outlook

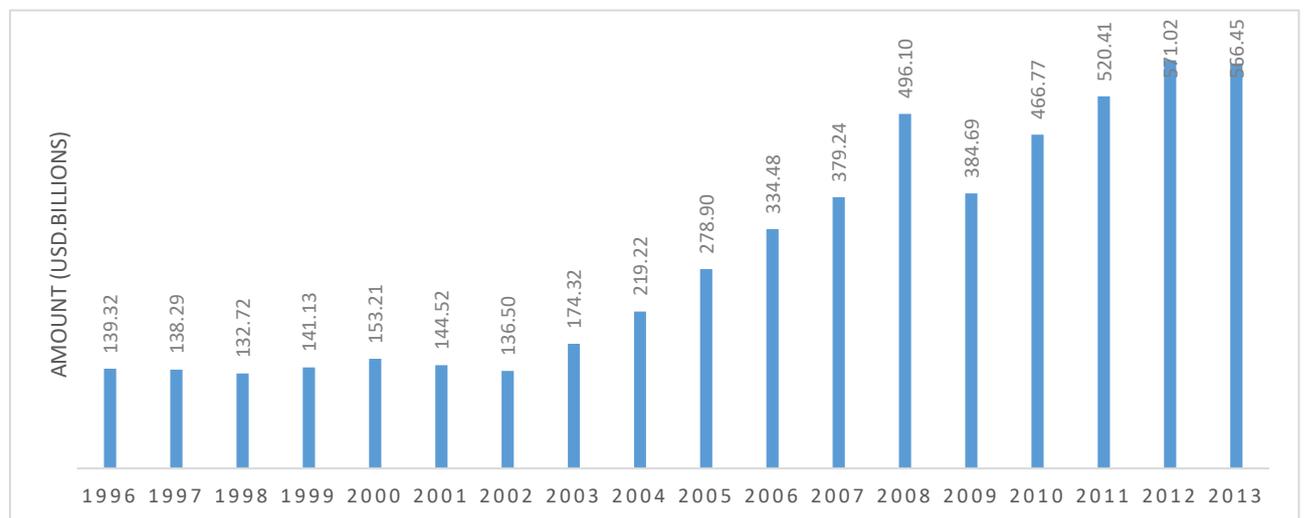
(AEO, 2010), Africa’s average tax revenue as a share of GDP has been increasing since the 1990s. However, this increase was mostly due to taxes on the extraction of natural resources, which does not require as much government accountability as does other forms of taxes. Resource taxation has not appeared to offer a stable tax base to African countries. According to the IMF (IMF, 2007), countries that substantially rely on taxes from income, profit, and capital gains, tend to expand revenues performance as compared to countries that depend on taxes from goods and services.

Many African countries are endowed with natural resources, but they have failed to use them to their advantage. This is largely because of poor governance and political instability. However, if foreign aid is used to improve institutions--like establishing efficient, effective and fair tax systems, and better government for its citizens--then aid could improve economic growth and sustainable development.

1.1 Trends in Africa Taxation and Foreign Aid

Despite the challenges, most African countries have shown an improvement in DRM (excluding grants) since 2003, as shown in Figure 1-1 below, apart from the significant drop in 2009, which was as a result of Global financial and economic crisis.

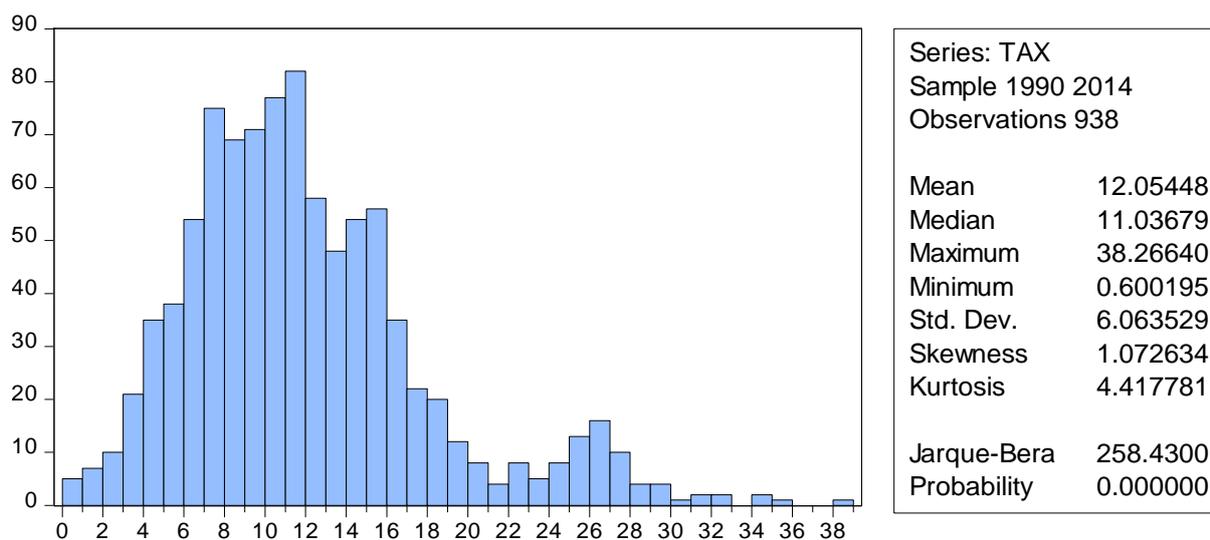
Figure 1-1: Trends of domestic revenue mobilization in Africa (1996-2013)



Source: AEO Database on African Fiscal Performance

The 42 Sub-Saharan Africa countries covered in our study showed an average tax revenue of 12% of GDP (Figure 1-2) over the past 25 years. However, it is important to note that there are a large number of countries with tax levels are above 20% of GDP. On the other hand, governments' final consumption expenditures averaged 15% of GDP (figure 1-3), which highlights the importance of foreign aid and domestic borrowing for them.

Figure 1-2: Average Taxation Revenue as a share of GDP for 42 countries (1990-2014)

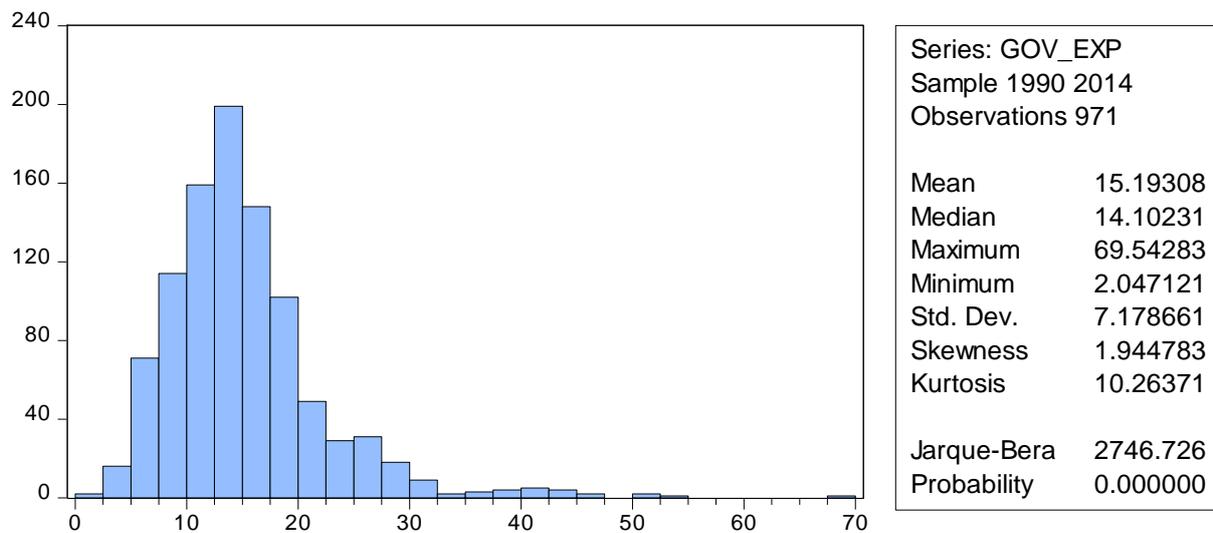


Source. GFS and IMF country reports

Average Central Government final consumption Expenditure in Sub-Saharan Africa

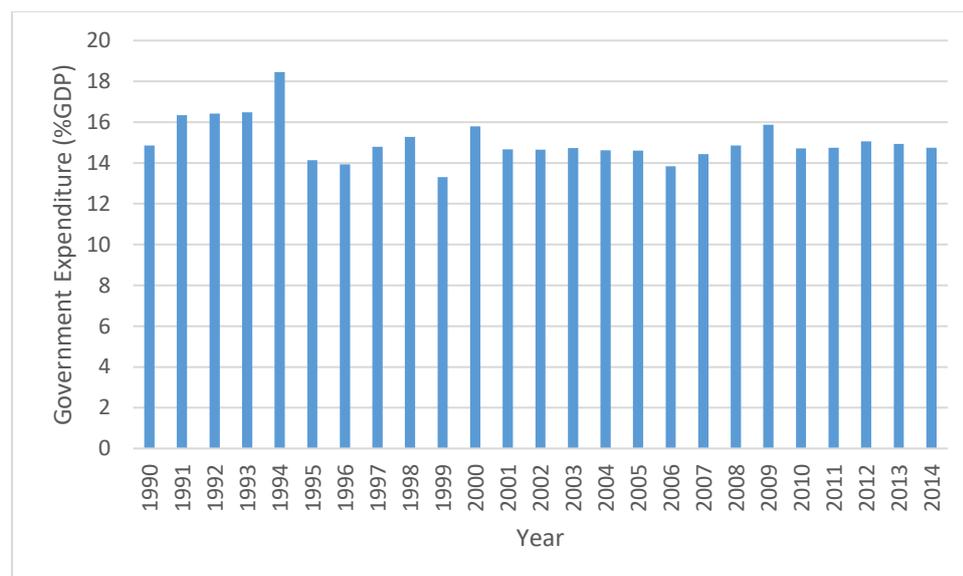
These expenditures are consumed within the current years and are mainly made up of recurrent expenditures which are essential in sustaining community needs. They exclude military and capital expenditure which are huge. Government funds expenditure with revenue from Taxes, Seigniorage, borrowing and foreign aid. We observe that average final consumption expenditures, 15% of the GDP, are greater than the average tax revenue, 12% of GDP. Which implies tax collection in Sub-Saharan Africa is way lower compared to expenditure demands.

