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The Effects of Aid on Fiscal Capacity

An econometric analysis on African countries (1960-2015)

by

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Abstract Low tax revenues in many African countries are hindering sustained economic development and aid could have an inhibiting effect on the development of fiscal capacity. This paper will use newly published high-quality data on tax revenues to dive deeper into the effects of aid on hard-to-collect taxes in Africa between 1960-2015. Previous aid literature has mostly focused on short-term effects on revenue collection but by looking at fiscal capacity this paper is able to contribute to the literature on the effects of aid and its components on more long-term institutional development. Using a fixed effects panel regression model, the results of the analysis show that aid has an overall positive effect on a country's fiscal capacity. The results provide further evidence on the larger positive effects of loans on fiscal capacity compared to grants. Furthermore, the paper presents weak evidence of improvements in the effects of aid on fiscal capacity. The paper argues that aid has not created dependencies in Africa by undermining fiscal capacity development.

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1 Introduction

State capacity is fundamental for sustained economic development since it allows the state to perform the roles which are necessary for a functional society (Centeno, Kohli & Yashar, 2017). Often in economic research the state's ability to perform these necessary tasks has been taken for granted, but recently more attention has been paid to understanding why some states are better able to fulfil their assumed tasks and how state capacity can be improved among developing countries (Besley & Persson, 2009; Centeno, Kohli & Yashar, 2017). The ability of the state to extract resources through taxation is referred to as fiscal capacity and is a necessity for the state to perform any other tasks including public goods provision (Baskaran & Bigsten, 2013; Besley & Persson, 2009; Thies, 2015). Therefore, much of the research on state capacity has focused on fiscal capacity or tax collection as an important measure of state capacity (Besley & Persson, 2009; Moss, Pettersson & van de Walle, 2005). Tax collection also creates a backbone for the state-society relationship as the state enters into a negotiation with the society to determine appropriate levels of taxation and how to distribute those resources (Bräutigam, 2008). Therefore, it is crucial to understand how this capacity can be improved in regions where fiscal capacity cannot be taken for granted.

Many African countries have been a cause for concern regarding their lack of development in state capacity and especially at the turn of the millennium concerns were raised about the decline of state capacity in Africa (Moss, Pettersson & van de Walle, 2005). According to the Fragile State Index 2023, 14 out of the top 20 fragile states are found in Africa, including Somalia as the most fragile state in the world (Fund For Peace, 2023). Furthermore, literature on optimal tax-to-GDP ratios have found that countries should aspire to have a tax share of at least 15% (Adam & Bevan, 2001; Gaspar, Jaramillo & Wingender, 2016). Reaching this tipping point is argued to enable sufficient resources for public goods provision such as health, education and infrastructure which is found to increase economic growth over 10 years by 7.5% compared to countries that did not reach the sufficient tax ratio (Gaspar, Jaramillo & Wingender, 2016; Junquera-Varela & Haven, 2018). Nigeria tops a list of the 20 developing countries with the largest tax ratio gaps, meaning that the country was the furthest away from reaching the 15% threshold (Junquera-Varela & Haven, 2018). According to the same source, seven other African countries were also included in this list. Looking at these unfortunate statistics and taking into account the discovery by Thies (2015) who finds that fiscal capacity developments in Africa reduced the incidence of state failure, it makes sense to research how fiscal capacity development in the region can best be supported.

Aid literature as well as increasingly also aid donors have come to realise the importance of assessing the role of aid in fiscal capacity building (Marineau, 2020). According to the International Centre for Tax and Development Government Revenue data (ICTD GRD) (2022), between 1980-2021 the share of aid of total government revenues in Africa has averaged between 11% and 19%. Since aid has contributed a significant part to government

revenues in Africa, it is reasonable to expect that this has had an impact on governments' fiscal policies.

1.1 Research Problem

An influential research paper by IMF researchers Gupta, Pivovarsky, Clements and Tiongson (2003) found in the early 2000s that overall aid would have had a negative effect on tax revenue collection in developing countries. Some of the people from the same team of researchers released another research article over 10 years later confirming the original findings: overall aid and grants had a negative effect on domestic resource mobilisation (DRM) but concessional loans had a positive effect on DRM in aid recipient countries (Benedek, Crivelli, Muthoora & Gupta, 2014). The two papers have argued that while grants crowd out government revenue collection, concessional loans create incentives for governments to mobilise domestic revenues in order to service the debt. Nevertheless, these results have sparked a lot of controversy and debate among academics who have either argued that overall aid has had no effect on tax revenues (Brun, Chambas & Laporte, 2010; Clist, 2016; Morrissey, Islei & M'Amanja, 2006) or that aid would even have positive effects on tax collection (Clist & Morrissey, 2011; Gnangnon, 2020; Morrissey, Prichard & Torrance, 2016; Osei, Morrissey & Lloyd, 2005). Recently, Albers, Jerven and Suesse (2023) looked at development and determinants of fiscal capacity and found that exposure to aid has had a negative effect on fiscal capacity building in Africa between 1900-2015. While earlier studies largely found that there is a negative effect of aid on tax revenue collection (McGillivray & Morrissey, 2001), as aid policies have become to include more conditionality, the negative effects of aid have potentially decreased (Clist & Morrissey, 2011). Since there is still disagreement on the effects of aid on fiscal capacity, it is important to continue to research the topic to understand what could be driving these diverging results.

It is also important to understand what the long-term impacts of aid are on countries' development since this is supposed to be the ultimate goal of aid. The effectiveness of aid remains a controversial topic among development economists and much remains unknown (Quibria, 2014). Generally, research on the effectiveness of aid in this century has been rather pessimistic (Edwards, 2014; Tarp, 2009). While the goal of aid policies has generally not been to increase fiscal capacities in recipient countries, investigating the effects of aid on DRM is still vital in order to understand aid effectiveness in terms of supporting long-term development. In a situation where aid is allowing the recipient country to reach the immediate goals that aid is given for, say improving health outcomes, but the aid flows are undermining the recipient's efforts in improving fiscal institutions, over the long-run aid flows could actually be hindering the country's ability to provide health care (McGillivray & Morrissey, 2001). As a result, countries would become dependent on aid, a major concern in contemporary aid literature (Moyo, 2010). On the other hand, if aid has a positive effect on fiscal capacity overall, or under certain conditions, then looking at the effects of aid on tax revenues can reveal how aid policies should be implemented to bring about the best possible long-term benefits for recipient countries. Furthermore, conclusions on the different effects of loans and grants on fiscal capacity matter for aid donors' decisions. If grants are found to

discourage DRM while loans are found to have the opposite effect, then this would suggest that loans should perhaps be preferred even for very low-income countries.

So far, the research on fiscal effects of aid has largely focused on short-term effects on total tax revenues rather than on fiscal capacity. The difference between the two is important methodologically as well as conceptually. Methodologically looking at the effect of aid flows on tax revenues within the same time period suffers from reverse causality issues since it is likely that fiscal pressures will increase aid flows (Benedek et al., 2014; Mkandawire, 2010; Prichard, 2016). Furthermore, aid policies might affect tax policies directly as donors might attach aid with conditions for trade liberalisation (Gnangnon, 2016). While this has an immediate negative effect on domestic revenues since it decreases trade tax income, it does not speak to the institutional ability of the state to extract revenues if it wishes to do so. Conceptually, fiscal capacity measures should be able to capture the ability of the state to extract revenues if it chose to do so regardless of the current policies and how efficiently the state is able to extract resources (Baskaran & Bigsten, 2013). In practice, it is impossible to observe the government's latent ability to extract revenues that it is not choosing to extract. Instead, researchers must focus on proxy measures. Albers, Jerven and Suesse (2023) argue that an appropriate measure for fiscal capacity is the government's ability to extract hard-to-collect taxes, that is direct and indirect taxes including value added taxes (VAT) but excluding resource and trade revenues. This is an appropriate measure for fiscal capacity since taxes that are hard to collect in terms of enforcement require significant fiscal institutional capabilities from the state. It is also the quality of fiscal institutions in the country which matters more for long-term development of the country which makes it interesting to study.

Albers, Jerven and Suesse (2023) collect data on tax revenues from primary sources to allow for the best possible comparability across time and countries to study fiscal capacity development in 46 countries in Africa between 1900-2015 and as mentioned find aid to have a negative effect on fiscal capacity. However, their study only proxies aid by using a complex indicator for the exposure to aid instead of looking at aid flows. Among other things, this prevents them from looking at the different effects of loans and grants on fiscal capacity. Therefore, this paper contributes to the literature on the effects of aid on fiscal capacity by diving deeper into the fiscal capacity data made accessible by Albers, Jerven and Suesse (2022) to see how overall aid flows and its components affect fiscal capacity. Due to the comprehensive nature of the revenue data on Africa, another way this paper is able to contribute to the literature on fiscal effects of aid, is by looking at heterogenous time effects. This is something that has been hinted at by previous research but not very well studied and not with data from this long of a time period.

1.2 Aim and Scope

The aim if this study is to evaluate the effect that received aid has had on fiscal capacity development in Africa between 1960-2015. Therefore, this paper asks the question: *how has aid affected the development of fiscal capacity in Africa?* Furthermore, this paper aims to

provide evidence on the effects of the components of aid, so it also asks *whether there has been a difference in the way grants and concessional loans have affected the development of fiscal capacity?* While there is considerable debate around the effects of aid on fiscal capacity, it seems that the empirical research that is methodologically stronger and uses better data sources, is more optimistic on the effects of aid on DRM. This leads to the hypothesis that aid would have overall positive effects on fiscal capacity. Furthermore, it is likely that the positive effect of concessional loans is larger compared to the effects of grants on fiscal capacity. This is because the loans create more incentives for the government to continue and improve DRM in order to service the debt.

This paper answers the research question through a quantitative fixed-effects regression analysis using a newly collected long-term data on fiscal capacity in Africa. Since previous research has found heterogenous effects of aid on tax revenue collection in different regions, it makes sense to focus on a specific set of countries (Feyzioglu, Swaroop & Zhu, 1998). One of the reasons for the heterogeneity across regions could be due to different historical legacies. Due to the colonial past which has heavily affected state development on the continent and which makes it different to the Western experience, Africa is an interesting case to study fiscal capacity building in (Albers, Jerven & Suesse, 2023; Mkandawire, 2010; Mkandawire, 2017). Looking at ICTD GRD (2022) between 1980-2021, aid of GDP in Africa averaged at 2.9% whereas in the Americas and Asia these figures stood at 1.7% and 1.8%, respectively. The larger significance of aid flows in the region compared to others, makes Africa an optimal subject for the study of the effects of aid. The choice of region is further motivated by continued need for development of state capacity and within that fiscal capacity as indicated by the State Fragility Index and the tax revenue gap, respectively. Nevertheless, there is also large heterogeneity in African fiscal capacities which makes it interesting to understand what is driving the differences and how other countries in Africa can catch up. The time period under scrutiny will be since the 1960s since this is the decade when African states largely became independent and started developing their own fiscal policies and capacities. More specifically, the thesis is looking at 42 African countries listed in Appendix A and the time period is 1960-2015. Data availability for the fiscal capacity variable prompts the cut-off point at 2015. Since the research in this paper only looks at African countries, the conclusions of this study might not be valid for overall effects of aid across different regions. Furthermore, due to lack of data, the research only includes 42 out of the 56 countries on the African continent. Some of the countries excluded are some of the more fragile states including Somalia which tops the State Fragility Index. Moreover, the measure for fiscal capacity in empirical research is limited in its ability to capture fiscal capacity in the way that it is conceptualised in theoretical literature.

1.3 Outline of the Thesis

The following section will give a short historic review of fiscal capacity development in Africa and global aid policy development. Section 3 will review previous literature on the research topic by presenting a theoretical framework and looking at empirical research highlighting the gaps in the current literature. Based on the theoretical framework, section 4

introduced the empirical model and method to be used. This is followed by a description and discussion of the data used. Finally, section 6 presents and discusses the results and section 7 concludes.

2 Context

The following section will give a short introduction into the development of state capacity in Africa and the development of international aid policies and paradigms.

2.1 Development of fiscal capacity in Africa

In his influential book, Herbst (2000) argues that building state capacity in Africa has always been difficult due to low population density which made it more expensive for a state to wield control over its citizens. According to him, African states did not develop the same way as Eurasian states due to the geographical characteristics which made it hard to support large populations on the majority of the continent. Osafo-Kwaako and Robinson (2013) disagree with Herbst and argue that the traditional explanations for state formation and centralisation (high population density, inter-state warfare and trade) were not determinants of state formation in Africa. They argue that African state institutions developed following a different logic than the Eurasian states. Nevertheless, African polities, rather than states, were largely very small with populations in the thousands (Robinson, 2023). Even the more developed states had limited power over their societies and taxation was not characteristic for these polities that were not designed to control their societies to the extent that fiscal institutions would have had to (Southall, 2004). This can be argued to be one of the reasons for poor economic institutions and lagging economic development in Africa compared to Europe at the onset of colonialism (Osafo-Kwaako & Robinson, 2013).

When colonial rulers brought their large Western imperial state institutions into Africa, colonial rulers also faced the same problem of sparsely populated regions and focused their state building into urban areas whereas the majority rural population was often ignored (Herbst, 2000). Nevertheless, colonial states still invested in fiscal institutions often through the introduction of poll taxes on the native population. These fiscal expansions were often protested against of which the Aba Women’s War in southeastern Nigeria is one of the more cited examples of this (Albers, Jerven & Suesse, 2023; Robinson, 2023).

Those focusing on state development in developing countries and specifically in the African context, have highlighted the importance of colonialism as well as international factors in determining state capacity, including fiscal capacity (Albers, Jerven & Suesse, 2023; Centeno, Kohli & Yashar, 2017; Mkandawire, 2017). Baskaran and Bigsten (2013) and Mkandawire (2010) have paid special attention to how the colonial tax institutions have persisted into the post-colonial period. They look at the three different types of colonial economies first categorized by Amin (1972): the cash-crop economies, the concessionary companies and the labour reserve colonies. Mkandawire (2010) describes the difference between the three

different colonial country types. First, he explains that in the cash-crop economies, mostly located in West Africa, farming was done by peasants and the produce was sold to international markets by mercantile houses through which a large proportion of taxation went through. In terms of taxation, the concessionary companies were largely similar to the cash-crop economies since their economies were characterized by large private companies which owned vast areas of land for plantations or mineral extraction. These colonies located in the Congo basin, similarly to the cash crop economies, relied heavily on trade taxes for income (Mkandawire, 2010). Contrastingly, Mkandawire (2010) demonstrates that the labour reserve economies were characterised by a higher share of European settlers where the non-European population was heavily controlled. He goes onto illustrate that the control of the majority for the "protection" of the minority elite required significant state resources which meant that these economies developed more extensive institutions to collect taxes domestically and relied more on direct taxes. This meant that at independence the labour reserve economies had inherited quite different set of fiscal capabilities compared to the non-labour reserve economies. Due to differing colonial legacies, the former labour reserve countries might have had very different experiences after gaining independence in how they responded to other determinants of fiscal capacity such as external funding.

The data collected by Albers, Jerven and Suesse (2023) on government revenues in Africa gives a lot of insights into the post-colonial development in fiscal capacity. They find that at early independence African states invested significantly into fiscal capacity and real tax revenues doubled from 1960s until 1970s. However, according to their data, the positive experiences of the first two decades of independence took a turn in the last two decades of the millennium when fiscal capacities did generally not grow and even collapsed in some countries. Their data also reveals a significant loss in total tax revenues in the period driven by loss of trade tax revenues as a result of trade liberalisation. The authors argue that the crisis which African states experienced in these decades has been the source for much concern of low state capacity despite positive development in fiscal capacity before the 1980s and also the after the 2000s. In the early 2000s, increases in fiscal capacity were driven by increases in value added taxes (VAT). Overall, Albers, Jerven and Suesse (2023) find that there has been a divergence in fiscal capacity over the last decades which makes it interesting to study what has been driving this phenomena and especially what role aid has played in it. Furthermore, the unique experience of African state formation and the development of fiscal capacities on the continent make it an interesting case to look into.

2.2 Aid

International aid flows are a rather new invention since they largely emerged after the second world war to help develop and rebuild Europe after the war (Tarp, 2009). However, aid flows grew significantly larger in the 1960s due to the Cold War when aid became a part of Western countries' foreign policies (Edwards, 2014). Later in the mid-1970s, aid was increasingly being distributed through international organizations like the UN and World Bank since it was seen as a less political and better way of distributing aid (Tarp, 2009). During these decades, economic ideas around aid were influenced by the neoclassical Solow model which

emphasised productivity growth and factor substitutability (Edwards, 2014). Based on these economic principles, donors assumed that giving concessional loans to increase physical capital, for example, through large infrastructure projects would give high returns by increasing economic growth (Rogoff, 2003). Yet, the following decade brought with it multiple crises in Africa and Latin America, which discouraged aid donors (Edwards, 2014).

In the 1980s, donors started to implement conditional aid policies which ranged from adapting good policies to structural reforms Clist and Morrissey (2011). The influential Berg report, as it is commonly referred to, was released in early 1980s and it argued that states in Africa were not benevolent actors trying to maximise welfare and instead were part of the reason for poor economic development (Berg, 1981; Edwards, 2014). The report suggested that focus should be placed on minimising the state and increasing trade instead (Berg, 1981). The report was very influential and aligned with the principles of the Washington Consensus which became to determine much of the aid policies of the 1990s (Edwards, 2014). This was also accompanied with a significant drop in aid flows since the 1992 (Edwards, 2014). After much pressure from the international community, the Highly Indebted Poor Countries (HIPC) initiative was launched in 1996 by The World Bank and the International Monetary Fund. Under the scheme eligible countries were granted debt forgiveness. The initiative has been especially important for Africa since to date 31 out of the 37 countries included are found in the region. The fact that African countries suffered greatly from being overburdened by debt from aid loans, sparked up debate around the benefits of grants versus loans (Gupta et al., 2003; Rogoff, 2003). Nevertheless, 1996 marked a turn in aid policy and since then the share of loans of total aid given to Africa has decreased from what it had been since the late 1970s (OECD, 2023). Coming to the 2000s, academics as well as practitioners of aid had realised that the investments in physical capital was not enough to create economic growth (Rogoff, 2003). Instead, investments in institutions and governance were needed in order to create sustainable growth (Rogoff, 2003). In the last decade, aid policies have generally come to favour project evaluation and small-scale projects.

Since aid policies in the last few decades of the 1900s had largely been focusing on cutting government spending, the aid community did not pay attention to increasing revenues (Bräutigam, 2008). However, this has recently changed as best indicated by the launch of the Addis Tax Initiative facilitated by Germany and the EU, and the Platform for Collaboration on Tax which is a joint effort by the International Monetary Fund (IMF), the Organisation for Economic Co-operation and Development (OECD), the United Nations (UN) and the World Bank Group (WBG). The initiatives were launched in 2015 and 2016, respectively, which means that their effects on fiscal capacity development is beyond this research. Aid policies throughout the decades have varied and the paradigms driving the policies have changed. Thus, it is possible that aid has had differing effects on fiscal capacity through the decades even if this has not been an outright target of the policies.

3 Theory and previous research

3.1 Theoretical Approach

3.1.1 Fiscal capacity

In her book, Bräutigam (2008) argues that taxation is a key determinant for building and maintaining state power as it is one of the central areas in which the state interacts with the society through the collection and redistribution of resources. A prerequisite for this to happen is for the state to develop the necessary institutions for collecting and distributing resources (Bräutigam, 2008). The increased demand for representation and development of state institutions is beneficial for state building and therefore it is important to understand how states' tax capabilities are determined and how they can be developed. The ability of the state to extract resources namely through taxation is referred to as fiscal capacity (Besley & Persson, 2014). This paper will focus on the definition of fiscal capacity that refers specifically to its ability to mobilise hard-to-collect tax revenues meaning indirect and direct taxes, including value added taxes (VAT) but excluding resource and trade taxes (Albers, Jerven & Suesse, 2023). The following section will discuss some of the more prominent theories on its determinants. This will be followed by a longer discussion on how aid might hinder or enhance fiscal capacity.

Traditional theories on fiscal capacity have been criticised for being very Eurocentric but they allow for a starting point to building a theoretical framework for understanding what role aid might play in the development of fiscal capacities. When discussing the formation of the European state, the role of international wars is often highlighted (Besley & Persson, 2009). What is referred to as the bellicist account, highlights the role of war as a common interest public good that justifies the expansion of the state for increasing military resources. According to this theory, gains made in fiscal capacity development for warfare are maintained even after war (Bräutigam, 2008). However, in the context of Africa, the role of international war in developing the state has not been considered as important partially due to the lower incidence of international war on the continent (Albers, Jerven & Suesse, 2023). Instead, the role of civil war could have a significant role in deterring development of fiscal capacity even in the long run (Albers, Jerven & Suesse, 2023). In addition the destruction of physical and human capital due to armed conflicts, the long-term negative effects of civil wars could be due to lack of social cohesion which could be a cause and effect of civil wars which in turn could hinder fiscal capacity development (Persson & Sjöstedt, 2012; Tengs, 2020).

According to the fiscal contract theory, taxation is a collective action problem where rulers wish to maximise revenue and taxpayers wish to minimise payments (Bräutigam, 2008). Tax

revenue collection will thus be determined by the relative bargaining power of the state in relation to the society, the costs related to taxation including measuring taxable flows and enforcing tax policies, as well as the government's discount rate for future revenues (Bräutigam, 2008). The relative bargaining power the of the society will depend on the level of representation. Often in the fiscal contract theory, it is argued that the level of representation will increase with increases in revenue collection as this has been the experience in Europe (Acemoglu, Johnson & Robinson, 2005; Bräutigam, 2008). However, Acemoglu (2010) argues that in England the causal relationship was reversed meaning that an increase in political constraints affected the development of fiscal capacities. Therefore, the level of representation can be an important factor in determining fiscal capacity. The costs related to taxation will depend on existing fiscal technologies and capabilities, tax compliance as well as the structure of the economy. Robinson (2023) argues that the pre-colonial social contracts in Africa continue to matter for contemporary preferences for tax eversion. Therefore, the costs of tax enforcement are likely to be high in Africa and depend on social institutions. Characteristics of the economy will also matter for the costs of taxation since some areas, such as agriculture, are harder to tax whereas industry is likely to be easier to tax (Karagöz, 2013) The discount rate of the government will likely be influenced by political stability and amount of political competition since it will determine to what extent the government is able to benefit from future tax revenues (Acemoglu, 2005). These three factors lend themselves for more universal understanding of how states make decisions regarding revenue mobilisation.

3.1.2 Aid and fiscal capacity

In addition to colonialism, one of the key differences in the context in which African states developed compared to states in Europe, has been the access to foreign resources. This has included both revenue collected from selling mineral resources as well as aid. The resource curse literature has discussed the negative effects of countries in Africa relying on revenues from mineral resources in terms of detrimental effects on institutional development (Auty, 2001) including fiscal capacity (Crivelli & Gupta, 2014). Aid revenues have been compared to resource revenues since they are perceived as an easy form of government revenue which might present similar issues regarding, for example, rent-seeking (Collier, 2006). As aid flows continued to grow and become a significant source of revenue for countries in Africa and for low- and middle-income countries elsewhere, attention was being brought to the various effects aid would have on the recipient states. The literature on aid became concerned with potential detrimental effects that aid could have if it substituted state's tax revenues. This would not be good for the development of the state since the positive effects of fiscal capacity mentioned earlier in setting the state-society relations would be lost. Additionally, it could reduce the incentives for the society to demand representation and monitor the use of government resources (Yontcheva, Isard, Lipschitz & Mourmouras, 2006). If the government's legitimacy in collecting taxes is viewed to be significantly reduced by the population, the result can be lower tax compliance which would further harm the government's ability to mobilise tax revenue (Marineau, 2020). All in all, if aid had a negative effect on fiscal capacity in recipient countries, it would mean that African countries

would become dependent on aid revenues (Bräutigam, 2000; Djankov, Montalvo & Reynal-Querol, 2008; Moss, Pettersson & van de Walle, 2005).

The aid dependence literature tends to focus on three ways aid could negatively hinder fiscal capacity: the opportunity cost of developing fiscal capacity, behavioural reasons and the diversion of government resources. First, developing and maintaining fiscal capacity requires significant expenses from the government (Albers, Jerven & Suesse, 2023). When building fiscal capacity, the government must make short-term investments in order to enforce tax compliance and to build the necessary infrastructure to handle the revenue streams (Albers, Jerven & Suesse, 2023). However, before these investments are made, the marginal cost of taxation remains high and so aid can offer a more cost-effective alternative for government spending (Devarajan, Rajkumar & Swaroop, 1999). Hard-to-collect taxes are more costly due to larger difficulties in enforcement (Clist & Morrissey, 2011). In high-income country contexts, this would only include direct taxes but in the African context, value added taxes (VAT) can also be included in this category since they require significant up-front investments to be collected (Albers, Jerven & Suesse, 2023). Ideally, aid could be used to cover some of the investment costs of setting up taxation infrastructure, but the aid dependency literature argues that aid flows remove the incentives to make such investments (Bräutigam, 2000).

Furthermore, on the behavioural side, especially early literature on aid and the fiscal capacity raised the concern that aid flows might be creating dependencies due to moral hazard (Bräutigam, 2000; Ghura, 1998; Mkandawire, 2010). Since aid is not attached with the same political costs or constraints as tax revenue, governments might end up using the income flows poorly and the political elites are not incentivised to change the situation (Bräutigam & Knack, 2004; Remmer, 2004). While conditionality has become increasingly a staple in aid policies and thus some of the issues with poor management of aid resources has been dealt with, it is not clear if the conditionality has dealt with the moral hazard specifically related to fiscal capacity building.

Another way in which aid might be undermining the fiscal capacity development of African states is by diverting resources, including human resources, away from fiscal capacity building. This could be in the form of burdening domestic bureaucracies with conditions and tasks set by aid donors (Moss, Pettersson & van de Walle, 2005). The fragmentation of aid projects causes difficulties for states, especially weak ones, by making it difficult for the recipient governments to manage their budgetary processes, among other things (Bräutigam, 2008; Yontcheva et al., 2006). Especially in the past, decisions of what aid should be spent on was decided outside of the recipient’s policy-making institutions, aid donors shifted the ownership of government spending and revenue collection away from domestic policymakers undermining the local administration’s ability to learn-by-doing (Azam, Devarajan & O'Connell, 1999). However, the issue with ownership was also recognised in mid-1990s by donor organisations which might have improved the situation (Edwards, 2014). Nevertheless, conditionality seems to be double edged sword since increased conditionality might mitigate moral hazard and when involving DRM even ensure investments to some areas of fiscal capacity. On the other hand, if conditionality overburdens the bureaucracy and takes away ownership, it could have the opposite effect.

There are many factors that could counteract some of the negative effects of aid or even cause aid to have a positive effect on fiscal capacity. First, it could be that governments in Africa might already be taxing their economies to the extent that is actually feasible and aid revenues offer a necessary additional revenue stream (Clements, Gupta, Inchauste & Keen, 2004). Since aid is increasingly attached to conditions and might create political costs for recipient governments due to dependency, it is not obvious that governments would prefer aid revenues over tax revenues (Morrissey, Prichard & Torrance, 2016). Tagem (2022) argues that the political costs of aid are in fact higher than those of tax revenues. Therefore, the incentives to develop fiscal capacity would remain in place despite having access to aid flows. In this case aid would likely not have a significant effect on fiscal capacity since aid would not be crowding out domestic revenue collection. Furthermore, concerns regarding the negative effects of aid on developing administrative capability building might be less significant in the context of current aid policies. An important part of aid funds is the accompanied technical assistance which could be used to develop specifically capabilities regarding DRM (Morrissey, Prichard & Torrance, 2016). Furthermore, since the 1990s aid funds have been given through project funding where recipient governments are often obliged to match some of the foreign funding with domestic resources (Bräutigam, 2000). If the aid policy is well implemented, this would require the government to maintain their levels of revenue collection or ideally even increase incentives to develop fiscal capacity.

Something that must also be considered when discussing the effects of aid, is that aid is not always given as a grant but instead a significant proportion of it is given as a loan. Much of the literature on the relationship between aid and revenue mobilisation has generally been more positive on the effects of loans on tax collection (Clements, Gupta, Pivovarsky & Tiongson, 2004; Clist & Morrissey, 2011). Proponents of concessional lending argue that compared to grants, loans are better at creating incentives for the government to maintain or to increase tax revenues since the government must ensure its ability to repay the loan (Benedek et al., 2014; Gupta et al., 2003). However, whether recipient governments react differently to loans compared to grants will depend on their perceptions of the consequences attached to them (Gupta et al., 2003). Governments that view the terms of the highly concessional loans as too lax and assume that they will be bailed out if they fail to repay their loans, might react to loans and grants in the same way (Bräutigam, 2000).

Looking at the theoretical literature on fiscal capacity some potential key determinants of fiscal capacity in Africa can be identified. First, institutions seem to have an important role and especially democratic institutions might play a significant role in increasing demand for the improvement of fiscal capacity. Social institutions through its effects on voluntary tax compliance and the sectoral composition matter for fiscal capacity by affecting the costs of tax revenue collection. Furthermore, while international conflict is found not be an important determinant for fiscal capacity in Africa, domestic conflict is. Resource revenues are also affecting the incentives for states and institutional development. On the effects of aid, there are theoretical arguments for and against its role in strengthening fiscal capacity, but it seems that the specific aid policy design matters. This would suggest that as aid donors and academics have recognised issues and suggested improvements, there would be more beneficial effects of aid over time. Technical assistance and spending matching should mitigate some of the moral hazard and opportunity costs. Furthermore, aid loans are likely to have a positive effect on the development of fiscal capacity by creating incentives for the

government to invest in fiscal capacity. Overall, it is likely that many of the factors benefiting recipient countries and hindering their development are at play at the same time to varying degrees depending on the context. This conclusion is also supported by the empirical literature on the effects of aid on tax revenue collection which finds contradicting and heterogenous results.

3.2 Previous Empirical Research

In the early 2000s, Gupta et al. (2003) published an influential piece of research which found that grants had a negative effect on tax revenue collection in 107 low- and middle-income countries between 1970-2000, whereas loans had a positive effect. Their research sparked a lot of academic debate and follow up research found both supporting evidence (Albers, Jerven & Suesse, 2023; Benedek et al., 2014; Bräutigam & Knack, 2004; Odedokun, 2003; Remmer, 2004; Thornton, 2014) as well as contradicting evidence (Boone, 1996; Brun, Chambas & Laporte, 2010; Clist, 2016; Clist & Morrissey, 2011; Osei, Morrissey & Lloyd, 2005; Prichard, 2016; Teera & Hudson, 2004). To understand what could be driving these contradicting results and to get an understanding of what is missing from the research, the following section will discuss the previous empirical research in closer detail.

Often cited as the pioneer in this research area, Heller (1975) developed a fiscal response model to foreign aid inflows. Looking at 11 countries in Africa, he found that aid had a negative effect on revenue collection and that this was mostly driven by the effect of lending. Heller's model which did not predict the effects of aid but allowed for estimations of the revenue and spending patterns in aid receiving countries, inspired further research into the topic that was mostly country case study based. However, these early models were difficult to estimate and required high quality data to be accurately empirically modelled (McGillivray & Morrissey, 2001). McGillivray and Morrissey (2001) reviewed the early literature on the effects of aid on domestic revenue mobilisation and found that generally studies tended to find aid to have a negative effect. However, they also noted that in these studies tariffs were included as part of the tax revenue and what these studies might have been capturing was the effect of countries meeting the Structural Adjustment Program (SAP) conditions which required significant trade liberalisation. In fact, Aizenman and Jinjarak (2006) focus specifically on revenues from easy-to-collect taxes such as tariffs and found that the SAPs had a significant negative effect on these. These results do not speak to the level of fiscal capacity a state has and thus not much can be inferred from these studies in terms of fiscal capacity effects.