Figure 1-3: Average Central Government Expenditure as a share of GDP for 42 countries (1990-2014)



Source: World Bank national accounts, and OECD National Accounts data files

Figure 1-4: Government Expenditure (% of GDP) in Sub-Saharan Africa



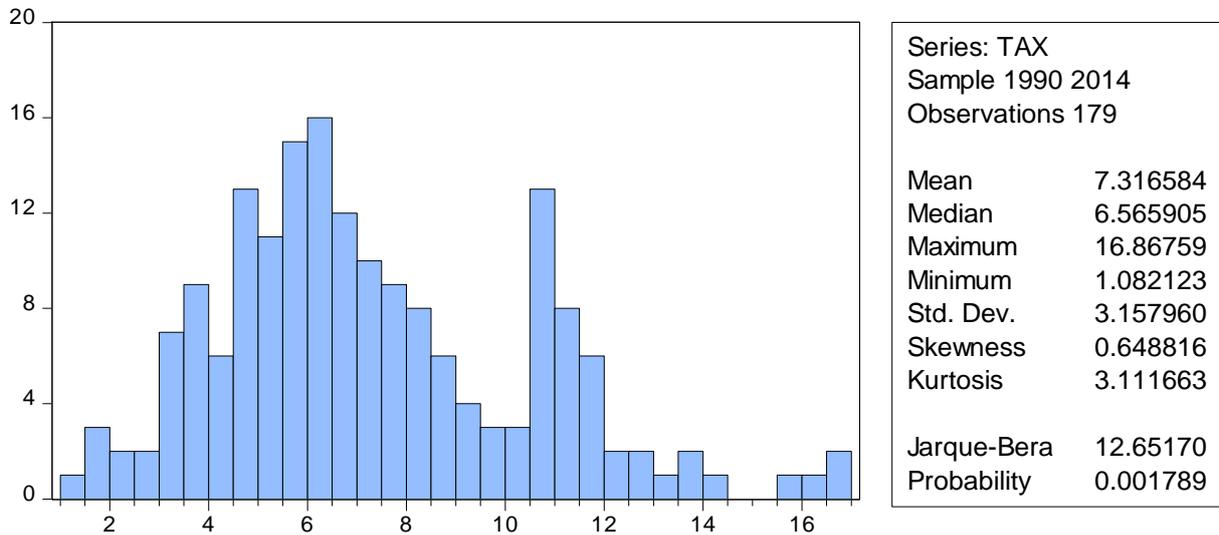
Source: World Bank national accounts, and OECD National Accounts data files.

Average Tax in Oil Exporting Countries in Sub-Saharan Africa

According to existing literature, oil-rich countries pay less attention to tax collection as a result of an overemphasis on oil-related sources of revenue. Which creates less accountability to the citizen who demands social developments in exchange for their money. These countries, some of which are upper-middle income countries such as Angola, Gabon, and Equatorial Guinea, have average tax revenue of 7% of GDP (Figure 1-5), which is lower than the average tax revenue in both low-income (10% of GDP) and lower-middle income levels (12% of GDP).

This demonstrates the resource curse argument since more developed countries are expected to collect more tax, which is not the case with oil-rich countries.

Figure 1-5: Oil Exporting Countries Average Tax Revenue for 7 Countries (1990-2014)

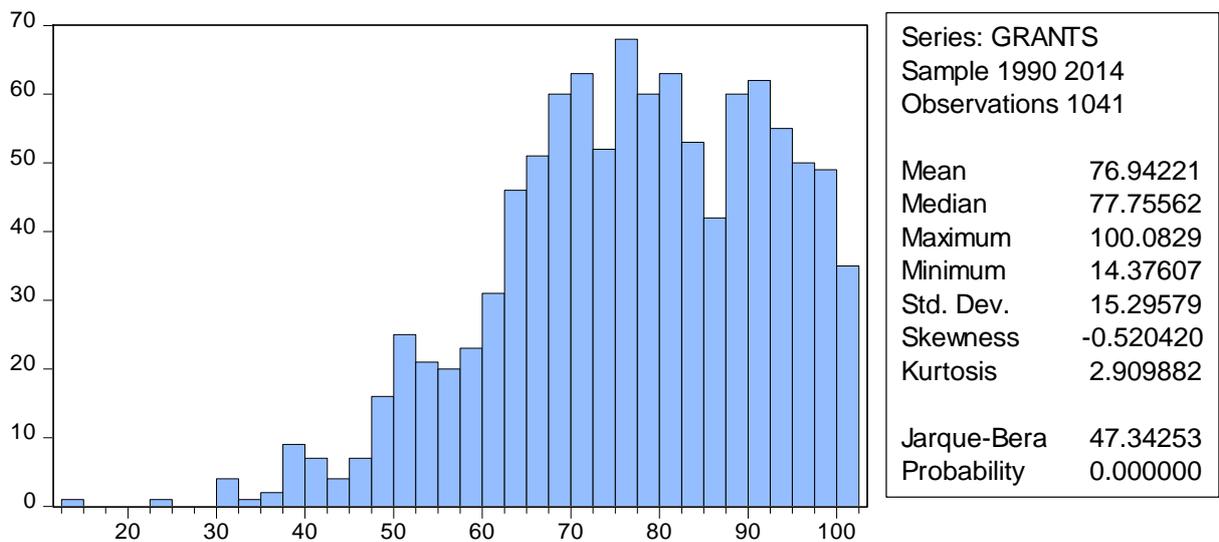


Source. GFS and IMF country reports

1.2 Disaggregation of Foreign Aid into Concessional Loans and Grants

The high average levels of grants (Figure 1-6), 77% of GDP, for the 42 Sub-Saharan countries can be explained by the fact that most of the poor countries receive foreign aid in the form of Grants since they are not eligible for loans which need repayment. Additionally, most of the Sub-Saharan countries are classified under fragile countries, and the frequently receive humanitarian grants especially during civil wars and severe drought.

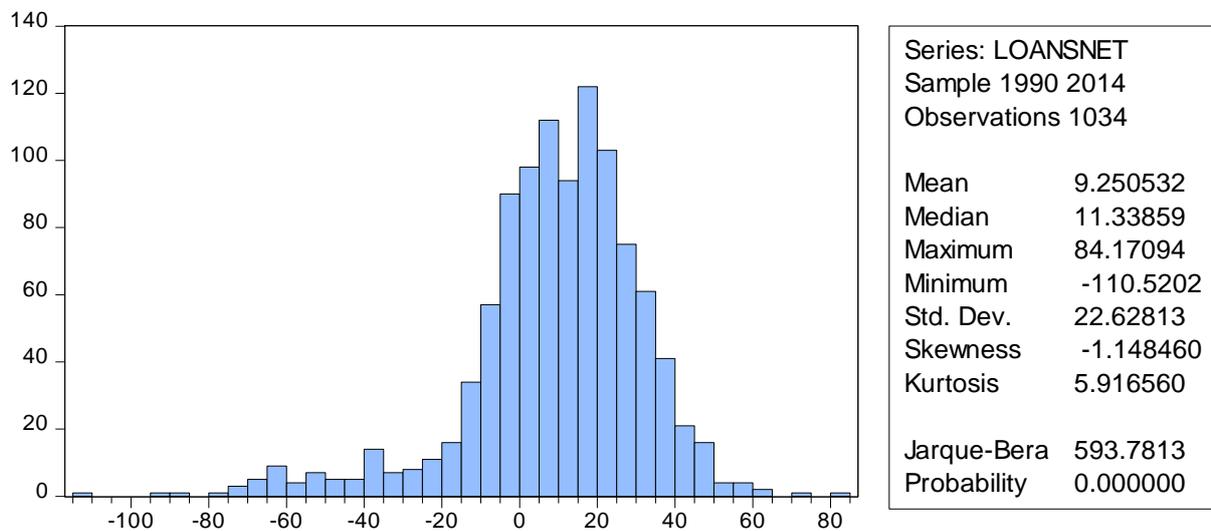
Figure 1-7: Distribution of Grants as a share of percent GDP in Sub-Saharan Africa



Source: OECD Geographical Distribution of Financial Flows to Aid Recipients

Net concessional loans constituted an average of 9.3 percent of GDP per annum for the 42 Sub-Saharan countries over the 25-year period. (Figure 1-8)

Figure 1-9: Distribution of net Loans as a share of percent GDP in Sub-Saharan Africa

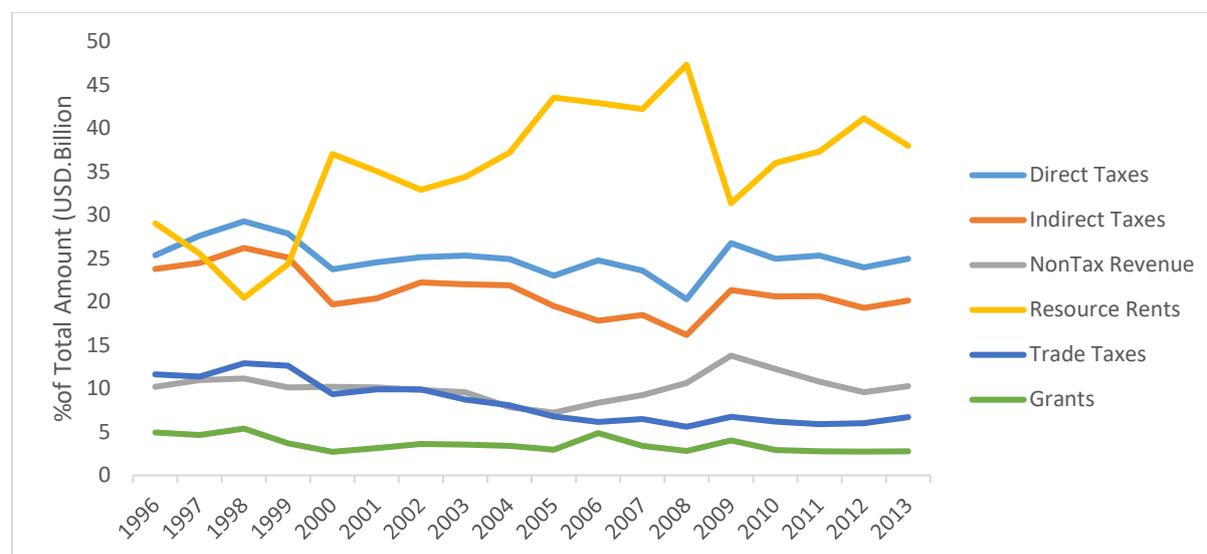


Source. OECD's Geographical Distribution of Financial Flows to Aid Recipients

Performance of different taxes

According to statistics, Africa's largest source of revenue is resource rents, obviously from resource-rich countries. Thomas (2013), analyzed the relationship between non-resource tax revenue and resource revenue in Sub-Saharan Africa and determined that higher resource revenue-to-GDP ratio had a negative influence on non-resource revenue, implying low tax efforts. The paper argues that most of these resource-rich countries have weak institutions, which encourages tax evasion and high levels of corruption. According to figure 1-8 below, resource revenue is high in Africa, implying that tax efforts are relatively low. Resource-rich countries under this bracket could perform much better economically if other forms of taxes are given ample attention in the collection.

Figure 1-10: Performance of Different Taxes



Source: AEO Database on African Fiscal Performance

1.3 Challenges Facing Developing Countries

Developing countries have weak systems of financial management. Thus, the challenges to increasing revenue collection include such things as tax avoidance, tax evasion, out-dated tax systems, unskilled tax collectors, and high rates of corruption. Moreover, there is a lack of oversight on how the collected revenue is spent for sustainable development. In short, there is lack of accountability from the government side.