Therefore, when reviewing the literature, it is important to look at how the outcome variable has been defined. First, Brun, Chambas and Laporte (2010) who find no effect of aid, have total government revenue including resource revenues as their outcome variable. Gupta et al. (2003), Thornton (2014), Remmer (2004) and Feyzioglu, Swaroop and Zhu (1998) look at the effect on total tax-to-GDP ratio and find that aid has a negative effect which could be due to the effects on trade taxes, an important part of tax income in low-income countries before trade liberalisation (Albers, Jerven & Suesse, 2023). However, Teera and Hudson (2004) and

Morrissey, Islei and M'Amanja (2006) find no significant effect of aid even when looking at total tax revenue. When Morrissey, Prichard and Torrance (2016) look at 4-year averages of total tax revenues and aid, their coefficient is positive but not significant. The earlier evidence by Boone (1996) who focuses on the effects of aid on indirect taxes in 1971-1990, find there to be no significant effect of aid. Looking at data from 1980-2009, Benedek et al. (2014) provide a breakdown of results by different components of tax revenue and find that aid would have had a negative effect on VATs, income taxes and excise taxes but not trade taxes, which would suggest that aid would have a negative effect specifically on hard-to-collect taxes. The coefficients are consistently statistically significant when looking at total Official Development Aid (ODA) but when looking at loans and grants separately the results are not robust. The results on the negative effects on VAT is supported by Crivelli and Gupta (2017) who are looking at data from 1993-2012. However, they find no significant effect on income or trade taxes. On the other hand, Gnangnon (2020) finds evidence that developing countries respond to aid flows by reducing their reliance on tariffs and instead increase domestic tax revenues.

While the more recent evidence on hard-to-collect taxes in particular would suggest that there is a negative effect of aid on fiscal capacity, their treatment of the aid variable has been criticised by much of the literature that has aimed to replicate the findings of Benedek et al. (2014) (Clist, 2016; Clist & Morrissey, 2011; Morrissey, Prichard & Torrance, 2016). Much of this literature pays special attention to the timing of the aid variable and finds that when studying a contemporaneous relationship between aid and taxes, the coefficient is more likely to be negative but when lagging aid, the significance of the coefficient is lost (Clist, 2016; Morrissey, Islei & M'Amanja, 2006) or becomes positive (Clist & Morrissey, 2011). Crivelli and Gupta (2017) report results when aid is lagged five years and confirm a negative result for overall aid but do not provide results for components of tax revenue. Furthermore, Morrissey, Prichard and Torrance (2016) and Morrissey, Islei and M'Amanja (2006) provide further convincing evidence against a negative relationship by binning their data to look at four year averages to account for cyclical changes in tax revenues and volatility in aid revenues. Benedek et al. (2014) and Gupta et al. (2003) have also been criticised for their data sources since both rely on revenue data, which is collected from various sources, mainly the IMF Government Financial statistics (GFS) and from the annual consultation reports of the IMF with its member countries (Clist, 2016). The issue with using data from different sources to allow for a more complete dataset is that the sources use different ways of defining revenues and expenses which leads to unreliable and non-comparable cross-country data (Clist, 2016; Prichard, 2016). However, since the release of the International Centre for Tax and Development Government Revenue Dataset (ICTD GRD), researchers have been able to access more reliable and cross-country comparable data (Prichard, 2016). Prichard (2016) reviews the evidence on aid’s effect on revenues based on the new data and argues that there is no significant or consistent relationship between the two.

Since there is a lot of contradicting evidence on how government revenues are affected, it is also important to see if these differences are driven by the sample on which the evidence is based on. Furthermore, due to the specific colonial legacies and social institutions, the effect of aid in Africa could differ (Mkandawire, 2017; Robinson, 2023). Most studies like Gupta et al. (2003) have included all aid receiving countries by looking at low- and middle-income countries and some have included all but provide results for sub-samples. Benedek et al.

(2014) find that Africa is the only region where loans in addition to grants and total ODA, have a negative effect on tax revenues. These results are similar to Ghura (1998) who focuses solely on the Sub-Saharan sample. On the other hand, using the more reliable GRD dataset Morrissey, Prichard and Torrance (2016) find that the overall positive effects of loans remain in the Sub-Saharan African sample and that grants would also possibly have a positive effect on tax revenues, though the latter results is not robust to all specifications. Since Mkandawire (2010) finds that colonial legacies matter when it comes to determining fiscal institutions, it is reasonable to expect the experience of Africa to differ from those of other regions and the lack of research focusing on this area prompts further investigation into the region.

Generally, the literature on the effects of aid on tax revenue assumes that there's a certain uniformity to how aid effects fiscal policies of countries regardless of the time period. Since the prevailing ideologies behind aid and the specific aid policies might matter significantly on what the effect of aid is, it is important to pay attention to the time period under study. To the author's best knowledge, the only study which pays attention to this matter is Clist and Morrissey (2011) who find no general time trend between 1970-2005, but that there is a more positive effect of aid since mid-1980s for middle-income countries. The result is confirmed with a Wald-test which shows a clear break. The results by Clist and Morrissey (2011) that find a change for a better effect of aid on tax revenues since the 1980's can be interpreted as a sign that conditionality which was used increasingly since then has had a positive effect. A case study on Ghana conducted by Osei, Morrissey and Lloyd (2005) confirm these results by finding that since the introduction of the structural adjustment programs in Ghana in the mid-1980s, the country has been more fiscally responsible by increasing tax revenue collection and substituting borrowing with aid. However, Crivelli and Gupta (2017) who proxy institutions with a corruption index and Montinola (2010) who proxies institutions with a democracy indicator, find that conditionality does not substitute for good institutions. This could mean that overall, the effect of more conditionality did not necessarily help countries in developing their fiscal institutions. However, potentially due to lack of data, most studies have dataset that spans over less than three decades so it is hard to differentiate between different time effects. Furthermore, there are not many studies including data from 2010's when there possibly would have been further improvements in aid policies and the influential results by Gupta et al. (2003) would have potentially had significant effects on the aid policy arena.

In general, Heller (1975) is the only one to find negative effects of concessional loans whereas others find there to be a positive effect of loans on revenue collection (Benedek et al., 2014; Gupta et al., 2003; Odedokun, 2003; Thornton, 2014). In some specifications Clist (2016) is able to find negative effects of loans on tax revenue collection but generally the tax revenue literature seems to be quite positive of the effects of loans. However, without reliable data and a proper specification of the model in regard to timing of the aid, it could be that the results are capturing the effect of aid donors preferring loans when recipients are fiscally more stable and reliable and thus thought to be able to repay their loans.

Many of the issues raised here regarding answering the question on what the effect of aid on fiscal capacity is in Africa are addressed by Albers, Jerven and Suesse (2023) who construct a long-term data set for Africa from 1900-2015 specifically measuring fiscal capacity. They define fiscal capacity as the government's ability to collect hard-to-collect taxes meaning

direct taxes and indirect taxes, including value-added taxes (VAT) in the long-run. They then collect the data for 46 African polities ensuring comparability across time and polities. In their analysis, they attempt to uncover what the determinants of fiscal capacity have been in Africa during the time period and include a proxy for aid as one of the determinants. They specifically look at what the effect of access to aid is on the change in real tax revenue per capita and find there to be a significant negative relationship. However, it is not obvious that their measure for access to aid is able to capture the effects of actual aid flows. Their claim is that by using a measure of political proximity of an African country to a permanent member of the security council weighted with the budget balance of said member, they are able to sufficiently deal with endogeneity concerns related to aid flows being associated with fiscal pressure. However, this is not necessarily the case as it could be that African countries in fact first receive aid and as a condition are expected to align themselves with the donor in international political affairs. It is also plausible that African countries would feel increased pressure to align themselves politically with a donor in the face of fiscal pressure. Furthermore, the time period of Albers, Jerven and Suesse (2023) includes colonial times when financial flows from the imperial metropolis would have plausibly served a very different purpose compared to flows in the independent era. Therefore, their result warrants further investigation on how actual aid flows have affected fiscal capacity, including investigation into the effects of the components of aid, that is grants and loans, which have been found to have diverging effects in the overall tax revenue literature.

The studies that use GRD dataset and lag the aid variable are considered more reliable because they use better data, and they are better able to account for endogeneity. However, these studies use mostly total tax revenues instead of hard-to-collect taxes as their outcome variable. Since the reduction of trade taxes has likely had a major influence on tax revenues in the dataset, these estimations are likely to be downward biased compared to fiscal capacity studies. Therefore, it is more likely that aid would have a positive effect on fiscal capacity. Furthermore, the positive effect of aid on fiscal capacity is expected to be driven especially by aid lending rather than grants. While there are multiple studies on the effects of aid on total tax revenues, less attention has been paid to estimate the effects on fiscal capacity and where this has been done, endogeneity concerns have not been sufficiently accounted for. This would suggest that the negative effect of aid on fiscal capacity would be overestimated. The time periods under study in the tax revenue studies have been rather short which means that not a lot of attention has been paid to heterogenous effects of aid across time. This is an important part to investigate since there are some initial analysis on this which finds that there might be different effects found across time and it would give an understanding of whether changing aid policies and paradigms would influence the way aid affects governments' fiscal choices.

4 Method

In order to investigate what effect aid has had on fiscal capacity in Africa between 1960-2015, a quantitative regression analysis is most appropriate. When looking into the factors that affect fiscal capacity there are time variant and time invariant determinants. Time invariant determinants are expected to be significant and may include the geographical size of the country (Herbst, 2000), the culture including linguistic and ethnic diversity (Albers, Jerven & Suesse, 2023), persisting social institutions (Robinson, 2023) as well as the history of the country, including colonial legacy (Mkandawire, 2010). Some time-invariant characteristics, such as culture or social institutions, are very hard to measure quantitatively and in order to avoid omitted variable bias it is reasonable to control for country fixed effects. Furthermore, countries in Africa are likely to experience common time shocks affecting their fiscal capacity due to a globalised world order. Therefore, it is also important to control for time fixed effects. This would lead the error term, ε_{it}, and the outcome variable, fiscal capacity, uncorrelated with time invariant characteristics of countries as well as the time variable. In order to accurately estimate the effect of aid time variant characteristics must also be included in the model. In the tax revenue literature, the standard models include quality of institutions, GDP per capita, shares of agriculture, industry and trade value added in GDP, inflation and external indebtedness (see, for example, Benedek et al., 2014; Ghura, 1998). The model in this paper is adjusted to also include relevant controls from Albers, Jerven and Suesse (2023) which are: incidence of civil war, droughts and socialist economic systems.

Therefore, to model how fiscal capacity is affected by aid, we have the following population model:

$$\frac{1}{5}\sum_{t=0}^{4}\frac{TAX}{Y}_{it} = \alpha+\beta_1\frac{ODA}{Y}_{it}+\beta_2\left(\frac{ODA}{Y}\right)^2+\beta_3 INST_{it}+\sum_e \beta_e ECON_{et} + Z_{it}+\eta_i+\gamma_t+\varepsilon_{it} \quad \textbf{(1.1)}$$

where *i* denotes the country and *t* is a one-year period, the outcome variable is the share of tax revenues excluding resource and trade revenues of GDP averaged over the current period *t* and the following four periods, *t+1* to *t+4*. The main variable of interest is the ratio of ODA inflows to GDP, $\frac{ODA}{Y}$, and a squared term is added to account for the predicted nonlinear relationship between aid and fiscal capacity. The squared term on ODA is widely used in the literature (Benedek et al., 2014; Morrissey, Prichard & Torrance, 2016). This is because it is believed that increases in aid are not proportionate to changes in fiscal capacity (Collier,

2006). The institutional context is denoted by INST and the subscript *e* denotes the five variables which account for the economic context, ECON. The economic variables thought to be important in this scenario are resource revenues, the shares of agriculture, industry and trade of GDP and the overall level of economic development. Finally, in equation (1.1) Z denotes a vector of controls (sovereign debt default, incidence of civil war, hyperinflation episode, share of population affected by drought and a socialist economic system), η denotes country fixed effects, γ denotes period fixed effects and ε is the error term and includes all unobserved characteristics. Based on previous literature, β_1 is likely to have a positive sign and β_2 a negative sign. This is because the conclusions from the previous section would suggest that aid has positive effects on fiscal capacity but that these positive effects would be reduced as aid increased. The sign on β_3 is expected to be positive to imply that countries with stronger institutions have higher fiscal capacity. Within the economic variables, resource revenues and the shares of agriculture of GDP are expected to be negatively associated with fiscal capacity whereas the opposite is expected for the shares of industry and trade of GDP and the overall level of economic development. The relationship between the control variables, aid and fiscal capacity will be further discussed in section 5.

In order to observe how the different components of aid affect fiscal capacity on their own the following model is also estimated:

$$\begin{aligned}\frac{1}{5}\sum_{t=0}^{4}\frac{TAX}{Y}_{it} = {} & \alpha+\beta_1\frac{grants}{Y}_{it}+\beta_2\left(\frac{grants}{Y}\right)^2+\beta_3\frac{loans}{Y}_{it}+\beta_4\left(\frac{loans}{Y}\right)^2 \\ & +\beta_5 INST_{it}+\sum_e \beta_e ECON_{it}+Z_{it}+\eta_i+\gamma_t+\varepsilon_{it}\end{aligned} \quad \textbf{(1.2)}$$

where $\frac{grants}{Y}$ and $\frac{loans}{Y}$ denote the share of grants and loans of GDP, respectively. In (1.2) squared terms for the components of aid are included to account for the nonlinear relationship. In (1.2), β_1 is expected to be smaller than β_3 which is expected to be positive. Whether β_1 is positive or zero is difficult to predict since previous literature has mostly found grants to have negative or zero effects on total tax revenue collection. However, many of these studies are not properly accounting for endogeneity concerns, using the proper data, or might be mostly observing reductions in trade tariff incomes which suggest that the results would be downward biased compared to the estimation in this paper. Nevertheless, the coefficients on the squared terms, β_2 and β_4, are expected to be the opposite sign of the coefficients on β_1 and β_3, respectively. A regression with decade dummies will also be run to see if aid received in different time periods had different effects on fiscal capacity.

$$\begin{aligned}\frac{1}{5}\sum_{t=0}^{4}\frac{TAX}{Y}_{it} = {} & \alpha+\beta_1\frac{ODA}{Y}_{it}+\sum_d \beta_d\frac{ODA}{Y}_{it}\times T_d+\beta_3 INST_{it} \\ & +\sum_e \beta_e ECON_{it}+Z_{it}+\eta_i+\gamma_t+\varepsilon_{it}\end{aligned} \quad \textbf{(1.3)}$$

Equation (1.3) illustrates the equation to be estimated, where *T* indicates a decade, *d,* dummy variable. In this equation, β_1 will give the effect of ODA on fiscal capacity in the first omitted time period. The interaction terms will give the difference in the effect between the omitted time period and the given decade. Finally, regressions interacting the aid term with the colonial legacy dummy and institution variable will be run to see if countries with different colonial pasts or countries with stronger institutions react differently to aid incomes.

The econometric method used to estimate the relationship between aid and fiscal capacity will be an OLS regression with county and time fixed effects and standard errors clustered at the country level following the example of (Albers, Jerven & Suesse, 2023). A fixed effects estimator rather than a random effects estimator is considered more appropriate since it is thought that both country fixed effects which include factors such as colonial legacy as well as time fixed effects which would account for, for example, common global economic shocks matter for determining fiscal capacity (Angrist & Pischke, 2009). The choice to run a fixed effects model is further motivated by a Hausman test which gives a p-value of 0.016 which indicates that the null hypothesis of the random-effects estimator being appropriate can be rejected at the 5% significance level. Country level clustered standard errors are used to account for heteroscedasticity within countries. However, with small number of clusters (less than 50) this can lead to unreliable standard errors and so robustness checks with different standard errors are also applied (Correia, 2017).