African countries often face problems of poor governance and political instability. Although most African countries are endowed with natural resources, they may fail to garner the full benefits under such circumstances. If foreign aid can be channelled towards upgrading institutions, this can revitalize domestic revenue mobilization and improve governance and political accountability. In this case, foreign aid to Africa would provide a long-term positive impact towards DRM.

1.4 Research Focus

This study focuses on the impact of foreign loans and grants on tax revenues of 42 Sub-Saharan Africa countries for the period covering 1990-2014. Using this panel, we test the hypothesis that loans have a positive effect on taxation revenue because of the obligation to repay them,

whereas grants have a negative effect because the recipient treats them as ‘free’ money and as a substitute for taxation.

We begin with a basic model for predicting taxation revenue, and then consider the role of loans and grants. We try to account for underlying structural differences among countries by analyzing countries classified in different income levels separately.

Findings of this paper contribute to existing literature by: first, making use of the most recent data; secondly, controlling for structural differences, and lastly, controlling for tax collection ability by the use of tertiary school enrolment (% gross) as a proxy for skilled tax collectors.

The rest of the study is organised as follows; Section 2 reviews existing literature on the relationship of foreign aid compositions, concessional loans, and grants, on tax revenue. In this section, we further review the effect of foreign aid on institutions, fiscal behavior and economic growth. Section 3 outlines the methodology and data sources. Section 4 presents empirical results and interpretation, and finally, Section 5 captures our conclusion and policy recommendation(s).

Chapter Two

2 Review of Existing Literature

Government expenditures are financed through the three key sources; foreign aid (grants and concessional loans), tax revenue (also not-tax revenue for resource-rich countries) and borrowing (both domestic and foreign). In our literature review, the impact of foreign aid on taxation, institutions, fiscal and overall economic growth is analysed. Impact of Foreign aid on institutions, fiscal behavior and economic growth literature is captured since any shock on taxation revenue has leakages effect on these sectors.

2.1 Impact of Foreign Aid on Taxation

For sustainable development to be attained, especially in developing countries, governments should invest heavily in improving tax administration systems to increase the level of revenue from taxation. High dependence on foreign aid tends to hinder the development of major projects due to its volatile nature. On the contrary, domestic revenue is more stable, possible to predict and hence allows for appropriate planning. Therefore, it is of paramount importance that developing countries attain sustainable and stable levels of taxation to fund their growing government expenditures.

Foreign aid inflows to developing countries have increased sustainably in the recent past for use in financing the growing share of recurrent expenditures. Although recipient countries are expected to supplement the inflows by increasing domestic tax revenues, the record shows that this has not been the case with most of these countries. Some theoretical and empirical evidence suggests that increase in foreign aid inflow might reduce effort in revenue collection.

Gupta et al. (2004) analyzed the impact of foreign aid on tax revenue in 107 countries in the period 1970 to 2000. The paper majorly investigates the impact of grants and loans on domestic revenue mobilization alongside other structural variables. They found out that concessional loans are positively related to tax revenue, while grants are negatively related. Furthermore, total foreign aid was found to impact domestic revenue mobilization negatively. This implies that the negative effect from grants outweighs the positive effect from loans, and hence the overall effect becomes negative.

Gupta et al. (2004) further argue that the effects on domestic revenue as a result of increased foreign aid are country specific. The reduction of revenue in some countries arises as a result of high foreign aid through the tendency of recipient governments to “return resources” to the private sector by reducing the tax burden on citizens to accelerate economic growth. Also, corruption was used as a proxy for institutional development, whereby, countries with high levels of corruption with an increase in foreign aid led to offsetting tax revenue fully. Gupta et al. (2004) estimated the following model during the analysis.

$$\ln\left[\frac{Tax}{GDP}\right] = \beta_0 + \beta_1 AGR + \beta_2 IND + \beta_3 TRADE + \beta_4 INCOME + \beta_5 Grants \quad (2-1) \\ + \beta_6 Grants^2 + \beta_7 Loans + \beta_8 Loans^2 + \varepsilon$$

*** Time and country subscripts omitted*

Where Tax (% of GDP) represent tax revenue, AGR (% of GDP) represent agricultural sector, IND (% of GDP) represent industry sector, Trade (% of GDP) represent trade openness, INCOME represent real GDP per capita, which is a proxy for level of development, and finally Grants and Loans which make up foreign aid flows. The squared terms are included to capture nonlinear effects. The paper further found out that agriculture has statistically significant negative effects on tax revenue. Gupta et al. (2004) argue that it’s difficult to tax agricultural activities since most of the transactions are carried out informally and mostly practiced at subsistence level especially in low-income and lower-middle income level countries. Impact of Industry on tax revenue was positive and supported by the fact that it’s easy to levy tax due existence of well-kept books of accounts. GDP per capita posted a negative impact on tax revenue which is peculiar outcome compared to the expectation. Income per person was used as a proxy for development level, and more developed countries are expected to raise more revenue through taxation. Trade impact tax collection positively since transactions take place at a specific point making it easier to levy the tax.

Benedek et al. (2012), responded to critiques on Gupta et al. (2004) by re-examining the relationship between aid and domestic tax revenue in 118 countries for the period 1980-2009 with a focus on the three income levels; low-income, lower middle income and upper middle income. They estimated Two-way Error Correction Model in equation 2-2 below;

$$\ln\left[\frac{Tax}{GDP}\right] = \beta_0 + \beta_1 AGR_{it} + \beta_2 IND_{it} + \beta_3 TRADE_{it} + \beta_4 INCOME_{it} + \beta_5 ODA_Grants \\ + \beta_6 (ODA_Grants_{it})^2 + \beta_7 ODA_Loans_{it} + \beta_8 (ODA_Loans_{it})^2 + a_i + \mu_t + \varepsilon_{it}$$

These variables are the same used by Gupta et al. (2004). α_i and μ_t represent country and time specific effects respectively.

The findings of their research were in support of the results presented by Gupta et al. (2004) of a negative effect on tax revenue from grants and total aid as well as a positive relationship between concessional loans and tax revenue. The negative correlation was stronger in low-income countries. They further disaggregated tax data into VAT, income, excise and trade taxes and established that trade taxes have a positive relationship with ODA grants whereas other taxes maintained negative correlation. The positive effect from trade taxes is explained by increased imports which majorly accompany a rise in external grants. The negative impact on other forms of taxes such as VAT can be explained by the fact that increased imports are not taxed VAT which is added at the production stage and final sale of goods and services produced locally. Also, countries with weak institutions, i.e., more corrupt, are more affected by a rise in grants which drastically lower levels of tax revenue. Benedek et al. (2012) also noted keenly that the impact of grants on tax revenue has been weakening over time as Gupta et al. (2004) found an offset of the total revenue of about 28 cents for every additional dollar of grants and they found an offset of 9 cents for every additional dollar in grants.

Clist and Morrissey (2011) builds on Gupta et al. (2004) model by examining the impact of foreign aid (loans and grants) on tax efforts in 82 developing countries during 1970-2005. The paper analyzed two sets of data; 1970-1984 and 1985-2005 separately. They further classified countries into two income groups; lower-middleincome and low-income. The findings for the first set of data showed that loans are positively related to tax revenue while grants have a negative relationship with tax revenue. The second set of data, 1985-2005, indicates that grants are positively related to tax revenue, but this is only significant in middle-income countries. The argument supporting positive relationship is attached to conditional lending which became popular in mid-1980s and only significant to middle-income countries. which attributed to the fact that they had better fiscal systems than the low-income countries which had limited tax base and a weak fiscal system. Since the paper separated import taxes from export taxes, it was evident that import taxes were positively related to tax revenue as most of the countries and especially, low-income countries depend heavily on imports, which are taxed at the border. Export taxes had a negative relationship with tax revenue which the paper termed as an unexpected outcome. This might be as a result of the reduction or elimination of export taxes in the 1980s in most countries and further establishment of Export Processing Zones (EPZ) where investors are given long tax holidays, especially in developing countries, to attract

investors for industrialization visions. It's clear that poor countries have limited ability to expand tax revenue and hence receive more aid, mostly in the form of grants since they are fiscally constrained and the donor community may not wish to expose them to enormous debt burdens. This implies that, for poor countries with low levels of tax revenue, any increase in aid flow will impact negatively on tax revenue because, the more grants they receive, the more they lower the tax revenue. And hence, the automatic-negative contemporaneous effect between grants and tax revenue. Clist and Morrissey (2009) estimated the following model in their analysis.

$$\ln\left[\frac{Tax}{GDP}\right] = \beta_0 + \beta_1 AGR + \beta_2 IND + \beta_3 M + \beta_4 X + \beta_5 GDP + \beta_6 GDP^2 + \beta_7 Grants + \beta_8 Grants^2 + \beta_9 Loans + \beta_{10} Loans^2 + \varepsilon \quad (2-2)$$

*** Time and country subscripts omitted*

However, Benedek et al. (2012) results have been challenged by Clist (2016), who attempted to reproduce the model unsuccessfully. Clist (2016) failed to replicate results, even by using the same data set and attributed this to the use of different datasets in constructing variables, mainly dependent variable, without checking data compatibility. Clist, P. (2016) blames inconsistencies on various sources of the dataset used by the author and also stated that coefficient estimates are not robust to different sources of data.

Patrick Carter (2013) criticised past research which suggested that foreign aid, in the form of grants, has a negative impact on revenue mobilization, citing that they used simple, static models and strong econometric assumptions. Patrick Carter (2013) articulates that the results from previous research disappears or becomes insignificant when more general econometric methods are used to analyze the same data. Patrick Carter (2013) estimated the relationship between foreign aid and tax revenue using data from Gupta et al. (2004) and Remmer (2004). Patrick Carter (2013) applied panel time series estimators to carry out the analysis and found no evidence on the taxation and foreign aid relationship. The rising positive impact of grants on tax revenue is argued to be as a result of increased awareness and emphasis by the donor community on the importance of domestic revenue mobilization towards sustainable economic development.

Hisali & Ddumba-Ssentamu, (2013) found that grants have negative effect on tax revenue in Uganda which is offset by positive impact on loans. Unlike Benedek et al. (2012) and Gupta et al. (2004) who found the positive effect from loans being offset by the negative effect from grants, and hence the overall negative effect from total foreign aid. As a result, total aid has a

modest increase in tax revenue in the long-run. According to theory, countries with higher GDP per capita should translate to more tax collection. On the contrary, the study conducted by Hisali & Ddumba-Ssentamu (2013) argued that the negative relationship between GDP per capita and tax revenue is as a result of noncompliance from taxpayers. These results suggest that the individuals belonging to rich sphere practice tax avoidance and evasion and hence need for development in tax systems.

Chaudhry & Munir (2010) researched factors contributing to low levels of tax revenue in Pakistan. Their fiscal model incorporated income, economic policies, external and social factors. Foreign aid was one of the external variables besides external debts and foreign remittances. The results found out that foreign aid had a negative relationship with the tax collection in Pakistan, but the variable was statistically insignificant. Their baseline model used lagged variable of tax-to-GDP ratio, which was used to capture dynamic effects in the country and to solve autocorrelation problems in the model.