Endogeneity concerns

When looking at fiscal effects of aid, reverse causality causes a major concern for bias in the estimates (Benedek et al., 2014; Mkandawire, 2010; Prichard, 2016). It is plausible that countries receive more aid as a result of their inability to mobilize tax revenues and countries that have lower fiscal capacity might receive more aid (Brun, Chambas & Laporte, 2010; Mkandawire, 2010). While some of these concerns can be accounted for by using appropriate controls such as GDP per capita or the share of population affected by droughts, it is hard to control for all different causes.

Therefore, previous literature has attempted to deal with the endogeneity concerns by using different methods which has included difference generalized method of moments (GMM) and system GMM (Benedek et al., 2014), instrumental variable (IV) analysis and difference in difference analysis (Thornton, 2014) and more commonly lagging the aid variable (Gupta et al., 2003; Mkandawire, 2010; Morrissey, Islei & M'Amanja, 2006; Morrissey, Prichard & Torrance, 2016). Benedek et al. (2014) propose that GMM analysis should be used in these kinds of studies to accurately deal with endogeneity concerns related to reverse causality as well as persistency in tax revenue collection causing serial correlation. GMM is a panel method designed to deal with endogeneity concerns when the panel has a small number of time periods but a large number of individual units, such as countries (Roodman, 2009). While the GMM method would help to account for some of the endogeneity concerns, this

method is not appropriate for the sample in this paper since the dataset is characterized by a large number of time periods and smaller number of individuals. An attempt to run GMM regressions fails due to the large number of instruments used with this dataset including a large number of time periods. As a comparison, Benedek et al. (2014) use a panel with 29 years and 118 countries, whereas the sample for this paper consists of an unbalanced panel with only 42 countries observed in 56 years. Thornton (2014) uses geographical and cultural distance to donor countries as an instrument for aid. Other instruments, which have been criticized for their weakness, include global aid given in a given year and former colonial powers (Clist & Morrissey, 2011). If one would believe that the indicator for access to aid calculated by Albers, Jerven and Suesse (2023) would be sufficiently exogenous to fiscal capacity, the index could potentially be used as an instrument. However, the exogeneity of the indicator can be questioned and more importantly, as shown in section 5, it is not a very good predictor of aid flows and thus not an appropriate instrument. Prichard (2016) also argues that the use of IV is not so important if the results show a zero or positive coefficient since there is likely to be much more downward bias.

Nevertheless, reverse causality must somehow be tackled with and much of the literature solves this by lagging the aid variable (Clist, 2016; Clist & Morrissey, 2011; Morrissey, Prichard & Torrance, 2016). Most of the literature uses annual data for tax collection and aid which is not the case in this paper which uses an average measure for fiscal capacity. In fact, looking at the population model in (1.1), the aid variable as well as the other variables are essentially lagged since the rolling average measure for fiscal capacity is forward leaning, meaning that that is the average of period t¸ where other variables are measured, and the following four periods. Therefore, the forward leaning 5-year rolling average fiscal capacity variable not only deals with cyclical variations in fiscal capacity but also with endogeneity concerns, specifically reverse causality (Marć, 2017).

5 Data

To study the effects of aid on fiscal capacity in Africa, this paper will use an unbalanced panel dataset covering the time period 1960-2015 for 44 countries out of the 54 countries on the continent. Countries excluded are mostly smaller island nations but also fragile or failed states like Somalia and South Sudan for which sufficient data is not available. The full list of countries included in the dataset is in Appendix A.

5.1 Variables

Fiscal capacity

For measuring fiscal capacity, this paper will follow the definition provided by Albers, Jerven and Suesse (2023). They defined it as the "tax revenue a government can collect in the long run" and measure it as "tax revenue generated by hard-to-collect taxes, net of cyclical effects" (Albers, Jerven & Suesse, 2023, pp.68). Thus, direct taxes and indirect taxes, including value-added taxes (VAT), are included in the measure, whereas trade and resource taxes are considered easy-to-collect and thus excluded. The motivation to exclude resource and trade taxes is based also on the volatility of these revenue sources (Albers, Jerven & Suesse, 2023). Volatility in tax revenues inhibits planning of the use of government resources and thus prevents the state from developing as an institution (Ebeke & Ehrhart, 2011). Furthermore, Besley and Persson (2014) show through cross-sectional data, that having a higher share of government revenue accumulated through direct taxes increases the share of total tax revenues of GDP and as such provides a better base for the kind of measure of fiscal capacity this paper is interested in. Furthermore, collecting direct taxes requires significant bureaucratic capabilities from the government which are costly to develop (Besley & Persson, 2014). It must be noted that this paper is only able to measure capacity through performance (Centeno, Kohli & Yashar, 2017). This relies on the assumption that states are using their full capacity when it comes to tax collection (Centeno, Kohli & Yashar, 2017). This could be problematic since political ideologies and pressures influence the setting of tax rates and thus collection. However, capacity is very hard to measure in reality and thus one must rely on measurable metrics capturing fiscal capacity.

The data for government tax revenues have been collected by Albers, Jerven and Suesse (2022) for Africa between 1900-2015 for 46 countries. The benefit of using this dataset is the long time period covered by the dataset and the fact that it was collected for the purpose of investigating fiscal capacity. The authors have collected the data from primary sources and ensured consistent coding of different government revenues across years and countries. In many of the previous empirical studies, consistency of definitions across datasets has been raised as a serious concern and the process through which this data has been collected

credibly addresses that (Clist, 2016; Morrissey, Prichard & Torrance, 2016; Prichard, 2016). As seen in Figure 1, the tax revenue data used to measure fiscal capacity is closely following the GRD data which is generally preferred for its accuracy in tax revenue research (Prichard, 2016). However, this data is only available since 1980s and does not provide as good coverage for Africa as the data by Albers, Jerven and Suesse (2022). To have cross-country and cross-time comparable values, the tax revenues are calculated as a share of GDP following previous literature (Benedek et al., 2014; Clist & Morrissey, 2011; Crivelli & Gupta, 2017; Gupta et al., 2003; Morrissey, 2015; Morrissey, Prichard & Torrance, 2016). In their analysis, Albers, Jerven and Suesse (2023) are able to measure fiscal capacity in a way that mutes cyclical effects by binning the entire dataset at five-year intervals. They are able to do so without compromising the number of observations since their data period covers over 100 years. However, since the time period covered in this paper is significantly shorter, it is not possible to do the same in this case. Instead, this paper uses a forward leaning rolling 5-year average measure for fiscal capacity as explained in section 4.

By mapping the median total tax revenue and hard-to-collect tax revenues, Figure 1 shows the upward rising trend in fiscal capacity in Africa between 1960-2015. In the five and half decades under study, hard-to-collect taxes share of GDP more than doubled for the median country from less than 5% of GDP to over 10%. However, the development has not been even. There is an upward trend until the end of the 1970s, then a plateau until 1985, followed by another increase until late 1980s. Significant improvements in fiscal capacity can be seen

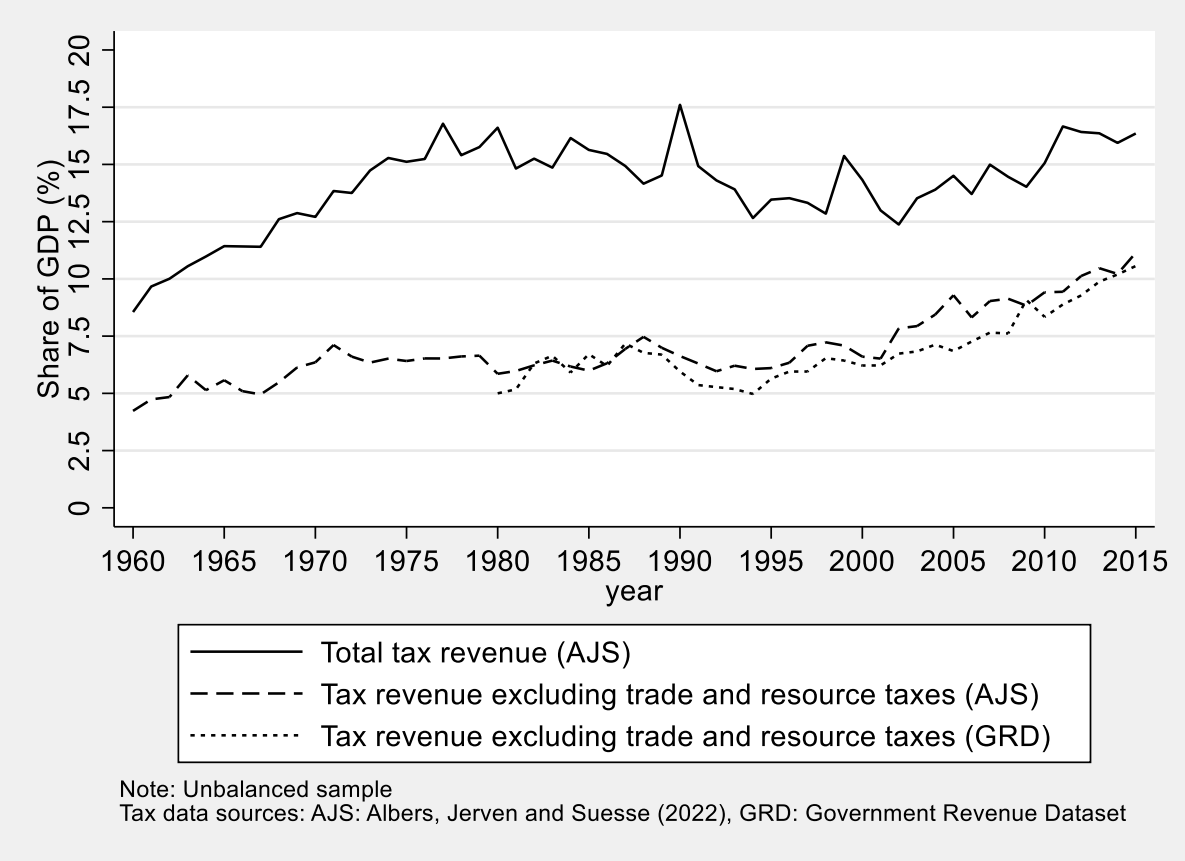

Figure 1 Median tax revenues in Africa 1960-2015

since the mid-1990s. Nevertheless, the level of fiscal capacity in Africa is still relatively low. Literature on optimal tax-to-GDP ratios recommend a minimum of 15% (Adam & Bevan, 2001; Gaspar, Jaramillo & Wingender, 2016). Looking at the total tax revenues, the median country reached this target in the early 1970s but between 1990 and 2010 even the median country fell short of the 15% tipping point. In the last five years, the median country is within the target but for the countries for which there is data 18 countries still do not reach this target. Furthermore, Figure 1 also illustrates the more stable nature of hard-to-collect tax revenues compared to more volatile overall tax revenues which includes trade and resource revenues. Therefore, improving fiscal capacity remains an important priority on the continent.

Aid variable

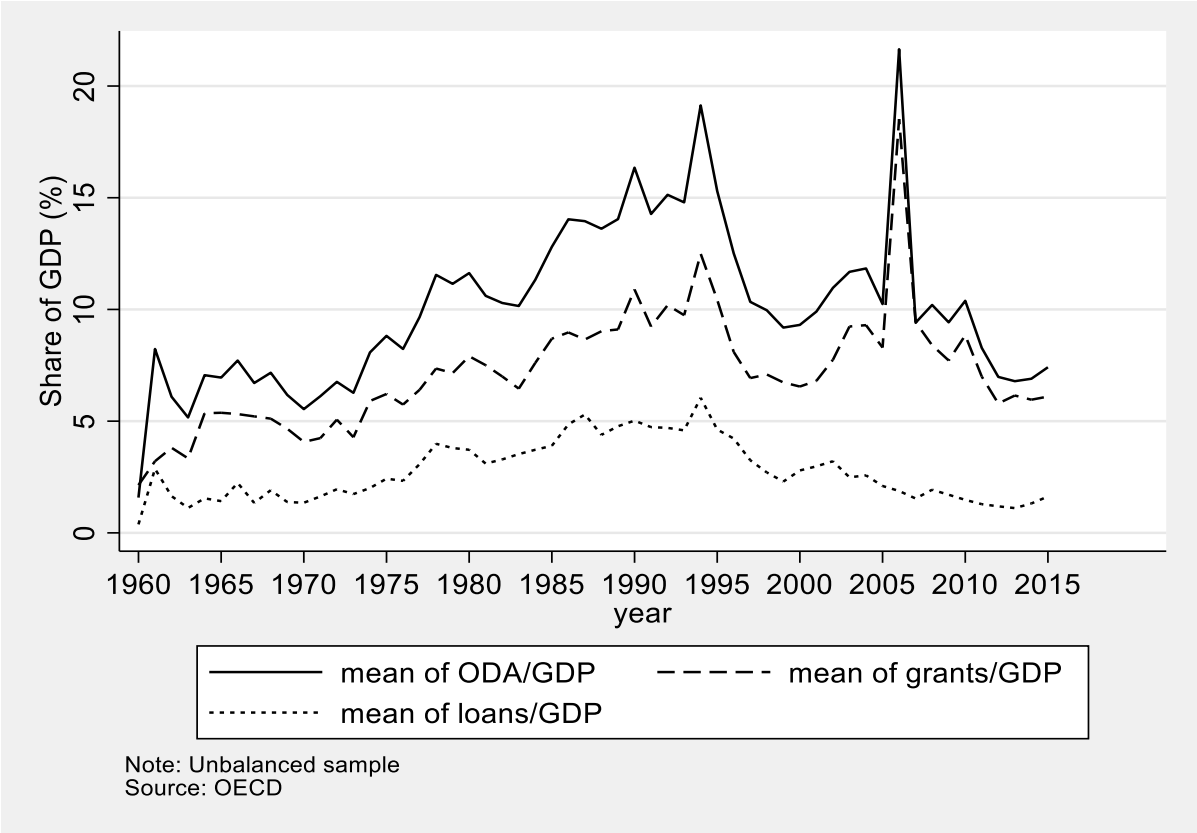

Figure 2 Trends in aid flows

The data for official development aid (ODA) flows from all donor countries and organisations is acquired from OECD which also includes data on the components of data separated into grants and gross loans. Gross loans and ODA are used instead of net to exclude loan repayment flows. According to the OECD's (2023) definition, ODA includes money flows by donor governments to developing countries with the main objective to promote economic development and welfare. According to their definition, loans are included when the grant element is at least 25% of the total. As per previous aid literature, ODA, grants and loans are measured also as a share of GDP to allow for suitable cross-country and -cross time analysis (see, for example, Benedek et al., 2014; Clist & Morrissey, 2011; Gupta et al., 2003). Furthermore, having both the fiscal capacity variable and aid variable measured in shares of GDP allows for an easier comparison and eases interpretation of results. While the OECD

data can be considered reliable and has good coverage, it does not include aid flows which are given to African counties outside of the government sector. This might be a serious oversight since aid distributed outside of the government could have very different effects on fiscal capacity. Aid flows going to agents working outside of state institutions could be more harmful for fiscal capacity if they negatively affect the state-society relationship or if they reduce the demand for public goods from the government (Boyce, 2010). On the other hand, it could be that aid flows which do not go through the government have no effect on fiscal capacity since they do not affect the government directly. Unfortunately, this data is not available by recipient to the best knowledge of the author and so official flows must be relied on.

As shown in Figure 2, there was a general increasing trend in aid flows from the 1960s to the mid-1990s. In 2005, at the G8 and the 2005 World Summit donors made large promises to increase aid flows especially to Africa to help eradicate poverty and to meet the Millennium Development Goals (de Renzio, 2006; OECD, 2008). The effects of this can be seen in Figure 2 as sizeable jump in aid flows in 2006. However, aid flows have generally been decreasing since. During the period, aid flows have been volatile and experienced large changes from one year to another. Figure 7 in Appendix B shows that these trends are not driven by outliers or very low and high individual country values since the median and 25th -percentile and 75th -percentile values show a similar trend. The share of loans of total ODA has been consistently lower than the share of grants but the importance of loans grew during the 1980s. However,

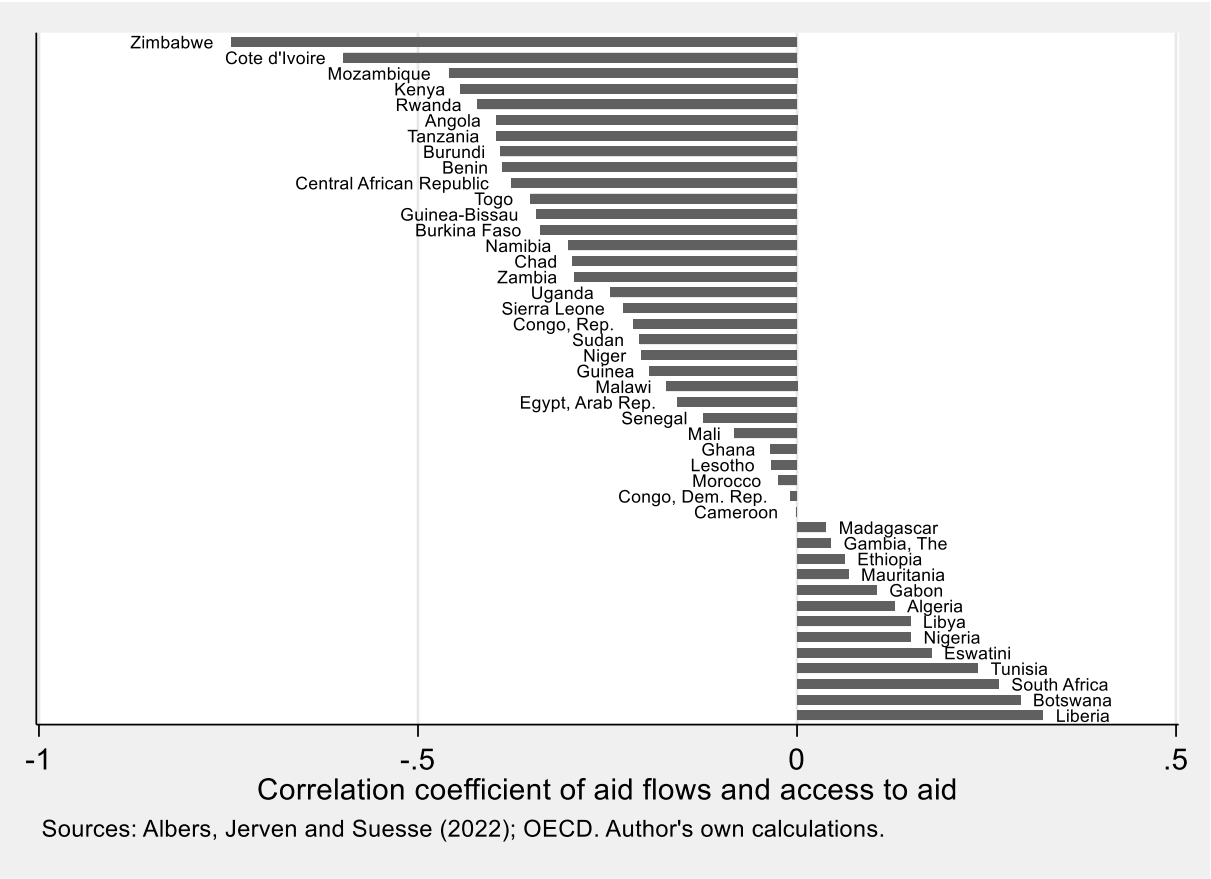

Figure 3 Correlation between aid flows and access to aid indicator

the share of loans has significantly decreased in the last decades and did not experience an increase like the one seen in grants in 2006.

Figure 3 shows the correlation for each country between the access to aid indicator which Albers, Jerven and Suesse (2023) have constructed and the aid flow variable which is used in this paper. An analysis on how correlated the two indicators are, is important in order to see whether the exposure to aid indicators from their paper is able to capture what it is intended to. Aid flows are highly influenced by political alliances and colonial pasts (Alesina & Dollar, 2000) which has motivated AJS to use countries political proximity as a proxy for aid. The access to aid indicator is proxied using a measure for political proximity to the five permanent members of the UN Security Council and the members' available budgets. This is done in an effort to combat endogeneity issues since the authors argue that the choice to politically align themselves with one of the security council members is believably exogenous to fiscal pressure. However, it is not entirely sure that this would be the case since vote buying is a highly complex matter and countries under more fiscal pressure might more actively seek foreign finances to ease that pressure whereas countries with more revenues might be better able to withstand political pressure in the international arena (Alpert & Bernstein, 1974; Carter & Stone, 2015). Nevertheless, what is more pressing is that the measure for access to aid does not seem to be consistently correlated with actual aid flows as indicated by Figure 3. In fact, for most countries the two measures are negatively correlated. In their supplementary material, Albers, Jerven and Suesse (2023) run a fixed effects regression of aid flows on access to aid using their 5-year averaged dataset and find that their access to aid variable would be strongly positively associated with aid flows. However, the statistically significant result from their paper cannot be replicated using their annual measure for access to aid and the annual aid flow data from the OECD. Shown in Table 5 (Appendix C), when regressing the access to aid variable on ODA/GDP, the coefficient is positive but the p-value is very high (0.87) very low statistical significance. The lack of correlation between the two indicators could signal that the measure used by Albers, Jerven and Suesse (2023) is not appropriate and the authors are missing something when it comes to access to aid. Alternatively, this could be explained by country's differing abilities to negotiate aid where some countries' votes are more easily bought and so their voting patterns are not related to the size of the aid flow received (Alpert & Bernstein, 1974). In either of the cases, aid flow data is going to be a more appropriate measure since it is directly measuring the extent to which governments could replace their tax revenues with aid. Additionally, by looking at aid flow data it is possible to look at components of aid which offer more insights into potential policy recommendations.

Other determinants of fiscal capacity

The other variables included in the dataset are factors considered to be significant determinants of fiscal capacity in Africa and motivated by findings in section 3. First, I include an institutional variable by using the liberal democracy score from Varieties of Democracy (V-Dem) database (2020). Values for the variable range between 0 and 1 and the dataset is comprehensive for the time period and sample in this study. While imperfect, the liberal democracy score can be considered an appropriate measure for institutional quality since Rodrik (2000) argue that democracy is a meta-institution which allows for other good institutions. While Albers, Jerven and Suesse (2023) also use this indicator, most empirical research rely on corruption measures from either The International Country Risk Guide

(Brun, Chambas & Laporte, 2010; Crivelli & Gupta, 2017) or the corruption perception index by Transparency International. However, the former of these is not publicly available and the latter only available after 1995. Ricciuti, Savoia and Sen (2019) find that constraints on the government in developing countries has significant effects on tax revenues and income taxes which further motivates the choice for the control variable. It is expected that countries with better institutions have higher fiscal capacities. Furthermore, some of the literature on aid and fiscal capacity has noted that institutions also play a role in how aid affects fiscal capacity (Albers, Jerven & Suesse, 2023; Benedek et al., 2014; Tagem, 2022).

To account for the characteristics of the economy which determine the tax base and the ease of taxing variables for resource revenues, the shares of agriculture, industry and trade of GDP and the overall level of economic development are included. The availability of resource revenues are likely to also have similar negative effect on fiscal capacity as aid as they offer an alternative source of revenue to replace tax revenues (Crivelli & Gupta, 2014; Morrissey, Prichard & Torrance, 2016). Relying on the work of Bazzi and Blattman (2014) for collecting commodity export shares for each country and world market prices for the commodities, Albers, Jerven and Suesse (2022) calculate real commodity prices for each country for each year in a way that accounts for the share of primary exports in its GDP. The measure which will be used for this paper is defined as follows:

$$R_{it} = \frac{\sum_k \left(S_{ik} \times P_{tk} \right)}{\prod_t} \times X_i \qquad \textbf{(1.4)}$$

where *i* refers to the country, *t* to the year, and *k* to a commodity. To get an index of resource exports world market prices for each commodity P_{tk} are interacted with the share of that commodity in a country's export basket, S_{ik}. The authors have deflated nominal prices with the US price indices, Π, for real values. Lastly, they they weigh the real indexes for each country by the share of primary exports in its GDP, *Xi*. This is to account for the relative importance of changes in resource prices for a given country (Albers, Jerven & Suesse, 2023). The resource price index is expected to be negatively associated with fiscal capacity.

Typical for the literature on looking at collection of tax revenues is to account for the type of economy by having indicators for the share of industry, agriculture, and trade of GDP since they affect the ease to collect taxes and the volatility of the economy (Piancastelli & Thirlwall, 2020). The data for the value added to GDP of agriculture, industry and trade, respectively, are taken from World Bank Development Indicators (WDI) (2023). According to the literature, the share of agriculture in the economy is negatively associated with fiscal capacity since extracting revenues from this sector is more difficult (Keen & Simone, 2004). Industry, on the other hand, is expected to be positively associated with the fiscal capacity for the opposite reason (Piancastelli & Thirlwall, 2020). Rodrik (1998) finds that countries that are more open for trade have larger governments, which motivates the use of the value of trade to GDP as a control variable. Additionally, to account for the level of economic development, data on log GDP per capita is calculated using data from the Maddison Project Database 2018 using their 2011 benchmarked real GPD data Bolt, Inklaar, de Jong and van Zanden (2018). The addition of the GDP variable is to account for countries' ability to tax growing faster than the size of the economy and thus predicted to be positively associated with fiscal capacity (Benedek et al., 2014; Mkandawire, 2010).

A set of additional controls are added to minimise omitted variable bias. First, a sovereign debt default dummy indicator is added to account to capture the countries' indebtedness. The data for this is taken from Albers, Jerven and Suesse (2022) due to the good coverage. However, ideally an indicator for the share of debt to GDP would be used as per much of the other empirical literature (Prichard, 2016). Limited coverage in WDI motivates the use of the dummy instead. The debt to GDP indicator would ideally capture one element of a country's fiscal response to aid which might be to service its debt with grants or to increase lending in order to meet donors conditions to match spending (Benedek et al., 2014; McGillivray & Morrissey, 2001). Instead, the dummy variable on sovereign debt default is likely to capture increased aid flows as a result of a difficult economic difficulties. Since it's likely to be associated with harsh economic difficulties it is predicted to have a negative effect on fiscal capacity. Also taken from Albers, Jerven and Suesse (2022), the effects of high inflation rates are captured by an inflationary episode dummy where 1 indicates a year when consumer price inflation is above 40%. Similarly to sovereign debt default, a continuous variable would be preferable but is not available from WDI for sufficient number of countries or time periods. A measure for inflation is included since governments might not be able to account for its effects fully in their collection of taxes leading to unindexed tax systems (Crivelli & Gupta, 2014). Therefore, inflation would have a negative effect on fiscal capacity. A dummy indicator for civil war is included in the model using the UCDP/PRIO Armed Conflict Dataset (Davies, Pettersson & Öberg, 2022; Gleditsch, Wallensteen, Eriksson, Sollenberg & Strand, 2002). Albers, Jerven and Suesse (2023) find that civil wars might have a significant negative effect on fiscal capacity which motivates the prediction for this study as well. Following the example of Albers, Jerven and Suesse (2023) and using the data that they have compiled on a dummy indicator for a socialist economic system and share of the population affected by droughts are also included as controls. A socialist economic system will likely increase the size of the state due to political preferences whereas droughts will likely impact aid flows positively and the tax base negatively. Table 6 provides summary statistics for all variables included in the analysis (Appendix D).

5.2 Descriptive statistics

Figure *4* plots the country average aid flows and fiscal capacity for the time period and a best fit line to show the negative relationship between the two variables. There are no countries in the top right corner indicating a country with high aid flows and fiscal capacity. Countries such as Namibia and South Africa which are found in the left top corner are more economically developed and so have received less aid but have most likely independently of aid have higher fiscal capacity. Multiple countries with high resource incomes, Nigeria, Libya and Angola, can be found in the bottom left corner. These countries low levels of fiscal capacity are more likely to be explained by the replacement of tax revenues by resource rent rather than the effects of aid. On the opposite end of the spectrum countries like Somalia, Guinea-Bissau and Liberia have received large shares of aid relative to the size of their economies but have low fiscal capacity. However, this does not suggest a causal relationship since it is likely that countries that have less fiscal capacity due to various factors such as civil wars, lower economic development or weaker institutions would also receive more aid.

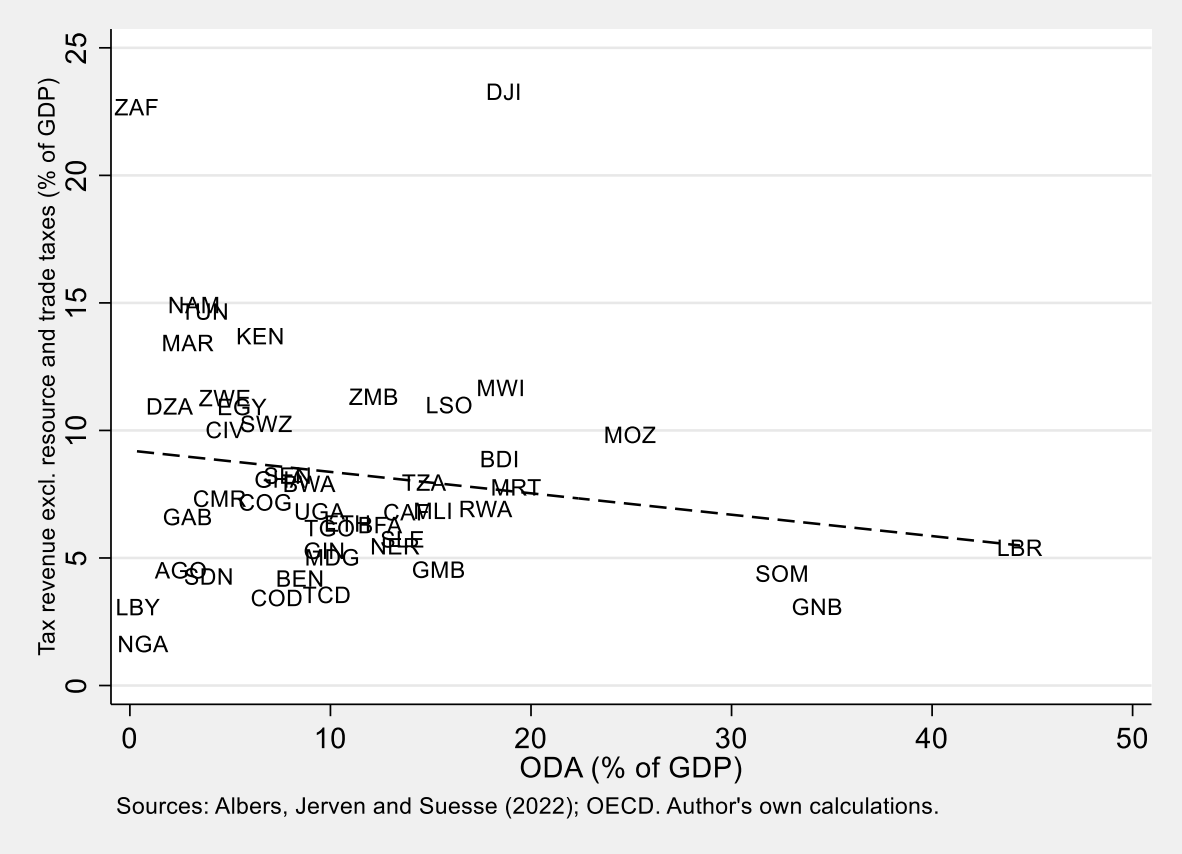

Figure 4 Mean fiscal capacity and mean ODA for each country in the sample.