Thornton (2014) critique the findings in the existing literature by the claim that the presence of endogeneity and heterogeneity problems might have biased the results. Thornton (2014) uses the distance between the recipient and the donor as well as former colony and religion as instrument variables to solve identified problems. The findings of the study are similar to existing literature, but the paper found out that OLS estimates are biased downwards due to the presence of endogeneity. This shows that existing study has been underreporting the effect of foreign aid on tax revenue.

2.2 Impact of Foreign Aid on Institutions

According to statistics, Africa is the largest recipient of foreign aid in the world and the least democratic at the same time. The phenomenal question is; Does the foreign aid hurt Africa or is the receipt of foreign aid a curse? Djankov et al. (2008) carried out a study on 108 foreign aid recipient countries from 1960 to 1999. The study was focused on establishing the impact of foreign aid on institutions in the beneficiary countries. Democracy was used as a proxy for institutional development whereby results show that countries which receive more foreign aid have low levels of democracy compared to counterparts who receive lesser foreign aid.

Increased aid to these countries leads to worse political institutions which further results in rent-seeking by corrupt government officials as observed in resource-rich countries. This is major because foreign aid provides windfall resources, similar to the case of natural resources which consequently fuels rent-seeking behavior. This only comes into play when weak institutions are in existence. Djankov et al. (2008) conclude that foreign aid has a negative impact on institutions and suggests the need for further probe of negative correlation.

In addition to determinants of tax efforts in the literature, Antonio and Carlos (2011) added income distribution into their regression. They used Gini index as a proxy for income distribution in the society where they identified zero effect of foreign aid on tax revenue. They further discovered a statistically significant negative effect of aid on tax revenue whenever Gini index was excluded from the model using IV and RE and a positive impact using sys-GMM. This showed that the omission of the income distribution could potentially lead to biased results. In literature, scholars have argued that the impact of foreign aid on tax revenue is pegged on the quality of the institutions, where aid fuels tax collection in countries with good institutions and induces tax-cut in poor quality institutions. Antonio and Carlos (2011) controlled for institutional quality and still found that aid did not seem to have any effect on tax revenue and hence the conclusion that irrespective of country's institutional quality, aid does not affect tax revenue. This is contrary to Gupta et al. (2003), Brun et al. (2007) and Azam et al. (1999) who found that more corrupt countries (poor institutional quality) foreign aid resulted to tax-cut.

Bräutigam & Knack, (2004) reviewed the impact of the high levels of aid to African countries with poor governance records and how they are delivered. The outcome of their study addresses the link between foreign aid and governance in sub-Saharan African countries. Their research has given evidence of deteriorations in governance as a result of high aid levels in Africa. Also, (Bräutigam & Knack, 2004) concluded that improvement in governance results in increased

GDP per capita and that there exists a strong relationship between increased levels of foreign aid and a lower tax share of GDP. Their suggestions for the solutions to these problems have been summarized into two main points: (1) the disbursement of foreign aid be more competitive and selective to governments with proven records of developmental governance; (2) large scale aid programs be provided only as a short-term development tool.

2.3 Impact of Foreign Aid on Fiscal Components

Osei et al. (2005) used Vector Autoregressive (VAR) methods to establish the cointegration among nonstationary fiscal variables in the effort of finding out the impact of foreign aid on the national budget of Ghana. The fiscal response model is made up of; government spending, tax revenue, aid finance and domestic borrowing. Impulse response analysis shows fiscal variables are cointegrated and further shows that aid leads to increase in government spending, increase in tax effort and finally reduced domestic borrowing in Ghana. Franco-Rodriguez et al. (1998) found out that the total impact of aid on consumption was negative despite the allocation of almost half of the total aid to government consumption in Pakistan. Impact on government was slightly positive, but there was a negative effect on total public expenditure and taxation.

Oliver Morrissey (2014) studies on aid and government fiscal behavior show that aid did not have a significant effect on tax revenue until the 1980s when a positive relationship was observed leading to reductions in domestic borrowing which is a requirement of the IMF. Bazoumana Ouattara (2006) found out that almost 41% of aid flows to Senegal is used to finance the country debt. The research further established the existence of a negative relationship between aid and government revenue while there was the insignificant effect on domestic expenditure and borrowing. (Batten, 2010) analyzed the interplay between foreign aid and fiscal behavior in Papua New Guinea where aid grants led to lower tax revenue and lower domestic borrowing.

Ghura, (1998) carried out a study on the determinants of tax revenue by focusing on the effect of economic policies and corruption in Sub-Saharan Africa. The paper found out that the implementation of structural reforms is positively correlated to tax revenue and an increase in grants results in a reduction in tax revenue. Corruption was also captured in the model among other variables and the analysis reported that the presence of corruption reduced tax revenue.

Bhushan & Samy (2014) undertook a case study of four countries; Bolivia, Uganda, Guatemala, and Zimbabwe, in the event of finding out the impact of fiscal capacity and

performance on aid allocation. It is evident that both bilateral and multilateral donors, despite endless emphasis on domestic revenue mobilization, pay little attention to fiscal capacity and performance during aid allocation

Salih, (2012) analyzed the impact of foreign aid on the public sector in East Africa, and results show that aid had a positive impact on both public investment and recurrent government expenditure. The study further argued that aid is negatively related to taxation and domestic borrowing.

2.4 Impact of Foreign Aid on Economic Growth

Existing literature on the effectiveness of foreign aid in developing countries does not seem to agree whether aid impacts economic growth positively or negatively. Arguments for and against foreign aid to developing countries have been put forward by different researchers.

Quazi, (2005) carried out a case study by estimating two models; Aid-Growth model and Aid-Fiscal model, to analyze the impact of foreign aid on economic growth and fiscal behavior in Bangladesh. Results show that total foreign aid has a marginal effect on economic growth of Bangladesh. Disaggregating foreign aid into loans and grant revealed that grants are associated with a statistically insignificant effect on growth whereas loans lead to GDP growth in Bangladesh. In the fiscal model, aid loans are related to increased tax revenue since they mostly finance productive projects, unlike aid grants which finance non-productive public expenditures, and hence, display negative impact on tax revenue.

Ekanayake & Chatrma,(2009) analysed foreign aid data covering 85 recipient countries in Asia, Africa, Caribbean and Latin America during 1980-2007, in the effort of finding out the effect of foreign aid on economic growth. Estimation of the model implies that foreign aid has mixed effects on economic growth in developing countries. For example, there was a positive correlation between foreign aid and economic growth in Africa but negative in other regions. The study further grouped countries according to their income levels; Low-Income Countries, Low-Middle-Income Countries, Upper-Middle-Income Countries, and High-Income Countries. Of the four income groups considered in the case study, foreign aid had a positive impact on growth on the three income groups except for Low-Middle-Income countries where economic growth was negatively affected by the inflow of foreign aid. Aye Mengistu Alemu and Jin-Sang Lee (2015) found a positive relationship between economic growth and foreign aid in low-income countries in Africa while middle-income countries, also in Africa, had a

negative relationship. He further noticed that Foreign Direct Investment (FDI) impacted positively on economies of middle-income countries.

Chervin & van Wijnbergen, (2010) focuses on how volatility in foreign aid affects economic growth of 155 countries over the period 1966-2001. The results suggest that volatility in foreign aid has a negative relationship with economic growth while when volatility is controlled, foreign aid has a positive relationship with economic growth. Asteriou, (2009) found a positive relationship between aid and economic growth in five South Asian countries. The study carried out panel data analysis to establish the long-run and short-run relationship between foreign aid and economic growth. The paper claims robust estimates as a result of using panel unit root test, mean group and a pooled mean group which are robust for panel data econometrics.

Ndambendia & Njoupouognigni, (2010) study on the impact of foreign aid and foreign direct investment on economic growth in Sub-Saharan Africa shows a positive relationship but with a very low coefficient of foreign aid. Statistics show that 1% increase in foreign aid grows the economy by 0.05%. This entails that an increase in foreign aid does not necessarily lead to a proportionate increase in economic growth.

According to (Islam, 1992), statistics on the inflow of foreign aid show that despite Bangladesh being one of the largest recipients of foreign aid, it remains amongst the poorest countries in the world. Foreign aid to the country aims to boost economic growth, but domestic resources impact more positively on economic growth than foreign aid. It is further noticed that foreign aid in the form of loans are preferred than grants.

In most African countries, especially in Sub-Saharan Africa, poverty levels are insanely high. Mallik, (2008) analysed six of the poorest African Countries; Malawi, Mali, Togo, Sierra Leone and Central Africa Republic and Niger. These countries have had either declining or stagnant real GDP per capita or still living in poverty despite being highly dependent on foreign aid. Cointegration analysis showed a negative long-run relationship between aid and economic growth in five out of the six countries. In the short-run, foreign aid displayed no significant effect on growth except in Niger.

Contrary to some research papers on the effect of foreign aid on economies of developing countries, (Karras, 2006) found a positive statistically significant relationship between the economic growth of 71 developing economies and foreign aid. The results obtained did not factor in controlling for fiscal policies. Empirical statistics show that 1 percent increase in foreign aid raises per capita growth rate by approximately 0.14 to 0.26 percent.

Kim, (2011) analysed the success story of South Korea which moved from foreign aid recipient to a donor. Foreign aid greatly supported the economic development of South Korea. The research put into consideration two government regimes where by the first regime was full of corrupt and incompetent officials while the second regime was more economic development oriented with high levels of government capacity, commitment, and ownership. Hence, good governance and support from the USA as the main donor propelled the fuelled economy.

Table 2-1: Summary of Empirical Literature Findings

Author(s)	No. of Countries	Panel/Time series	Agr	Ind	GDPP	Trade	Total Aid	Grants	Loans
Gupta et al (2004)	107	Panel	-	+	-	+	-	-	+
Benedek et al (2012),	118	Panel	-	+	+	-	-	-	+
Clist & Morrissey (2011)	82	Panel	-	+	-/+	M=+ X=-	N.I.M	-/+	+
Hisali & Ddumba-Ssentamu, (2013)	1	Time series	N.I.M	N.I.M	-	N.I.M	+	-	+
Thornton, (2014)	93	Panel	-	+	+	+	-	-	+

Clist & Morrissey (2011) found different signs when different samples were used, 1970-1984 and 1985-2005. They also found out that GDP per capita affect tax revenue positively when its squared value was included in the model and negatively when excluded. N.I.M stands for not included in the model studied, M stands for imports and X for exports.

Chapter Three

3 Methodology and Data

This study focuses on the panel time series analysis of 42 Sub-Saharan Africa countries for the period covering 1990-2014. We focus on the 42 countries due to the availability of data and also because they are among the largest recipients of foreign aid, especially in the form of grants, and most of them are still poor. Estimation of this model is carried out by employing secondary annual panel data only.

3.1 Model Specification

Our study entails determining the impact of foreign aid on tax revenue. We begin by estimating two models; one includes net foreign aid among other control variables and the other disaggregate foreign aid into grants and concessional loans. Our model of interest position to capture the impact of grants and loans on tax revenue. We estimate the model in equation (3-1), by regressing tax revenue (% of GDP) on its determinants which are: Agriculture – value added (AGRI), Industry – value added (IND), GDP per capita (GDPP), Trade openness (TRADE), ODA-Grants and ODA-Netloans. Nonlinear effects are captured by including a squared value of GDP per capita in the model. We estimate equation (3-1) using a Fixed-Effect estimator that takes into account unobservable country specific effects, which is time invariant and helps to explain differences in cross-country tax revenue.

We are employing a one-way error component model, which allows for cross-section heterogeneity in the error term since a two-way error component model not supported in Eviews® with an unbalanced panel. Our unbalanced panel is as a result of missing data. We further hold strongly that Fixed Effects estimator is more appropriate since some econometrically unobservable factors which are country specific such as management skills of the policy makers, might influence the tax collection. On the contrary, Random Effect estimator assumes unobserved country heterogeneity to be random such that: $\alpha_i = IID(0, \sigma_\alpha^2)$ and $\mu_{it} = IID(0, \sigma_\mu^2)$, which further assumes strict exogeneity in explanatory variables of unobserved country heterogeneity and idiosyncratic errors.

Unlike random effects, fixed effects allow unobserved country heterogeneity to be correlated with explanatory variables but assume strict exogeneity in all explanatory variables conditional

on idiosyncratic error. However, since its difficult to find an appropriate observable and nonzero instrument variables to control for the unobserved heterogeneity, Fixed effect estimator wipes out unobservable country effect by demeaning the variables using within transformation and estimates the model by OLS, assuming all the explanatory variables are exogenous, i.e., $E(X_{it}, \mu_{it}) = 0, t = 1 \dots T$ and $i = 1 \dots N$

$$\begin{aligned} \text{Log} \left(\frac{\text{Tax}_{it}}{\text{GDP}_{it}} \right) = & \alpha + \beta_1 \text{AGRI}_{it} + \beta_2 \text{IND}_{it} + \beta_3 \text{TRADE}_{it} + \beta_4 \text{GDPP}_{it} \\ & + \beta_5 \text{GDPP}_{it}^2 + \beta_6 \text{ODA}_{GRANTS_{it}} + \beta_7 \text{ODA}_{NETLOANS_{it}} + \varepsilon_{it} \end{aligned} \quad (3-1)$$

3.2 Data Used

Taxation revenue (% of GDP) data was obtained from IMF's Government Financial Statistics (GFS), and IMF specific country reports to fill in the gaps. Taxation revenue refers to compulsory transfers to the private sector to the central government for public transactions which exclude social contributions. Foreign Aid/Official Development Assistance (ODA) data was obtained from OECD's Geographical Distribution of Financial Flows to Aid Recipients dataset. It is the sum of all bilateral and multilateral donors and comprises of grants and concessional loans. Grants represent transfers to recipient countries with no repayment obligation, and concessional loans represent transfers with a grant element of 25 percent or more.

Table 3-1: Description of variables used

Variable	Measure	Source of Data	Unit Root test
Agriculture – value added	% of GDP	World Bank's WDI Database	Stationary I (0)
Industry – value added	% of GDP	World Bank's WDI Database	Stationary I (0)
Trade (Imports + Exports)	% of GDP	World Bank's WDI Database	Stationary I (0)
GDP Per Capita	US\$ (constant 2010)	World Bank's WDI Database	Stationary I (1)
Oil rents	% of GDP	World Bank's WDI Database	Stationary I (1)

GDP	US\$ (constant 2010)	World Bank's WDI Database	Stationary I (1)
Tertiary school enrolment	% gross school enrolments	UNESCO Institute for Statistics	Stationary I (1)
Corruption Index		ICRG and PRS	
Tax Revenue	% of GDP	IMF's GFS & IMF country reports	Stationary I (0)
ODA_grants	% of GDP	OECD database	Stationary I (0)
ODA_loans	% of GDP	OECD database	Stationary I (0)
ODA_aid	% of GDP	OECD database	Stationary I (0)
Government Expenditure	% of GDP	World Bank's WDI Database	Stationary I (0)

All variables are measured yearly. I (0) means the variable is stationary at level and I (1) mean the variable is non-stationary at level but become stationary after first difference.

Description of Other Variables

All variables are expressed as a percentage of GDP to capture their relative sizes except GDP per capita (GDP/population) and tertiary school enrolment which is expressed as a percentage of gross school enrolment.

Agriculture valued added represent the net output of the sector after adding up all the outputs and subtracting intermediate inputs. Industry, just like agriculture capture the net output after subtracting intermediate inputs from the total output of the sector. Trade openness is captured by the sum of imports and exports of goods and services. Agriculture, industry, and trade openness are used to control for the economy structure GDP per capita, which captures income per person in the economy, is used as a proxy for the level of economic development. Agriculture, industry, and trade openness are used to control for the economic structure

Oil rent represents the net value of crude oil production at world prices after subtracting total cost of production.

3.2.1 Unit Root Test

This test determines whether a series is stationary or non-stationary. This is critical to carrying out any form of empirical analysis. For instance, two non-stationary variables trending together over time may post a very high R^2 despite the two being unrelated. Carrying out regression with non-stationary variables, may violate standard assumption and eventually produce spurious results and hence, wrong inferences. To test for unit root, we use Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests, where the null hypothesis is presence of unit root, or rather a series which has characteristics of a random walk, and the alternative hypothesis is absence of unit root/stationary. And hence, it's critical to carry analysis with series which have constant means and variances over time, stationary variables, as compared to non-stationary variable. Most of macroeconomic non-stationary variables are converted to stationary variable by first differencing. If a non-stationary variable is converted to stationary variable by first differencing, it's said to be integrated of order one, $I(1)$ and integrated of second order if it's differenced twice, $I(2)$. (See table 3-1)

3.2.2 Test of Long run Relationship

Cointegration test is undertaken to investigate variable long run relationship. Most of the economic time series are integrated of order one, $I(1)$. If any linear combination of two or more series may be integrated of order zero, $I(0)$, we conclude that the series are cointegrated (Engle and Granger, 1987). Johansen Cointegration test can only take place if series involved are integrated of the same order. Engle and Granger (1987) and Johansen (1988) are the two commonly used methods to carry out cointegration test. Deviations from the equilibrium of cointegrated variables will eventually return to the equilibrium point, meaning that the shock is not permanent or rather does not cause permanent deviations. These deviations from the equilibrium path can be modeled by Error Correction Model.

3.3 Data Analysis

In our model specification, one of the challenges of estimating the impact of foreign aid on taxation revenue is the possibility of reverse causality; such that donors may effect foreign aid depending on the levels of domestic revenue mobilization in the recipient countries. For example, donors may resort to increasing the levels of foreign grants because of a reduction in domestic revenue. Similarly, donors may increase levels of foreign loans to countries that have shown a tremendous increase in collection of domestic revenue. Grants to the poor countries

and loans to the countries with steady tax revenue is necessitated by the fact that poor countries have no financial muscle to repay loan, unlike the counterparts. Moreover, hence, most evidence point to the fact that aid levels are linked to a country's level of development. There is a possibility our model may suffer from an omitted variable, which explains tax effort, which may further lead to the presence of impure heteroscedasticity. At the same time, the omitted variable may be correlated with some regressors in the model while being correlated with taxation revenue, which will automatically result in endogeneity problems. In our case, endogeneity bias may arise due to correction of the independent variable, foreign aid, with error term, as a result of reverse causality between aid and tax revenue, and/or omitted variable, and/or measurement error. This implies that OLS estimates would be biased and inefficient and standard errors will be biased and inconsistent. As a result, we will use other econometric methods which will correct possible endogeneity and heterogeneity problems in our model.

We suspect our model suffers from omitted variable and/or variable measurement error as a result of multiple data sources. This implies there is a possibility of endogeneity problems in our model and hence OLS estimates will be biased, inefficient and inconsistent. The presence of endogeneity problems in the model necessitates use of instrumental variables. Also, there is an underlying argument that “foreign aid may respond to shortfalls in domestic revenue mobilization” (Gupta et al. 2004), suggesting the presence of reverse causality between tax revenue and foreign aid. Problems associated with finding a strong instrumental variable for foreign aid lead us to use one period lags of loans, grants and total net aid as the instrument variables in our model. Both Fixed Effects and Random Effects assumes strict exogeneity of the instrumental variables conditional on unobserved country heterogeneity, i.e., $E(z_{it}, \mu_{it}) = 0$

Our choice of Fixed Effects 2SLS estimator is necessitated by the fact that it does not condition instrument variables to be exogenous like in the case of Random Effects 2SLS which require instruments to be exogenous. We cannot rely fully on Random Effects 2SLS because it is challenging to find strictly exogenous instrument variables. On the other hand, Fixed Effects 2SLS estimator assumes instruments variables are contemporaneously exogenous not necessarily strictly exogenous, which is a bit hard to achieve in our model

In our second model specification, we intrude tertiary school enrollment as a proxy for skills development and also to capture the importance on focusing on quality education for country's development goals. This variable is used as a control variable in the model since more qualified personnel in government revenue collection authorities translate to more revenue collection as

a result of specialised data collection and analysis, regarding broadening tax base or increasing tax rates. No other study in the literature, which we are aware of that has controlled for the skills development by including education in the model.

Secondly, in this second model, we will use one period lags of grants, loans and total aid as instrument variable to control for the endogeneity problem and disaggregate trade into exports and imports. This is important to pin down their individual effects on tax revenue, similar to the case of grants and loans.

$$\begin{aligned} \text{Log} \left(\frac{\text{Tax}_{it}}{\text{GDP}_{it}} \right) = & \alpha + \beta_1 \text{AGRI}_{it} + \beta_2 \text{IND}_{it} + \beta_3 \text{Export}_{it} + \beta_4 \text{Imports}_{it} + \beta_5 \text{SCH}_{it} \\ & + \beta_6 \text{GDPP}_{it} + \beta_7 \text{GDPP}_{it}^2 + \beta_8 \text{ODA}_{\text{GRANTS}_{it}} + \beta_9 \text{ODA}_{\text{NETLOANS}_{it}} + \varepsilon_{it} \end{aligned} \quad (3-2)$$

3.3.1 Estimations

To account for country's heterogeneity effects, we choose fixed effects estimator. However, this estimator will be biased due to potential endogeneity problem. Hence, we apply fixed effects 2SLS estimator which uses one period lags of grants and loans as instrument variables. We further compare it with random effects and random 2SLS estimators. According to the visual test of heteroscedasticity (unable to perform other specific tests) there is the presence of heteroscedasticity, and hence we choose 'cross-section weights' in Eviews which automatically estimates the heteroscedastic variances of the cross-sections and eventually perform feasible generalized least squares (FGLS) weights to correct heteroscedasticity. In addition, we select 'white cross-section' which assumes errors are cross-sectionally correlated to estimate robust coefficient standard errors. To capture dynamic effects of tax revenue and to correct serial correlation, we use one period lag of dependent variable (tax/GDP)

3.3.2 Expectation of Parameters

Based on the existing literature, we have formulated expectations on our parameters. Starting with Agriculture, we expect a negative relationship with tax revenue. This is explained by the fact that most of the agricultural practices in low-income and lower-middle income levels are carried out informally. Most of these countries practice agriculture for subsistence purposes. Moreover, hence, if agriculture is one of the biggest sectors of the country's economy, it implies lower tax revenue due to lack of proper records for tax purposes, making it extremely hard to levy the tax. However, we expect upper-middle income level to post a positive relationship

between agriculture and tax collection because, agriculture in these countries is mostly practiced for commercial purposes with well-kept records to ease tax collection.