Figure 5 shows the development of aid and fiscal capacity for 4 chosen countries. Despite limited data availability, Mozambique is an interesting country to look at since it was the first country to receive aid from the EU that was attached to tax-conditionality (Boyce, 2010). There is a small initial bump in fiscal capacity in Mozambique around the mid-2000s which would suggest that this policy perhaps had a positive impact on fiscal capacity development. This can also be seen in Figure 4 where the country is located closest to the top right corner. However, the larger increase in fiscal capacity does seem to happen in the 2010's when aid flows dramatically decrease. The Gambia makes an interesting comparison to Mozambique since the two countries are roughly equally far from the best fit line but on opposite sides where the Gambia has below average fiscal capacity for its level of received aid. However, when looking at the time trend graph for The Gambia, it seems that increases in aid were associated with increases in fiscal capacity. Its placement in Figure *4* is more due to the higher levels of aid and relatively low levels of fiscal capacity throughout the time period. Rwanda is an interesting case to look at because of the high levels of aid it has received. However, despite the large sums of aid received, especially after the genocide and late 2000s, the country's fiscal capacity has not responded to the spikes in anyway but continued to increase in a stable way since mid-1990's. Finally, Tanzania was a country which received aid

from some of its donors in the 1990s with a spending matching condition (Bräutigam, 2000). Looking at time trends for fiscal capacity and aid flows in the figure, it seems like the two variables have been positively associated with fiscal capacity responses being slightly lagged. However, variance in aid flows is much larger compared to variance in fiscal capacity for all countries. Overall, looking at the correlation between aid and fiscal capacity or individual county experiences, nothing very conclusive can be said about the two without a proper regression analysis.

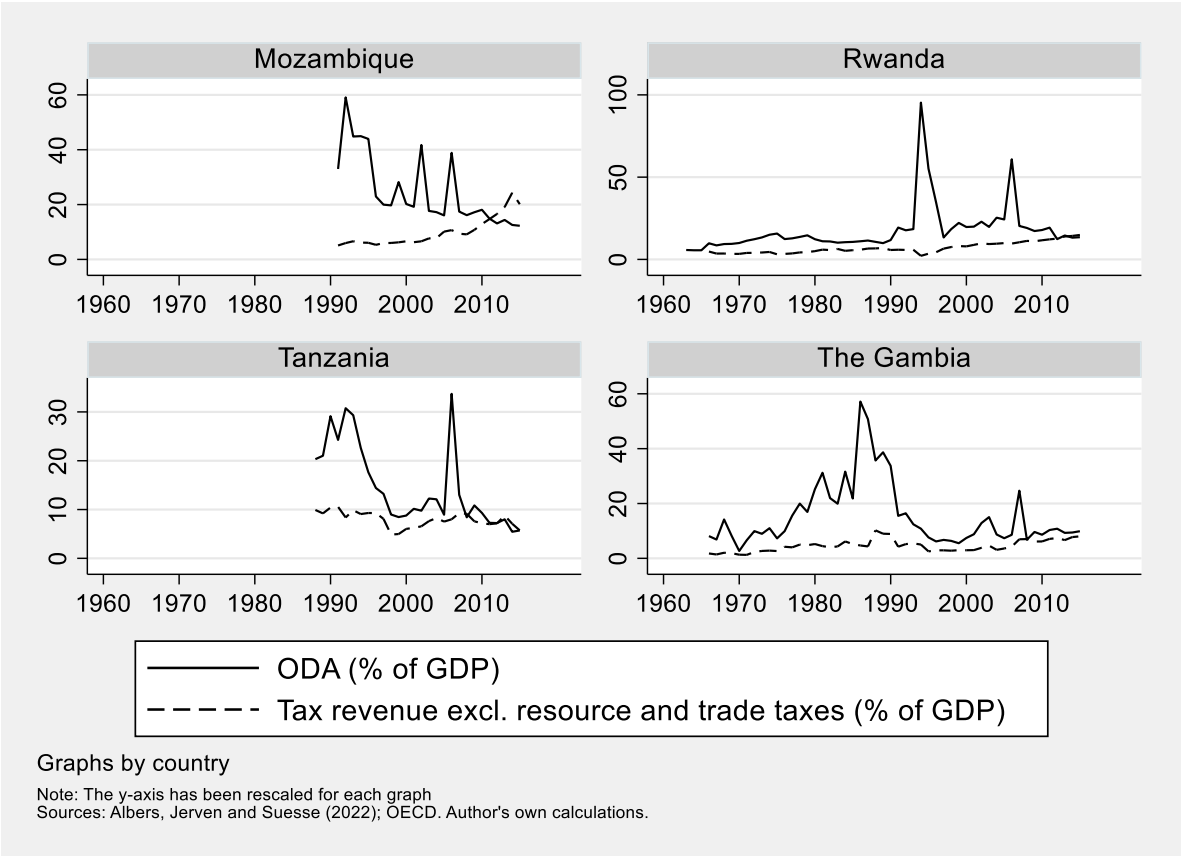

Figure 5 Aid and fiscal capacity development for selected countries

6 Empirical Analysis

6.1 Main results

Table 1 - The effects of ODA on fiscal capacity

	(1)	(2)	(3)	(4)	(5)
	5-year rolling average of tax revenue excl. resource and trade taxes (% of GDP)				
	b/se	b/se	b/se	b/se	b/se
ODA (% of GDP)	0.016	0.072	0.060	0.062+	0.067*
	(0.02)	(0.05)	(0.05)	(0.04)	(0.04)
$(ODA)^2$ (% of GDP)		-0.001*	-0.001+	-0.001*	-0.001**
		(0.00)	(0.00)	(0.00)	(0.00)
Liberal democracy score			3.484+	0.543	0.768
			(2.27)	(2.19)	(2.06)
Real resource price index				-0.011**	-0.011**
				(0.01)	(0.00)
Trade/GDP				0.039***	0.038***
				(0.01)	(0.01)
Industry/GDP				-0.109***	-0.103***
				(0.03)	(0.03)
Agriculture/GDP				-0.080***	-0.075***
				(0.03)	(0.03)
Log(GDPpc)				1.790**	1.845**
				(0.83)	(0.74)
Additional controls	NO	NO	NO	NO	YES
Adjusted R-squared	0.78	0.78	0.78	0.82	0.83
N	1625	1625	1625	1625	1625

Additional controls: socialist economic system, share of population affected by droughts, hyperinflation period, sovereign debt default and incidence of civil war.
Country-level clustestered standard errors in parantheses.
+ p<0.15, * p<0.10, ** p<0.05, *** p<0.01

Table 1 displays the results the effects of ODA on tax revenue excl. resource and trade taxes using a country- and time-fixed effects regression with standard errors clustered at the county level. As can be seen in Table 1 (column 1), ODA and fiscal capacity are not strongly correlated, controlling only for time and country fixed effects. The coefficient on aid is positive, yet non-significant. However, when a squared term for aid is added, the p-value on the coefficient on ODA increases and the squared term is statistically significant which

suggests that the relationship between aid and fiscal capacity is non-linear with decreasing returns from aid. The coefficient on ODA being positive in columns 1 and 2, suggests that a lot of endogeneity bias is already controlled for by having an essentially leading dependent variable and controlling for country and time fixed effects. In column 3, liberal democracy score is added as a control and the sign on the control variable is positive and weakly significant. The coefficient on the institutional variable becomes statistically non-significant when other controls are added. This is somewhat surprising since institutional capacity is usually found to have a significant positive effect on tax revenues (Benedek et al., 2014; Brun, Chambas & Laporte, 2010; Gupta et al., 2003). This is likely due to the different measure for institutions since the results align with the findings from Albers, Jerven and Suesse (2023) who use the same institutional measure. In column 4, controls for the economic environment of the country are added. The coefficients on resources prices and agriculture are negative whereas the coefficient on trade is positive as expected. However, the coefficient on industry is negative which is unexpected, though other papers have found similar results (Gupta et al., 2003; Morrissey, Prichard & Torrance, 2016). Morrissey, Prichard and Torrance (2016) argue that this is due to the fact that resource production is a major driver of industry share, so the control variable is essentially capturing part of the effect on resource revenues. All coefficients on the economy variables are statistically significant and the signs of the coefficients on the control variables remain the same in the full model which is shown in the last column. The coefficients on the additional control variables are as expected: negative for civil war dummy, debt default dummy and population affected by drought variable while positive for inflation period and socialist economic system.

Adding the controls and looking at the full model, increases the coefficient of aid to 0.067 and the coefficient of the squared term is the same (0.001) throughout the specifications. This means that in the sample for a given country in given year, a 1%-point increase in the GDP share of ODA in year *t* increased on average the GDP share of tax revenue excluding resource and trade taxes in year *t* and the four following years by 0.066%-points holding the institutional setting, economic setting, socialist economic system, share of population affected by droughts, hyperinflation period, sovereign debt default and incidence of civil war constant. The coefficient on the aid term is statistically significant at the 10% level and the coefficient on the squared aid term is statistically significant at the 5% level. One standard deviation increase of ODA/GDP (10), increases the hard-to-collect tax revenue to GDP ratio by 0.57%-points which would mean a 7.11% increase in tax revenue to GDP ratio at the mean. This suggests that, while the effects of aid are statistically significant, the effects are economically only moderately significant.

The negative significant coefficient on the squared term suggests that the relationship between aid and fiscal capacity is non-linear and that there are decreasing returns to aid. By solving $\beta_1 = \beta_2 X$, the turning point at which an increase in aid no longer has a positive affect is found to be at 68%. There are only 3 observations in the sample where ODA reaches that high, including the observation for Rwanda after the genocide seen in Figure 5. Considering the turn for negative is at such a high level, it would suggest that by enlarge ODA does not have a negative effect on fiscal capacity but rather that the positive effects on fiscal capacity are not increasing proportionally to increases in aid. This is reasonable considering the higher variance in aid flows compared to fiscal capacity also observed in Figure 5.

6.2 Components of aid

Table 2 – The effects of grants and loans on fiscal capacity

	(1)	(2)	(3)
	5-year rolling average of tax revenue excl. resource and trade taxes (% of GDP)		
	b/se	b/se	b/se
Grants (% of GDP)	-0.005	0.000	0.004
	(0.02)	(0.06)	(0.04)
$(\text{Grants})^2$ (% of GDP)		-0.000	-0.000
		(0.00)	(0.00)
Loans (% of GDP)	0.079+	0.209**	0.150*
	(0.05)	(0.09)	(0.08)
$(\text{Loans})^2$ (% of GDP)		-0.006**	-0.004*
		(0.00)	(0.00)
Liberal democracy score			0.827
			(2.03)
Real resource price index			-0.011**
			(0.00)
Trade/GDP			0.037***
			(0.01)
Industry/GDP			-0.105***
			(0.03)
Agriculture/GDP			-0.076***
			(0.03)
Log(GDPpc)			1.712**
			(0.73)
Additional controls	NO	NO	YES
Adjusted R-squared	0.78	0.78	0.83
N	1625	1625	1625

Additional controls: socialist economic system, share of population affected by droughts, hyperinflation period, sovereign debt default and incidence of civil war.
Country-level clustestered standard errors in parantheses.
+ p<0.15, * p<0.10, ** p<0.05, *** p<0.01

Using the same using a country- and time-fixed effects estimation method, Table 2 shows the results when regressing grants and loans on fiscal capacity to see if the two components of aid have a different effect. In the first column, grants are negatively associated with tax revenues when only controlling for time- and country-fixed effects, but this result is not statistically significant. In the same column, loans are positively associated with tax revenues and this result is weakly statistically significant (15% confidence level). In the second column when squared terms of grants and loans are added, there seems to be a slight negative return to grants which explains the overall negative coefficient. However, neither of the coefficients on the grant variables are statistically significant and the sizes of the coefficients are very small. On the other hand, the coefficients on loans suggest that there is a nonlinear significant positive relationship with decreasing returns to fiscal capacity of loans. The coefficient on loans is much larger than on ODA (or grants) and is statistically significant at the 5% level.

Furthermore, the squared term also is statistically significant at the 5% level with a negative coefficient.

When all the controls are added into the model in the third column the sign of the aid coefficients remain the same, but the size of the loan coefficients decreases and is statistically significant at the 10% level. In the model with aid broken down into its components the sign and significance of coefficients remain the same compared to the base results. There seems to be no effect of grants on fiscal capacity since the coefficient on grants is very small (0.004), the coefficient on the squared term is even smaller and both have high p-values (>0.5). In addition to being statistically insignificant, the economic significance of grants is also miniscule since a standard deviation increase in grants only leads to a 0.2% increase in fiscal capacity at the mean. This further supports the conclusion that, on average, grants have had no effect on fiscal capacity in Africa between 1960-2015. The general interpretation from the second column on loans remains in the full model. In the sample in year *t*, a 1%-point increase in the GDP share of loans for a given country in a given year increased the GDP share of hard-to-collect tax revenues by 0.15%-points on average in year *t* and the 4 following years, keeping the controls constant. At the mean, this would mean a 1.8% increase in tax revenues. This is more than twice the positive effect of 1%-point increase in overall aid. A standard deviation increase in loans increases fiscal capacity by 0.51%-points which at the mean of fiscal capacity is equal to a 6.5% increase. This is a slightly smaller effect compared to a standard deviation increase in overall aid. The turning point for loans comes at 38% which is significantly smaller than for overall aid, but this is reasonable since the GDP share of loans tend to be a fairly small part of overall aid and only one observation in the sample is above the turning point (Zimbabwe in 1995). This would suggest that at overall low levels of aid flows, replacing all grants with loans would have a positive effect on fiscal capacity but when aid levels are very high, then giving parts of the aid as grants is preferrable. Using the coefficients for the grants variables, the turning point would be at 14%. Only 13% of the observations are above this limit which suggests that the effects of grants would be more positive than negative for the vast majority.

6.3 Heterogenous time effects of aid on fiscal capacity

Since dominant international aid policies have developed significantly from one decade to another there might be heterogenous effects of aid on fiscal capacity across time. To test this assumption, Table 7 in Appendix E displays the results of interacting the aid term with decade dummies where the first decade is defined from 1960-1974 (due to smaller number of observations) and the following decade dummies go from 1975-1984, 1985-1994 and so on until 2005-2015. The coefficients with 90% confidence intervals are displayed in Figure 6 which illustrates a positive trend in the effects of ODA on hard-to-collect tax revenues. The coefficient on the ODA term is negative (-0.53) suggesting that the average effect of ODA on hard-to-collect taxes between 1960-1974 was negative. All the interaction coefficients are positive and increasing in size, though only in the two last decades is the positive coefficient larger than the coefficient on ODA. This implies that the average effect of aid on fiscal capacity was negative until around the mid-1990s. However, none of the interaction terms or

the coefficient on ODA are significant and thus any interpretation must be made with caution. Nevertheless, a similar trend is found when running a regression with 5-year interval time dummies with 1960-1964 as the omitted category (shown in Figure *8* in Appendix E). With the demi-decade interaction terms, the coefficient on the ODA variable is positive and all the interaction terms are negative but generally show a positive trend toward zero. This would suggest that in the first 5 years, aid had the strongest positive effect. However, these results might be biased due to sample selection bias since in the first five years, there are significantly less observations compared to all other time periods. Nevertheless, regardless of the time interval in the model, there is a general noticeable increasing trend in the time dummy interaction terms. The results from the demi decade analysis would suggest that the average effects of ODA turned positive in the early 1990s. This suggests that aid policy design has perhaps improved to take into account the possible negative effects that aid could have on crowding out government revenue collection. However, without statistically significant coefficients, these results should be interpreted with caution.