The industry is one of the sectors of the economy where transactions take place in a more formal environment with proper book keeping and hence, making it easier to levy the tax. This implies that we expect a positive relationship between industry and tax revenue. GDP per capita is used as a proxy for country's development level, and the more developed the country is, the more the tax collection. Positive changes in GDP per capita will eventually lead to positive changes in tax revenue collection. In our analysis, trade openness constitutes sum of exports and imports of goods and services. Since trade transactions are carried out at a specific place, it makes it easier to levy the tax, which leads to our expectation of positive relationship between trade openness and tax revenue. Countries which are more open to trade internationally, are at a better place to increase tax revenue.

As per the argument in the existing literature, foreign aid in form loans will impact positively on tax revenue and foreign aid in the form of grants will lead to a reduction in tax revenue. This is because loans, carry along an obligation to repay, implying the recipient government has to maintain current tax revenue levels or increase, unlike grants which are perceived as 'free' source of money by the recipient government and hence act as a substitute to tax revenue.

We introduced tertiary school enrolment variable in the model, which is a proxy for skills development and reflection of the same to personnel in tax collection. We would expect countries with high tertiary enrolment rate to result in increased tax collection.

Our last variable is oil which we expect to impact negatively on tax revenue collection because, oil-rich countries focus less on tax collection process compared to easily collected royalties and other oil tariffs.

Chapter Four

4 Empirical Results and Discussion

4.1 Unit Root Test Using the ADF and PP Test

ADF-Fisher & Phillips-Perron-Fisher test statistics are used. All test equations include individual intercepts, individual intercepts, and trends or none. The test shows; agriculture, loans and total aid are stationary in level when test equations include individual intercepts, individual intercepts, and trends or none while industry, trade grants and tax revenue are stationary in level when test equations include individual intercepts and individual intercepts and trends only. Being stationary in original specification means that variables are integrated of order zero, $I(0)$. GDP per capita, oil and tertiary school enrollment are non-stationary at level but become stationary when first-differenced. This implies they are integrated of order one, $I(1)$. Hence, the majority of variables are stationary in level, $I(0)$, mostly variable included in the baseline model (control variable) and our variable of interest, tax revenue. **Error! Reference source not found.** presents the statistical tests of all variables used in the model.

4.2 Long Run Relationship/Fisher-Johansen Cointegration Test

Non-stationary variables can be converted to stationary variables through differencing. The unit root test shows that GDP per capita, oil and tertiary school enrollment are integrated of order one, $I(1)$. Cointegration test is carried out to ensure that the three $I(1)$ variables are cointegrated before they are included in the model. Since they are integrated of the same order, Fisher-Johansen Cointegration test is applied.

Table 4-1 depicts that the three variables are cointegrated, meaning that they have a long-run relationship. Additionally, it implies that linear combination of the three $I(1)$ variables is integrated of order zero, $I(0)$. Consequently, they can be included in the model without generation of spurious results.

Table 4-1: Johansen Fisher Cointegration Test

Series: GDPP OIL SCH

Hypothesized	Fisher Statistics		Fisher Statistics	
No. of CE(s)	(from trace test)	Prob.	(from max-eigen test)	Prob.
None	48.87***	0	50.42***	0
At most 1	5.775	0.2166	3.838	0.4284
At most 2	8.959	0.0621	8.959	0.0621

Notes: ***represent significance at 1%. We reject the null hypothesis of none of our equations are cointegrated.

When variables are cointegrated, we can establish steady state equilibrium, and on the other hand, the absence of cointegrating equations (when dealing with non-stationary variables) may potentially result to spurious results, subsequently, wrong inferences. In our case, we can carry out Johansen cointegration test of the three I (1) variables only. Hence, to test for long run relationship/cointegration of all the variables in the model can only be done using Autoregressive Distributed Lag (ARDL) model which allows variables integrated of different orders-i.e., I (0) and I (1) but not I (2).

4.3 Empirical Models Results

Countries are classified by World Bank (July 2015) according to their income levels; low-income, lower middle-income, and upper middle- income level. Our analysis focuses on all countries pooled together but goes further to investigate any structural differences posted by different income levels. We begin by considering all 42 countries pooled together and later proceed to assess them based on their various income levels

4.3.1 Analysis of all countries

This section presents the results obtained by estimating equation (3-1) using Fixed Effects and Fixed Effects 2SLS methods. Baseline regression results are provided in Table 4-2. Our baseline regression in the first model includes only the main control variables which are; value-added agriculture as a percentage of GDP, value-added industry as a share of GDP, GDP per capita and trade openness (imports plus exports) as a share of GDP.

The structure of the economy, which comprises agriculture and industry sectors, has a significant impact on our analysis. Agriculture has a negative relationship with taxation revenue. This relationship meets our initial expectation since taxing agricultural activities is difficult, especially if practiced under informal set ups and at subsistence level. On the other hand, industry displays a peculiar behavior in our analysis as the results show a negative relationship, contrary to our expectations of a positive relationship. Taxing industry sector is expected to be easy since businesses are carried out under a formal environment. GDP per capita is used as a proxy for economic development level, and we expect that the more developed a country is, the higher the tax collection. Our results were as expected; GDP per capita is positively correlated with taxation revenue. More importantly, all the control variables are statistically significant. Comparing the control variables with that of Gupta et al. (2004), our results solve the effect of GDP per capita ambiguity by posting a positive relationship with tax revenue contrary to Gupta et al.(2004) which found a statistically significant negative effect, i.e., against their expectation. Other control variables agreed with Gupta et al. (2004), other than the industry which is peculiar in our analysis.

We turn to the key parameters of the study: total net aid, concessional loans, and grants, which are also included in the in the model. We estimated two models, one with total net aid and the other with grants and loans, in addition to control variables. Increase in total net aid (net loans plus grants) was associated with a statistically significant drop in taxation revenue. These results agreed with previous studies such as Gupta et al. (2004) and Benedek et al. (2012) amongst other related studies. When aid is disaggregated into net loans and grants, it is evident that both loans and grants have a negative effect on taxation revenue, and are both statistically significant. These results suggest that donors indirectly fund tax cut instead of productive government programs. Most papers found that loans have a positive effect on taxation revenue and the reverse for the grants (Gupta et al. (2004), Benedek et al. (2012), Clist and Morrissey (2009)). When the analysis of all the 42 countries is pooled together, the composition of foreign aid does not matter, i.e., grants and loans impact negatively on tax revenue. The effects of grants on tax revenue is supported in the literature by the argument that grants are viewed as a

source of “free” money by the recipient government, with no obligation to repay. On the other hand, loans also have a negative relationship with tax revenue in the pooled analysis. We explain our findings by focusing on the frequency of debt forgiveness. Most Sub-Saharan Africa countries being poor, are part of Heavily Indebted Poor Countries (HIPC), and they frequently receive debt forgiveness. This may have corrupted any discipline of repayment as the recipient governments may have formed an expectation of always qualifying for debt forgiveness and hence perceive them as equivalent to grants, i.e., “free money.”

Table 4-2: Baseline Models - Tax Revenue and Foreign Aid

Estimation Method	FE- EGLS	FE- EGLS	Fixed Effects 2SLS	Fixed Effects 2SLS
C	2.587994*** (0.070873)	2.611353*** (0.085667)	2.631084*** (0.075964)	2.891052*** (0.173745)
AGR	-0.011884*** (0.001147)	-0.012544*** (0.00117)	-0.011613*** (0.001284)	-0.011742*** (0.001341)
GDPP	0.000229*** (2.87E-05)	0.000273*** (2.76E-05)	0.000193*** (2.28E-05)	0.000266*** (2.93E-05)
GDPP^2	-1.84E-08*** (2.35E-09)	-2.13E-08*** (2.23E-09)	-1.52E-08*** (1.80E-09)	-2.15E-08** (2.36E-09)
IND	-0.006535*** (0.001292)	-0.007125*** (0.001258)	-0.007124*** (0.001147)	-0.007006*** (0.001313)
TRADE	0.001851*** (0.000363)	0.001817*** (0.000356)	0.001959*** (0.000325)	0.001904*** (0.000385)
TOTALNET	-0.005692*** (0.000867)		-0.006497*** (0.001708)	
GRANTS		-0.001253** (0.000594)		-0.004682*** (0.001845)
LOANSNET		-0.000716** (0.000346)		-0.004713*** (0.001585)
R-squared	0.937029	0.947059	0.943532	0.942383
F-statistic	259.5792	303.3358	270.2752	293.9313
Prob(F-statistic)	0	0	0	0
Observations	831	827	798	794
Cross-Sections	40	40	40	40
Periods Included	24	24	23	23

Note: dependent variable is log (taxation revenue/GDP); all regressors are measured as a percentage of GDP except GDP per capita. Numbers in parenthesis are standard errors. ***, **, and * indicate significance at 1, 5 and 10 percent respectively. Two Stage Least Square (2SLS) using country fixed effects. One period lags of grants, loans, and total aid are used as instrument variables.

For example, one unit increase in agriculture leads to reduction in tax revenue by approximately 1.18% when Fixed Effect estimator is applied to model one as compared to 1.17% when Fixed Effects 2SLS estimator is used. Clist and Morrissey (2011) found 1.16% when current aid was used and 1.17% when lagged aid was used. Gupta et.al (2004) equally found a reduction of 1.11% in tax revenue with one unit increase in agriculture. Clist and Morrissey (2011) used Fixed Effects estimator and Gupta et.al (2004) used both Fixed Effects and Random Effects estimators. We therefore conclude that the three papers found approximately the same negative impact on tax revenue with every increase in agriculture by one unit.

Concerning our key variables i.e., total net aid, net loans, and grants, the signs and magnitudes of the parameters differ slightly from the previous studies. Fixed Effects Estimator shows that one dollar increase in total aid results in a reduction in tax revenue approximately 0.57% and Fixed Effects 2SLS estimator shows a reduction of 0.65%. The two estimators' post different results, and we attribute the difference to endogeneity problem solved by Two Stage Least Squares (2SLS), and hence we prefer FE-2SLS since it counters endogeneity problem. One dollar increase in grants and loans, reduces tax revenue by 0.47% when FE-2SLS estimator for correcting endogeneity problem was applied.