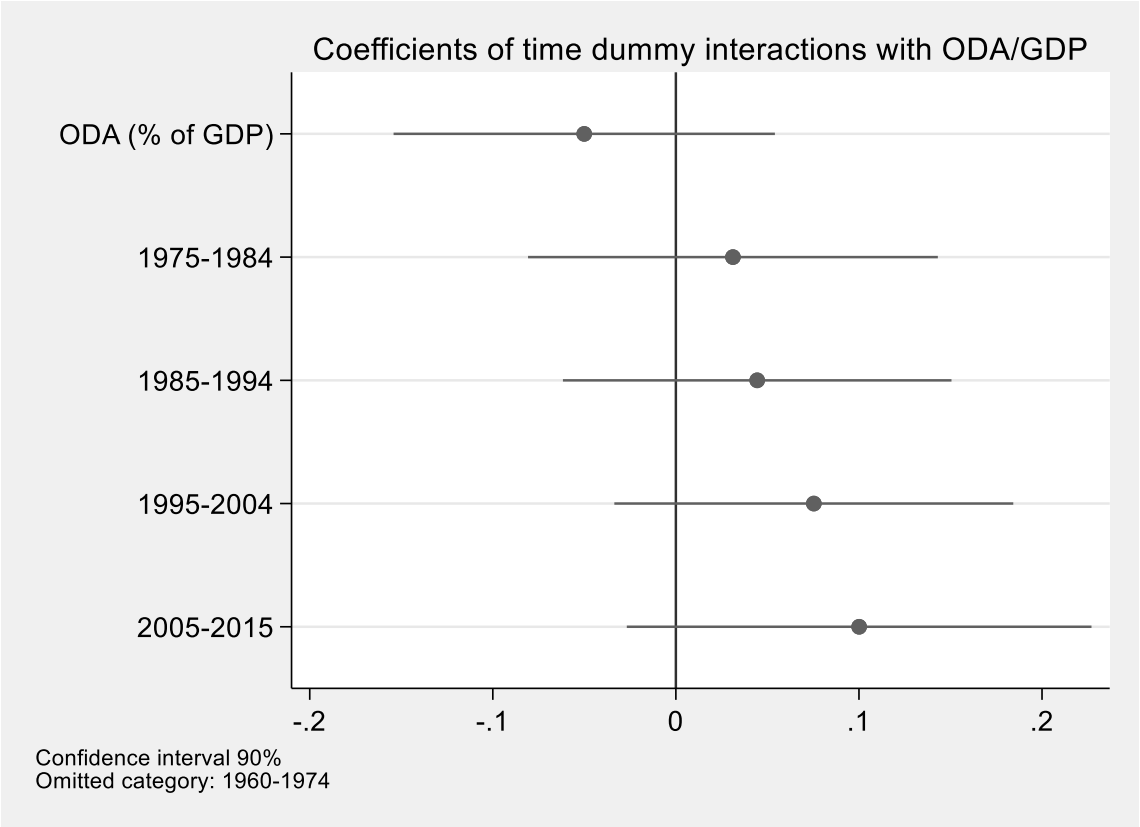

Figure 6 Decade dummy and ODA (% share of GDP) interaction coefficients

6.4 Colonial legacies and institutions

Table 3 - ODA interaction with colonial and institutional variables

	(1)	(2)	(3)	(4)	(5)
	5-year rolling average of tax revenue excl. resource and trade taxes (% of GDP)				
ODA (% of GDP)	0.013	-0.010	0.015	-0.020	0.010
	(0.02)	(0.01)	(0.02)	(0.02)	(0.02)
Labour reserve x ODA	-0.020				
	(0.07)				
British colony x ODA		0.066*			
		(0.03)			
French colony x ODA			-0.023		
			(0.03)		
Lib. democracy score x ODA				0.165*	
				(0.08)	
Controls	YES	YES	YES	YES	YES
Adjusted R-squared	0.83	0.83	0.83	0.83	0.83
N	1625	1625	1625	1625	1625

Standard errors in parentheses
Country-level clustestered standard errors in parantheses.
+ p<0.15, * p<0.10, ** p<0.05, *** p<0.01

In their theoretical model, Albers, Jerven and Suesse (2023) also argue that the legacy of colonialism affects how the different canonical and external factors influence the development of the fiscal state. Therefore, dummy variables for being a former French and former British colony are included in the dataset (Table 3). However, when looking at the determinant of fiscal capacity the type of economic order during colonial times might be more important rather than the ruling colonial power. Following the approach by Mkandawire (2010), ODA is interacted with the labour reserve dummy. See Appendix A for the full listing of countries into the two categories. The results show that in countries which used to be labour reserve colonies, the effects of aid are more negative whereas for other countries the effects are positive. However, the coefficient is not statistic suggesting that there is no significant heterogenous effect on the type of economy during colonial times on the fiscal effects of aid. However, interacting with the former British colony dummy gives a significant positive effects (at the 10% level). Furthermore, the coefficient on ODA is negative but non-significant. This suggests that in former British colonies aid has had a significant positive effect but there is no significant effect of aid on hard-to-collect tax revenues for former non-British colonies. In column 3, ODA is interacted with a former French colony dummy which gives an interaction term with a negative non-significant coefficient. This would suggest that there is something specific about former British colonies. This could be due to different aid policies being used or due to institutional characteristics influenced by the colonial period. In

order to investigate further one could look into where aid has been received and whether countries that received more aid from Great Britain had better effects on fiscal capacity from aid compared to receiving aid from other countries.

When aid on tax revenue research has looked at the role of institutions, much of it has found institutions to play a significant role in the effects of aid on DRM (Brun, Chambas & Laporte, 2010; Gupta et al., 2003). To see if this is the case, Table 3 also shows the results for an interaction between liberal democracy score and ODA. The interaction term is positive and statistically significant at the 10% level which suggests that in more democratic countries, the positive effects of aid are larger compares to countries with less democratic institutions. This result is somewhat surprising since earlier results showed that the liberal democracy score in itself did not affect hard-to-collect tax revenues.

6.5 Robustness

Different robustness checks are run to ensure that the main findings of the paper hold under different definitions of the fiscal capacity and aid variable. First in Appendix *F*, Table 8 shows the results when the main variables of interest, GDP shares of ODA, grants and loans, have been averaged over 5-year moving averages so that the first period is *t*-4 each period in between until *t*. Clist (2016) and Morrissey, Prichard and Torrance (2016) argue that lagging aid is crucial when looking at the effects of aid on tax revenues and that the exact time frame does not matter but it's important to vary the lag in order to get a better understanding of what is happening in the long run. Furthermore, aid revenues are highly volatile which is also seen in Figure 5. Therefore, averaging aid over multiple years is likely to give a more realistic understanding of long-term trends. By regressing a lagging average and a forward leaning average, the results in Table 8 can be interpreted to show the effects of aid in *t*-2 on the hard-to-collect tax revenues in *t*+2 net of cyclical effects. The coefficients on the ODA variables are larger and equally statistically significant in the model with rolling average ODA shares which suggests that in the long-run aid has even larger positive effects than in the short run. The coefficients on grants are smaller suggesting that in the longer run there is also no effect of grants on fiscal capacity. On loans the coefficients are larger which suggests that in the long-run, loans are even more beneficial in supporting fiscal capacity building in a country.

Robustness of the dependent variable must also be addressed. In the literature there are different ways the tax revenue or fiscal capacity variable is included in the model. A common way to include it is by using logged tax/GDP for ease of interoperation and to account for possible non-linearity (see, for example, Benedek et al., 2014; Clist & Morrissey, 2011; Gupta et al., 2003). Using a logged dependent variable does not change the significance of the results and the first column in Table 9 (Appendix F) shows that a 1%-point increase in ODA increased hard-to-collect tax revenues by 0.012%. Alternatively, a one standard deviation increase in ODA increases tax revenues by 0.11%. These results also suggest that the economic significance of the result is moderate. These results also hold for components of aid (column 2) and the sign and significance remain the same compared to the original model (column 6).

Albers, Jerven and Suesse (2023) look at the determinants of changes in fiscal capacity rather than the levels of fiscal capacity. They argue that this allows them to understand the determinants of investments in fiscal capacity. These results are show in Table 9 column 3 and 4. When looking at how aid changes the investments in fiscal capacity, the results are a little different and the positive effects are reduced. First, when looking at the effects ODA, the coefficient is negative, and the squared term is positive. This would suggest that aid has a negative effect on investments in fiscal capacity, but this negative effect is reduced at higher levels of aid. This result is similar to the findings of Albers, Jerven and Suesse (2023) but it must be noted that the results is not statistically significant and thus the evidence of a potential negative effect on investments in fiscal capacity are weak in this paper and ultimately contradict from their conclusion. Breaking down ODA into its components help us to see that the negative overall effect of ODA is driven by the negative effect of grants on changes in fiscal capacity. These coefficients are statistically significant at the 10% level. The coefficient on loans remains positive with the squared term negative and suggesting decreasing returns, but these results are not statistically significant. Overall, regressing on changes in fiscal capacity brings down the positive effects of aid, grants, and loans but the coefficients for ODA and loans are too small to be statistically significant. Following the line of argument of Albers, Jerven and Suesse (2023) this would suggest that aid flows are a positive determinant of fiscal capacity but does not increase investments in fiscal capacity. However, it is not entirely clear that changes in fiscal capacity would be measuring investments in fiscal capacity. Countries do not only experience increases in fiscal capacity but also significant decreases which would suggest that states must continuously place resources into fiscal capacity to maintain levels of fiscal capacity. Nevertheless, looking at the change in fiscal capacity and the stock of fiscal capacity offer slightly different interpretations to the phenomenon and as such the dampened positive effects of loans and overall aid or even the negative effects of grants does not change the main conclusions of this study.

As noted in section 4, the use of clustered standard errors at the country level might be problematic since there are less than 50 countries in the sample (Correia, 2017). Therefore, Table 10 (Appendix F) shows the results for the main results using different standard error estimations. In the first two columns robust standard errors are used to correct for heteroscedasticity while still assuming independence between observations. In columns 3 and 4 unadjusted standard errors or conventional OLS standard errors are used which assumes homoscedasticity. Using the alternative standard errors gives results that have higher significance than the original results. However, the assumptions underlying the use of standard errors are more credible when using clustered standard errors. This is because in clustered data, there is a higher likelihood of correlation among the error terms at the country level.

6.6 Discussion

The results of the analysis have shown that overall aid has in fact had a positive effect on country's capacity to accumulate hard-to-collect tax revenues in Africa between 1960-2015. According to the results, looking at aid split into its components grants have no effect on

fiscal capacity whereas loans have a positive effect on fiscal capacity. The changes to fiscal capacity are non-proportional to the changes in aid flows and any increases in aid, loans or grants lead to a proportionally smaller change in fiscal capacity. Furthermore, the analysis provides weak evidence to suggest a positive trend of aid's effects on fiscal capacity since the 1960s. The results can be read as an indication that for grants, the negative influence of aid on moral hazard, opportunity costs and diversion of resources on the one hand are roughly outweighed by the positive influence on aid from technical assistance, matching and conditionality on the other. Alternatively, it could suggest that grants have no effect on fiscal capacity as governments view foreign assistance as a necessary additional revenue to tax revenues. A closer look at the effects of different aid policies and instruments in future research could provide further insight into which of these effects are at play. The positive effect of concessional loans suggests that governments view grants and loans differently and take their responsibility of repaying their debts seriously as it seems to be creating incentives for the government to increase fiscal capacity.

Usually, the literature on aid's effects on tax revenues has been concerned about reverse causality which would be causing downward biased estimates (Benedek et al., 2014; Mkandawire, 2010; Prichard, 2016). This paper has attempted to appropriately account for endogeneity by having a forward leaning dependent variable. Since the overall effect of aid is positive, this would suggest that reverse causality is not leading to false overall conclusions. There could still be some downward bias which is causing the grant variable to be non-significant, or the positive effects could be larger than shown. Since longer lagging periods seem to strengthen the conclusions of the main results (Table 8), this is unlikely. However, there could be an upward bias observed in the positive effects of loans which is unaccounted for. There could be something which donors are able to perceive about a country's ability to repay its loans which is not observed in the data. It could be that countries which are perhaps showing positive signs in its investments in fiscal capacity are given loans rather than grants because donors have more faith in the country's ability to repay. On the other hand, countries that are experiencing persisting difficulties are perhaps more likely to receive grants.

The results of this study contradict those of Albers, Jerven and Suesse (2023) who argue that aid has a significant negative effect on fiscal capacity development in Africa. Since their time period is longer and extends to the colonial period, the results are not fully comparable. Furthermore, the results in Table 9 would suggest that some of the differences could be driven by the different definition of the fiscal capacity term. However, this study has shown the importance of using direct aid flow data rather than proxy measures that might not be capturing what they were intended for. Furthermore, the differences in results could also be explained by the heterogeneity of aid across time periods. Looking at the total tax revenue literature this study provides contradictory evidence to the findings of Gupta et al. (2003) and Benedek et al. (2014) who find that grants would have a significant negative impact on tax revenue collection. This conclusion is significant because the results of their studies can be used to justify preferring aid loans rather than grants even in the case of countries with very low incomes. If grants have no effect on fiscal capacity and thus do not have negative long-term impacts on the countries fiscal institutions, then giving grants might be a better aid policy to implement in cases where there is a reason to suspect that a country would struggle to service its debts. However, both Gupta et al. (2003) and Benedek et al. (2014) find the same positive effect of loans on tax revenue collection. Considering that loans have

significant positive effect, this also suggests that loans should generally be preferred to grants if the aim of the aid policies are to support countries in strengthening their fiscal capacity.

Much of the tax revenue literature has also found that changes in aid are not proportional to changes in tax revenues or fiscal capacity (Benedek et al., 2014; Clist, 2016; Clist & Morrissey, 2011; Gupta et al., 2003). The disproportional effects of aid on fiscal capacity also appear logical considering that increasing fiscal capacity is rarely if ever the main aim of aid (Tarp, 2006). The diminishing positive returns to aid has also been reported by Clist (2016) but he did not find statistically significant effects of overall aid or grants but only of loans. Clist (2016) calculates the turning points for ODA, grants and loans to be 65%, 26% and 39% respectively for the 1980-2009 sample. The turning points found for ODA, grants and loans (68%, 14% and 38%, respectively) for fiscal capacity are in the same order of magnitudes though the turning point for grants is much smaller. Since the turning points for loans and overall aid are higher than almost all observations in the data, the results are not suggesting that very high levels of loans or overall aid would have negative effects on fiscal capacity. However, for grants a small but significant proportion of observations are above the turning point suggesting that if the grant proportion of aid is too large, this could cause fiscal capacity to decrease.

The findings somewhat align with tax revenue literature which also argues that there have been improvements in the effects of aid on fiscal capacity (Clist & Morrissey, 2011; Morrissey, Prichard & Torrance, 2016). Clist and Morrissey (2011) argue that there has been a positive change from the 1980s onwards. However, the results of this study would suggest that if there is any time trend it is pretty much continuously improving and that the change from negative to positive effects would have occurred a decade later in the 1990s. This could be due to the effects of trade liberalisation paradigm which caught wind in the 1990s (Gnangnon, 2016). This would have affected total tax revenues as African states experienced losses in trade revenues (Gnangnon, 2016) but potentially strengthened the incentives of African governments to turn to other sources of tax revenues, thus affecting fiscal capacity positively. This highlights the importance of focusing on the effects on hard-to-collect taxes since it is more likely to give a better understanding of long-term effects net of policy changes which are implemented quicker.

While Mkandawire (2010) finds that being a former labour reserve economy has a significant effect on fiscal capacity, colonial legacy does not seem to have any significant effects on how aid affects fiscal capacity. However, since non-labour reserve colonies were more reliant on trade tax incomes, it could be that total revenues were more affected by aid liberalisation policies (Gnangnon, 2016). It could also be that pre-colonial institutions which influence the extent of tax avoidance would matter more for how aid affects fiscal capacity (Robinson, 2023). Interestingly, while the results show no consistent effect of representative institutions on fiscal capacity, Table 3 does suggest that institutions matter in the interaction between aid and fiscal capacity. The nonsignificant coefficient on the democracy score variable goes against the theory by Acemoglu (2010) that democratic institutions would lead to better fiscal capacity. This result is also found by Albers, Jerven and Suesse (2023). Robinson (2023) argues that different social contracts in Africa compared to those in the West are characterised by higher aversion to taxation. This could explain why higher degree or representation does lead to higher fiscal capacity in Africa. On the other hand, the institutional pathway effect

between aid and fiscal capacity is widely cited in the tax revenue literature though other research has relied on a corruption variable for measuring institutional quality (Brun, Chambas & Laporte, 2010; Gupta et al., 2003). Since tax revenue literature has found corruption to be significant determinants of DRM, it would be important to include this measure for institutional capacity in the model in future research. Albers, Jerven and Suesse (2023) find that the interaction between democratic institutions and access to aid would be negative which does not align with the results of this study. Once again, this could be due to different time period effects or due to the different definition of the aid variable.