4.3.2 Analysis of Different Income Levels

In this section, we use World Bank 2015 classification of countries according to their income levels to analyze the effects of foreign aid on taxation revenue. In our analysis, we use three classifications of countries; low-income, lower-middle income, and upper-middle income. The expectation is that different income levels tax collection may react differently to total aid, loans, and grants which therefore accounts for structural differences. The first baseline model includes all the main control variables and total aid (net) and the second baseline model contains disaggregated aid into concessional loans and grants, i.e.

$$\begin{aligned} \text{Log} \left(\frac{\text{Tax}_{it}}{\text{GDP}_{it}} \right) = & \alpha + \beta_1 \text{AGRI}_{it} + \beta_2 \text{IND}_{it} + \beta_3 \text{TRADE}_{it} + \beta_4 \text{GDPP}_{it} \\ & + \beta_5 \text{GDPP}_{it}^2 + \beta_6 \text{TOTALNET}_{it} + \varepsilon_{it} \end{aligned} \quad (4-1)$$

and

$$\begin{aligned} \text{Log} \left(\frac{\text{Tax}_{it}}{\text{GDP}_{it}} \right) = & \alpha + \beta_1 \text{AGRI}_{it} + \beta_2 \text{IND}_{it} + \beta_3 \text{TRADE}_{it} + \beta_4 \text{GDPP}_{it} \\ & + \beta_5 \text{GDPP}_{it}^2 + \beta_6 \text{ODA_GRANTS}_{it} + \beta_7 \text{ODA_NETLOANS}_{it} + \varepsilon_{it} \end{aligned} \quad (4-2)$$

respectively.

4.3.2.1 Upper-Middle Income Level

The results provided in Table 4-3 are quite interesting. Agriculture as a share of GDP has a positive effect on taxation revenue. The results are in line with the argument that developed countries undertake commercial agriculture, where business transactions are carried out formally and are recorded. This therefore makes it easy for the tax to be levied. The results show that one unit increase in agriculture leads to increase in tax revenue by 2.39% when model one is estimated with Fixed Effects 2SLS estimator. Another stimulating difference from the previous analysis of all countries pooled together is the response of taxation revenue with changes in total aid. It is clear that increase in foreign aid translates to a statistically significant increase in taxation revenue. Both Fixed Effects and Fixed Effects 2SLS report same signs but different magnitudes. In the earlier case, one dollar increase in total aid led to a statistically significant increase in tax revenue by approximately 2.65% and in the latter case, the same dollar increase in total aid results in an increase in tax revenue by 8.87%. It may be so, due to well-developed systems, which are transparent and definitely, the obligation to repay. Other variables respond less the same apart from trade openness, which results in a reduction in taxation revenue when the second model is estimated by both Fixed Effects and Fixed Effects 2SLS estimators. We attribute high revenue collection to institutional development in these countries.

Table 4-3.Upper-Middle Income: Taxation Revenue and Foreign Aid

Estimation Method	FE_ EGLS	FE_ EGLS	Fixed Effects 2SLS	Fixed Effects 2SLS
C	1.945988***** (0.273485)	2.324999*** (0.238596)	1.223888*** (0.431983)	1.48951*** (0.49255)
AGR	0.013706 (0.008551)	0.006512 (0.007521)	0.023871*** (0.00889)	0.012112 (1.24E-02)
GDPP	0.00035*** (4.97E-05)	0.000286*** (5.43E-05)	0.000466*** (8.23E-05)	0.00032*** (8.93E-05)
GDPP^2	-2.33E-08*** (3.21E-09)	-2.01E-08*** (3.61E-09)	-3.07E-08*** (5.85E-09)	-2.10E-08*** (6.65E-09)
IND	-0.009655*** (0.002375)	-1.02E-02*** (1.99E-03)	-7.72E-03** (3.69E-03)	-0.009089*** (0.003328)
TRADE	0.000151 (0.000399)	-0.000163 (0.000325)	0.000978 (0.000612)	-0.000632 (0.000603)
TOTALNET	0.026528*** (0.007299)		0.088679*** (0.03127)	
GRANTS		0.000223 (0.000777)		0.008349 (0.005329)
LOANSNET		0.00091 (0.00055)		0.005323*** (0.001941)
R-squared	0.867554	0.867915	0.857522	0.851674
F-statistic	65.50271	59.13782	70.79569	57.70431
Prob(F-statistic)	0	0	0	0
Observations	133	131	128	126
Cross-Sections	7	7	7	7
Periods Included	24	24	23	23

The dependent variable is log (Tax/GDP), all variable are expressed at a percentage of GDP except GDP per Capita. Values in the parenthesis, (), are a standard error. ****, ** and * represent significance at 1%, 5% and 10%.

We further disaggregate foreign aid into loans and grants. Table 4-3 depicts results on how tax revenue in more developed countries responds to concessional loans and grants. Contrary to earlier findings in the pooled analysis, both loans and grants have a positive effect on taxation revenue. This might be necessitated by the fact that Upper-Middle income countries do not fall under Heavily Indebted Poor Countries (HIPC) initiatives which imply that they are not eligible for debt forgiveness. Moreover, hence, the obligation to repay concessional loans is an incentive to the recipient government to tax more. Since systems are well developed, accountability is not an option. Hence, grants are used in the intended projects which fuel development. Other control variables remained more or less the same as when total foreign aid was used in the model.

4.3.2.2 Lower-Middle Income and Low-Income Level

The response of these two income groups is similar to that displayed in the analysis of all countries pooled together (see Table 4-4). This is an indication that the pooled analysis findings are majorly plausible in low-income and lower-middle and rare in Upper-middle incomes countries. For example, a reduction in tax revenue as a result of one unit increase in agriculture is quite close to the pooled findings which average around 1.1%. It is interesting to note that one unit increase in trade has a higher positive impact on tax revenue in Low-Income countries as compared to Lower-middle income countries. The difference in magnitude between the two income levels is because Low-Income countries receive more grants than Lower-Middle countries and as a result, import volumes increased tremendously. It is also explained by the fact that Low-Income countries produce less locally, and hence, most goods and services consumed locally are majorly imported. We conclude that carrying out analysis on the three income groups separately is more intuitive than analyzing all the countries together.

Table 4-4: Lower-Middle and Low-Income: Taxation Revenue, total aid, Loans and Grant

Estimation	Fixed Effects	Fixed Effects	Fixed Effects	Fixed Effects
Method	2SLS	2SLS	2SLS	2SLS
	Lower-Middle	Lower-Middle	Low-Income	Low-Income
C	2.822988*** (0.193274)	3.238541*** (0.330421)	2.168584*** (0.175722)	3.364747*** (0.63)
AGR	-0.010913*** (0.002394)	-0.013041*** (0.003497)	-0.010161*** (0.001624)	-0.01106*** (0.002353)
GDPP	6.95E-05 (0.000127)	0.000208* (0.000118)	0.000802* (0.000485)	0.001384** (0.000562)
GDPP^2	-1.33E-08 (2.35E-08)	-4.11E-08* (2.48E-08)	-2.02E-07 (4.18E-07)	-5.96E-07 (4.83E-07)
IND	-0.010448*** (0.001704)	-0.00857*** (0.00221)	-0.00762*** (0.002248)	-0.006133* (0.003476)
TRADE	0.00198*** (0.000614)	0.001622* (0.000902)	0.005841*** (0.000633)	0.004499*** (0.001135)
TOTALNET	-0.008982 (0.006133)		-0.005745*** (0.001902)	
GRANTS		-0.007663** (0.003346)		-0.01593** (0.006619)
LOANSNET		-0.003178 (0.002296)		-0.014353*** (0.005136)
R-squared	0.922982	0.914459	0.788974	0.660398
F-statistic	151.5073	145.3913	55.31282	59.59915
Prob(F-statistic)	0	0	0	0
Observations	207	207	430	428
Cross-sections	10	10	21	21
Period	23	23	23	23
Included(yr)				

Note: dependent variable is log of taxation revenue/GDP; all regressors are measured as a percentage of GDP except GDP per capita. Numbers in parenthesis are robust standard errors. ***, ** and * indicate 1, 5 and 10 percent respectively.

4.3.3 Introduction of Tertiary School Enrollment

At this juncture, we introduce our third model which contains a new variable, tertiary school enrollment, the proxy for skills development in individual countries. Tertiary school enrollment was included in the model as a determinant of tax revenue as we assumed that country's level of education is correlated with skilled personnel being tasked with tax collection duties, i.e., a more educated country will translate into more tax revenue collection. The estimated model results shown in Table 4-5 agrees with our expectations of a positive effect of tertiary school enrolments on tax revenue collection. Using Fixed Effects 2SLS estimator, one unit increase in tertiary school enrollment leads to 1.45% increase in tax revenue. The ratio of tertiary school enrollment to the gross school enrolment was purposely used in the model as a policy variable to inform relevant decision makers about the role played by quality education towards development.

During model specification, we intended to use tertiary school enrollment as one of the key control variables, but unfortunately, our model would suffer from the small sample due to missing data. Control variables, grants and concessional loans in this model behaved more or less the same as in the pooled analysis except for industry which showed a change of sign to our expected outcome when Fixed Effects and Fixed Effects 2SLS estimators were used. Meaning, tertiary school enrollment might have been one of the omitted variables, and hence by introducing it, might have captured its effect on tax revenue, hence changes in industry sign. In this model, industry positively impacts on tax revenue (not statistically significant) which is in line with our argument that transactions in industry sector are carried out formally, and books of accounts are well kept to ease taxation. The laws governing practices in the industry sector, such as annual filing of tax returns are legally binding, and any form of violation is punishable by law. Also, industry sector comprises of registered companies which are easy to track and tax, unlike the agricultural sector, where transaction are carried out informally and mostly practiced for subsistence purposes in Lower-Middle income and Low-Income countries.

Table 4-5: Tax Revenue, Foreign Aid, and Tertiary School Enrollment

Estimation Method	Fixed EGLS	Fixed EGLS	Fixed Effects 2SLS	Fixed Effects 2SLS
C	2.492087*** (0.167379)	2.594802*** (2.29E-01)	2.56E+00** (0.180646)	3.32E+00*** (4.64E-01)
AGR	-0.012131*** (0.003052)	-1.22E-02*** (3.15E-03)	-1.27E-02*** (0.003299)	-0.013069*** (3.33E-03)
GDPP	0.000163*	0.000152*	0.000118	1.05E-04

	(9.46E-05)	(8.21E-05)	(0.000112)	(1.06E-04)
GDPP^2	-2.75E-08***	-2.65E-08***	-2.12E-08**	-1.91E-08*
	(9.48E-09)	(8.33E-09)	(1.04E-08)	(1.02E-08)
IND	-0.001176	-0.00141	-0.002248	-0.00373
	(0.002389)	(0.002388)	(0.002407)	(2.52E-03)
TRADE	0.001329*	0.001467**	0.001932***	0.002619***
	(0.000748)	(0.000687)	(0.000684)	(0.000799)
SCH	0.025328***	0.026043***	0.023155***	0.028638***
	(0.00592)	(0.006978)	(0.006452)	(0.009461)
TOTALNET	0.000709		-0.000879	
	(0.001925)		(0.003143)	
GRANTS		-0.001129		-0.009898*
		(0.001503)		(0.005506)
LOANSNET		-0.000451		-0.005095
		(0.000545)		(0.003205)
R-squared	0.814365	0.812617	0.822236	0.797122
F-statistic	35.60542	34.20043	35.38436	34.29709
Prob(F-statistic)	0	0	0	0
Observations	393	392	373	372
Cross-Sections	37	37	37	37
Periods Included	23	23	22	22

Note: dependent variable is log of taxation revenue/GDP; all regressors are measured as a percentage of GDP except GDP per capita. Numbers in parenthesis are robust standard errors. ***, ** and * indicate 1, 5 and 10 percent respectively

4.4 Robustness Test

To test for robustness, we can either add or reduce regressors and monitor how the estimates behave in response to modification of model specification. A stable model, which is the measure of robustness, will not reflect major changes in estimates regarding signs and magnitudes. We chose to add two control variables to the baseline model; oil and tertiary school enrolment (% gross). The choice of oil was compelled by the endless argument in the literature that oil exporters exercise low tax efforts. Reason being that, it is easy for the government to collect oil related revenue such as royalties compared to other sources of revenue like tax revenue (Uche & Uche, 2004). This is attributed to the conditions and expectations of taxpayers, and hence the government prefers non-tax revenue since it requires less accountability.

Uche & Uche (2004) carried out a study in Nigeria on oil and the politics revolving revenue allocation. Their paper revealed that present-day Nigeria is poorer than the pre-oil era and attributed it to an overemphasis on oil revenue as compared to other sources of revenue. As a

result, oil is expected to lower tax revenue, and the model meets our expectation since the unit increase in oil leads to a reduction in tax revenue by approximately 1.14% when Fixed Effects 2SLS model is estimated.

Tertiary school enrollment is used as a proxy for skilled tax collectors who are proficient in data collection and analysis to develop efficient and fair tax systems and broadening the tax base. Tertiary school enrollment has a positive correlation with tax revenue as expected. Results presented in the table below are quite similar to the baseline model of all countries pooled together, especially the signs of the estimates. Notably, a variable like agriculture has consistent signs and almost similar magnitude estimates in the pooled model and the robustness model. Similar observations are made for GDP per capita amongst other control variables. Grants and concessional loans are also consistent in signs, but magnitude changes slightly when instrument variable models are estimated. On the other hand, Fixed Effects models maintain consistency in signs and almost equal magnitudes of the baseline regression estimates. Our two additional variables; oil exporters and school enrollment are statistically significant, and their impact on tax revenue is in line with our theoretical expectations (see table 4-6).

Table 4-6: Taxation revenue & Foreign Aid: Other Controls Included (Robustness Test)

Estimation Method	FE_LS	FE_EGLS	Fixed Effects 2SLS	Fixed Effects 2SLS	Fixed Effects 2SLS
C	2.594802*** (0.228649)	3.12987*** (0.07784)	3.324386*** (0.463626)	2.727346*** (0.176684)	2.743532*** (0.453862)
AGR	-0.012229*** (0.003151)	-0.018513*** (0.00076)	-0.013069*** (0.003331)	-1.11E-02*** (1.44E-03)	-0.010552*** (0.003524)
GDPP	0.000152* (8.21E-05)	0.000105*** (1.58E-05)	0.000105 (0.000106)	0.000278*** (2.99E-05)	0.000177 (1.28E-04)
GDPP^2	-2.65E-08*** (8.33E-09)	-8.31E-09*** (1.51E-09)	-1.91E-08* (1.02E-08)	-2.17E-08*** (2.44E-09)	-2.20E-08** (1.02E-08)
IND	-1.41E-03 (2.39E-03)	-1.11E-02*** (1.42E-03)	-0.00373 (0.002522)	-.003849*** (0.00139)	2.01E-03 (2.17E-03)
TRADE	0.001467** (0.000687)	0.002989*** (0.000271)	0.002619*** (0.000799)	0.002278*** (0.000411)	0.004334*** (9.51E-04)
GRANTS	-0.001129 (0.001503)	-0.001632** (0.000649)	-0.009898* (0.005506)	-0.003562* (0.001852)	-6.23E-03 (4.61E-03)
LOANSNET	-0.000451 (0.000545)	-0.001434*** (0.000394)	-0.005095 (0.003205)	-.004458*** (0.001605)	-0.00377 (0.002746)
SCH	0.026043*** (0.006978)		0.028638*** (0.009461)		0.022933*** (0.008378)
OIL		-0.014112***		-.011395***	-0.023514***

		(0.000853)		(0.002018)	(0.005461)
R-squared	0.812617	0.730967	0.797122	0.943539	0.824232
F-statistic	34.20043	272.0408	34.29709	289.3852	36.63919
Prob(F-statistic)	0	0	0	0	0
Observations	392	810	372	779	367
Cross-Sections	37	40	37	40	37
Periods	23	24	22	23	22
Included					

The dependent variable is log (Tax/GDP), all variable are expressed at a percentage of GDP except GDP per Capita. Values in the parenthesis, (), are standard error. ****, ** and * represent significance at 1%, 5% and 10%.

Durbin- Watson statistics indicate that the baseline models are suffering from autocorrelation. To correct the autocorrelation problem and also capture tax revenue's dynamic effects, the model in Table 4-7 are estimated by using one period lag of tax revenue (dependent variable) as one of the explanatory variables. Durbin- Watson statistics in models reported in Table 4-7 are very close to 2, which is a rule of thumb for zero autocorrelation models. For example, the model column (1) and (3) have Durbin-Watson statistic of 1.930015 and 1.935594 respectively while the one in column (2) and (4) have 1.969344 and 1.970926 respectively. Meaning they are pretty close to 2 and hence we can argue that these models have zero autocorrelation. Comparing Table 4-2 and 4-7, it is clear that standard error are large in Table 4-2 than in 4-7. This implies that the dynamic model estimates robust standard errors which are efficient. Since serial correlation affects the standard errors only, estimates are less affected, and hence interpretation is similar to the ones in Table 4-2.

Table 4.7: Tax Revenue & Foreign Aid: Correction for Autocorrelation (Using lag of dependent variable)

Estimation Method	Fixed EGLS (1)	Fixed EGLS (2)	Fixed Effects (3)	2SLS (4)
C	0.677554*** (0.099068)	0.656134*** (0.100568)	0.634979*** (0.114426)	0.691942*** (0.163478)
LNTAX(-1)	0.720822*** (0.027031)	0.739973*** (0.025931)	0.731438*** (0.026787)	0.73301*** (0.026568)
AGR	-0.002661** (0.001221)	-0.002852** (0.001271)	-0.002578** (1.26E-03)	-0.002534** (0.00126)
GDPP	4.19E-05** (1.80E-05)	5.95E-05*** (1.74E-05)	4.91E-05** (2.18E-05)	6.52E-05*** (1.63E-05)
GDPP^2	-3.22E-09** (1.28E-09)	-4.67E-09*** (1.29E-09)	-3.79E-09** (1.51E-09)	-5.04E-09*** (1.15E-09)
IND	-0.000294 (0.000645)	-0.000383 (0.000647)	-0.000403 (0.000713)	-0.000431 (0.000642)
TRADE	0.000886***	0.000986***	0.000855***	0.000932***

	(0.000219)	(0.000226)	(0.000207)	(0.000224)
TOTALNET	-0.002016*		-0.000818	
	(0.001159)		(0.001531)	
GRANTS		-0.000797**		-0.001055
		(0.000253)		(0.001519)
LOANSNET		-0.000319*		-0.00136
		(0.000165)		(0.001439)
R-squared	0.964563	0.967403	0.965097	0.966925
F-statistic	440.2354	467.8994	445.24	475.7556
Prob(F-statistic)	0	0	0	0
Durbin-Watson	1.930015	1.969344	1.935594	1.970926
Observations	791	789	790	786
Cross-Sections	40	40	40	40
Periods Included	23	23	23	23

The dependent variable is log (Tax/GDP), all variable are expressed at a percentage of GDP except GDP per Capita. Values in the parenthesis, (), are standard error. ****, ** and * represent significance at 1%, 5% and 10%.

Chapter Five

5 Conclusion and Policy Recommendation

The scholars have argued that recipient government treat loans differently from grants, which they are obligated to repay. This makes the policymakers channel borrowed funds to productive projects that ultimately increase taxes and facilitate repayment. On the other hand, grants are treated as a source of 'free' resources.

When the analysis was done with all countries pooled together, both concessional loans and grants had a negative effect on tax revenue. We further carried out analysis in different income levels; low- income, lower-middle income and upper-middle income level, to account for structural differences. Results in low-income and lower-middle levels were more or less the same as the findings under pooled analysis. Upper-middle income level posted different results, where both loans and grants had a positive effect on tax revenue.

For the low-income and lower-middle income levels, most of these countries received debt relief under the HIPC Initiative (highly indebted poor countries), we argue that recipient governments formulate an expectation of always receiving debt forgiveness and therefore treated both loans and grants as a 'free' source of funds and a substitute for taxation. This creates a disincentive to tax citizens who demand accountability for their taxes. However, upper-middle income countries responded differently; loans and grants both demonstrated a positive effect on tax revenue. The positive effect of loans is a result of the upper-income level being ineligible for debt relief and are obligated to repay their loans, which creates an incentive to collect more taxes. The positive relationship between grants and tax revenue is explained by the fact that upper-middle income countries have achieved a significant level of development which translates into increased levels of efficiency and accountability in revenue systems from additional resources added to the fiscal.

As for the control variables, agriculture as a percent of GDP posted negative effect on tax revenue in all countries pooled together and low-income and lower-middle income level. We argue that the negative relationship is as a result of agriculture being practised on subsistence basis and the activities being carried out under informal sector which makes it difficult to levy the tax. On the contrary, agriculture had a positive effect on tax revenue in upper-middle

countries. This is explained by the fact that, upper-middle income countries have attained significant levels of institutional development which translates into more formal set up for business transaction in addition to venturing into commercial agriculture which is easier to tax. The positive response of tax revenue to GDP per capita is economically plausible since we expect tax revenue to increase with an increase in levels of development-more developed countries translates to high income per person and hence more pay as you earn (PAYE) tax collection. Moreover, GDP per capita posted positive effect on tax revenue in all income levels, which was in line with our expectation. Trade openness (sum of imports and exports) as a share of GDP, posted a positive effect on tax revenue in the pooled analysis, upper-middle, low-income and lower-middle income countries. We argue that more openness enables a more vibrant economy which raises GDP and hence more tax collection.

Results posted by the industry as a percent of GDP were not as expected. Economically, levying tax in formal sectors of the economy should be easier due to the existence of proper records as compared to informal sectors.

We further introduced tertiary school enrollment as a proxy for skilled workforce in tax administration, which also captures the importance of quality education on the country's development. Our results show that tertiary education has a statistically significant positive effect on tax revenue collection.

As a policy recommendation to address the disincentive created by grants, we argue that they should be channeled through Non-Governmental Organisations (NGOs) or the private sector rather than given directly to the government.

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