Overall, the results of this study have shown the importance of using high quality data for tax revenues and focusing on fiscal capacity to discover long-term effects of aid. Furthermore, newly published long-term data on fiscal capacity has enabled an investigation into the heterogenous effects across time. The results have also highlighted the benefits of using direct aid flow data to uncover differences in the effects of grants and loans.

7 Conclusions

This paper set out to investigate what effect aid has had on fiscal capacity in Africa between 1960-2015. In order to investigate this, a quantitative regression analysis was conducted for 42 African countries. The results confirm the hypothesis that overall aid would have a positive effect on fiscal capacity and that the positive effect is larger for loans than for grants. In fact, loans were found to have a significant positive effect on fiscal capacity whereas grants were found to have no effect on fiscal capacity. This would suggest that governments are reacting to loans by maintaining and increasing domestic revenue collection in order to service their debt. This could potentially be due to aid flows being invested in fiscal capacity building. Furthermore, it seems that the potential positive and negative effects of grants on fiscal capacity are balanced out which leads there to be no consistent effect. Both overall aid and loans were found to have a nonlinear relationship with decreasing returns to aid on fiscal capacity, reflecting the non-proportional changes in fiscal capacity to changes in aid flows. The main results are robust to different estimations of standard errors and different definitions of the independent and dependent variable, though looking at changes in fiscal capacity dampen the positive effects of ODA and loans and give a negative coefficient for grants. This paper has been able to utilise the recently published high quality fiscal capacity data for Africa with good time- and country-coverage collected by Albers, Jerven and Suesse (2023). This has made it possible to look at heterogenous time-effects of aid on fiscal development and the paper finds weak evidence of improving effects of aid on fiscal capacity. This suggests that over time matching conditionalities, provision of technical assistance and other aid policy improvements have played an important role in ensuring that recipient governments do not replace domestic revenues with foreign ones but instead help countries to develop fiscal institutions. The analysis finds that generally colonial legacies did not have an effect on the way aid interacts with fiscal capacity, though former British colonies seemed to have benefitted from aid more than other countries in Africa. This study has also found further evidence to support the claim that countries with higher quality institutions benefit more from aid in terms of fiscal capacity. Specifically, the results from this paper would suggest that countries with higher levels of democratic institutions are more likely to spend their revenues into improving fiscal capacity rather than to replace domestic revenues with foreign ones.

The results in this analysis contradict those of Albers, Jerven and Suesse (2023) who argue that exposure to aid has had a negative effect on fiscal capacity in Africa between 1900-2015. While the results are not fully comparable, this paper has shown the importance of looking at direct measures of aid flow data instead of a proxy measure which is found not to be highly correlated with actual aid flows. Furthermore, by looking at aid flow data instead of a proxy variable, this paper has been able to uncover heterogenous effects between the components of aid. By looking at how aid interacts with a medium-term (5-year average) measure of hard-to-collect tax revenues, or fiscal capacity, rather than annual total tax revenues as most of the past literature, this paper has been able to discover how aid influences the development of fiscal institutions. The difference between looking at fiscal capacity development and total tax

revenue changes is significant since the former allows for an understanding of the long-run effects of aid. Developing fiscal capacity is crucial for sustained economic growth as it is more closely related to state capacity. Therefore, the results of this study are better able to contribute to the literature on the positive effects that aid and especially aid loans have in supporting state capacity in Africa.

7.1 Limitations and further research

The paper attempts to discover how fiscal capacity, a highly theoretical term, has developed in Africa as a result of aid flows. However, research on fiscal capacity must rely on quantitatively measurable proxies for this. While appropriate care has been taken to define and measure fiscal capacity in a reasonable manner, the findings of the research could be strengthened by a qualitative analysis of more concrete institutions and capabilities which are developed or hindered by aid flows to recipient government. Since the analysis has demonstrated heterogenous effects through time, between components of aid and also indicated that former colonial past could have an effect in some cases, it could be interesting to look in further into what is driving these differences. One way to do this would be to look at whether aid from different donors have had heterogenous effects. Furthermore, one could look further into the different effects of specific aid policies used on fiscal capacity. For example, looking at whether technical assistance, matching obligations or different conditionalities are more efficient in encouraging development of fiscal capacity could be a path for future research.

Furthermore, some of the control variables are perhaps not able to capture what they are intended to due to limited data availability. The largest concern is the institutional variable for additional measures, mainly corruption should be included. The liberal democracy variable is not necessarily capturing all of the desired institutional phenomena since it has been found to be insignificant in determining fiscal capacity which goes against most of the literature on tax revenues (see, for example, Benedek et al., 2014; Clist & Morrissey, 2011; Gupta et al., 2003). Furthermore, higher levels of representation in Africa could have different effects on fiscal capacity in Africa due to tax aversion (Robinson, 2023). Due to the complexity of the institutional concept, future research on the matter would benefit from different institutional definitions and variables being used. Furthermore, some of the indicators, such as inflation, rely on the use of dummy variables rather than continuous variables which future research could address upon data availability. Finally, data availability also results in the exclusion of some of the most fragile states in Africa, such as Somalia. It would be interesting to add these to the study to see if aid is able to have a positive effect in especially difficult contexts. Related to this, the highly positive effects of loans could also be due to omitted variable bias if donors have been able to observe something in recipient countries which this study has not accounted for. It could be that loans have been preferred when donors have been able to predict improvements in fiscal capacity which would enhance recipients' ability to service their debt. A future study could attempt to better account for the potential bias.

7.2 Policy Implications

The results of this study imply that overall aid has not created dependencies in Africa by discouraging or harming the development of fiscal capacity but quite the opposite. The higher positive effect of loans suggests that they can be an especially good way to encourage countries to improve their institutional capacities. Looking at aid flow data, a decreasing role of aid loans is visible in recent years. If the trend continues, this could reduce the overall positive effect of aid on fiscal capacity. However, since grants are found not to have a negative effect on fiscal capacity, in situations where the use of grants would be preferred on other grounds, there is no evidence in this paper to suggest that this would be causing long-term harm for the countries' capacity building. Nevertheless, based on the results of this study, there is reason to believe that improvements in aid policies and close attention of aid's effects on fiscal institutions also matter. Therefore, care should be taken when designing aid policies to take into account its effects on government incentives to improve fiscal capacity.

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Appendix A - List of countries in the sample

Table 4 - List of countries in the sample

Labour reserve countries		Non-labour reserve countries	
AGO	Angola	BDI	Burundi
BWA	Botswana	BEN	Benin
KEN	Kenya	BFA	Burkina Faso
LSO	Lesotho	CAF	Central African Republic
MDG	Madagascar	CIV	Cote d'Ivoire
MOZ	Mozambique	CMR	Cameroon
MWI	Malawi	COD	Congo, Democratic Republic of the
NAM	Namibia	COG	Congo, Republic of the
SWZ	Eswatini	DZA	Algeria
ZAF	South Africa	EGY	Egypt
ZMB	Zambia	ETH	Ethiopia
ZWE	Zimbabwe	GAB	Gabon
		GHA	Ghana
		GIN	Guinea
		GMB	Gambia, The
		GNB	Guinea-Bissau
		LBR	Liberia
		LBY	Libya
		MAR	Morocco
		MLI	Mali
		MRT	Mauritania
		NER	Niger
		NGA	Nigeria
		RWA	Rwanda
		SDN	Sudan
		SEN	Senegal
		SLE	Sierra Leone
		TCD	Chad
		TGO	Togo
		TUN	Tunisia
		TZA	Tanzania
		UGA	Uganda

Appendix B - Median ODA, Grants and Loans

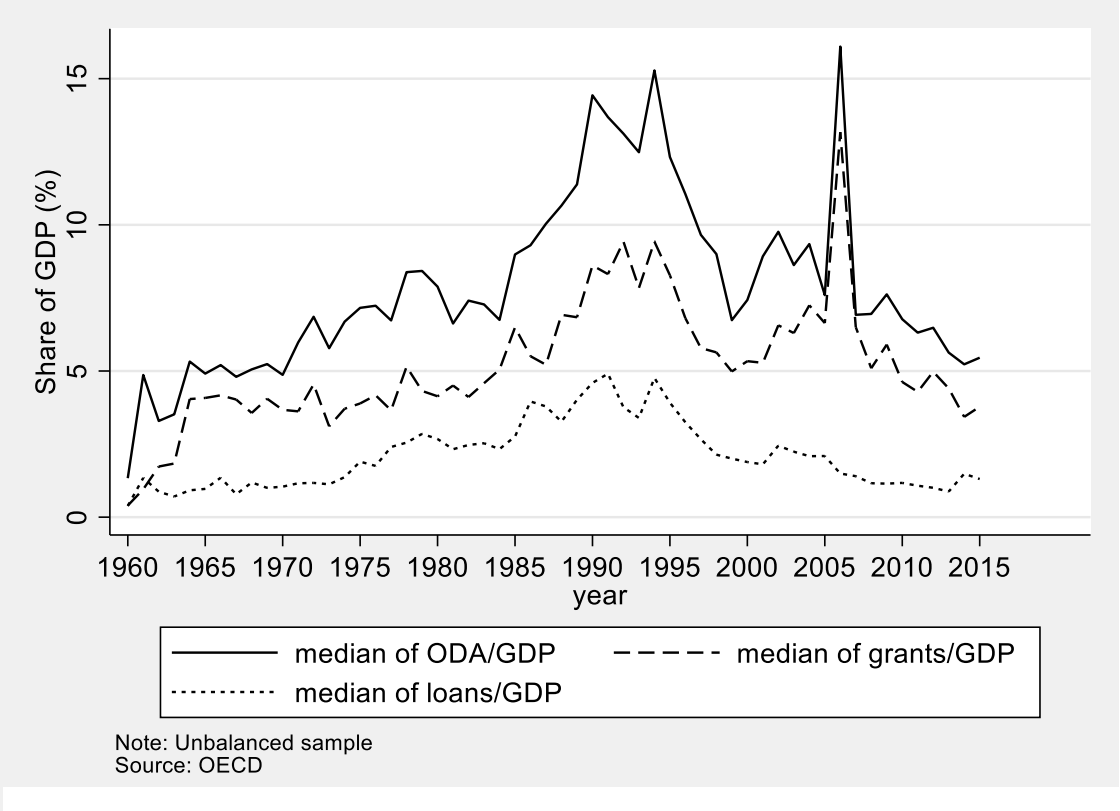

Figure 7 Median aid, grants and loans in Africa 1960-2015

Appendix C - Access to aid and aid flows

Table 5 - Relationship between access to aid and aid flows

	(1) ODA (% of GDP) b/p
Access to aid	0.808
	(0.87)
Constant	10.611***
	(0.00)
Adjusted R-squared	0.52
N	2099

Notes: Sample: African countries, 1960-2015.
P-value reported in parentheses.
Standard errors are clustered at the polity level.
* p<0.10, ** p<0.05, *** p<0.01

Appendix D - Summary Statistics

Table 6 - Summary statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Tax revenue excl. resource and trade taxes (% of GDP)	1626	8.042	4.667	.477	27.417
ODA (% of GDP)	1626	10.017	10.07	.036	95.326
Grants (% of GDP)	1626	7.275	7.95	.028	93.095
Loans (% of GDP)	1626	2.743	3.318	0	41.181
Liberal democracy score	1626	.208	.158	.013	.683
Real resource price index	1626	17.196	49.029	-.07	657.607
Trade/GDP	1626	61.902	30.194	1.378	188.648
Industry/GDP	1626	24.201	12.141	2.365	85.92
Agriculture/GDP	1626	27.464	14.795	1.384	83.781
GDP per capita in 2011US$, 2011 benchmark	1626	3463.002	4113.234	330	33343
Hyperinflation episode	1626	.124		0	1
Drought-affected population	1626	.439	1.212	0	15
Socialist economic system	1626	.039		0	1
Civil war incidence	1626	.178		0	1
Labour reserve dummy	1626	.191		0	1
Former British colony dummy	1626	.39		0	1
Former French colony dummy	1626	.482		0	1

Appendix E - Time Interaction Results

Table 7 - ODA interaction with time dummies

	(1)	(2)	(3)
	5-year rolling average of tax revenue excl. resource and trade taxes (% of GDP)		
	b/se	b/se	b/se
ODA (% of GDP)	-0.050	0.010	0.067*
	(0.06)	(0.02)	(0.04)
(ODA)2 (% of GDP)			-0.001**
			(0.00)
1975-1984 x ODA/GDP	0.031		
	(0.07)		
1985-1994 x ODA/GDP	0.044		
	(0.06)		
1995-2004 x ODA/GDP	0.075		
	(0.06)		
2005-2015 x ODA/GDP	0.100		
	(0.08)		
Controls	YES	YES	YES
Adjusted R-squared	0.83	0.83	0.83
N	1625	1625	1625

Country-level clustered standard errors in parentheses.
Omitted category: 1960-1974
+ p<0.15, * p<0.10, ** p<0.05, *** p<0.01

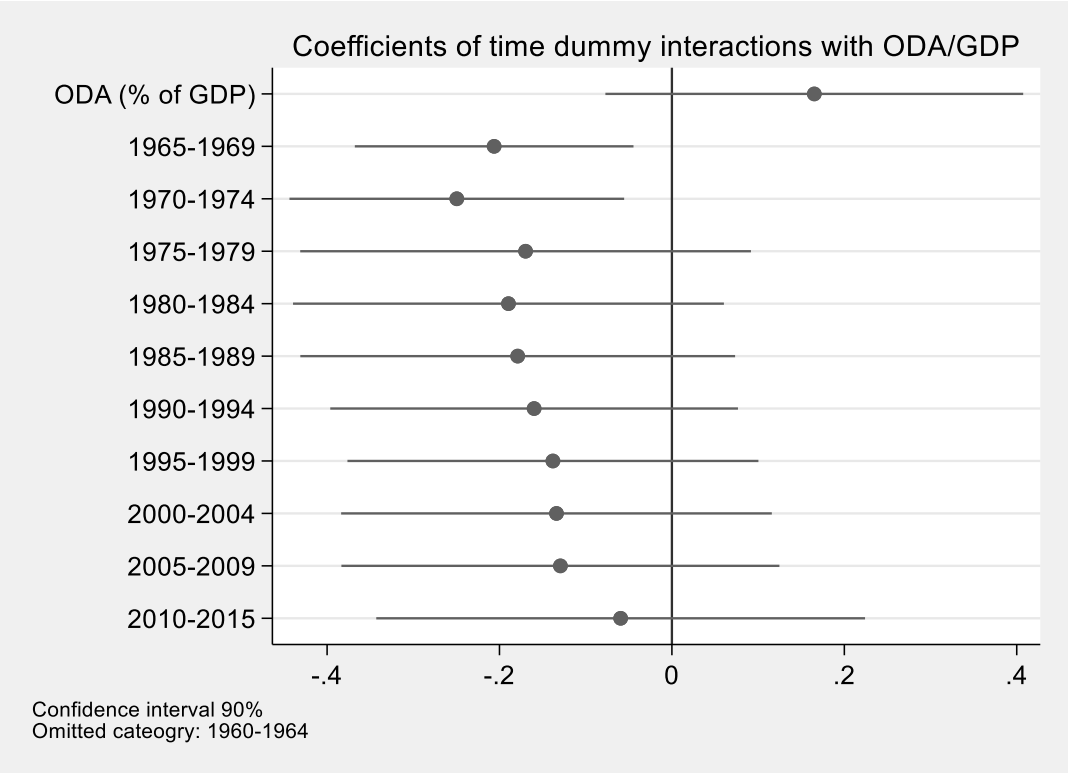

Figure 8 Demi-decade and ODA interaction coefficients

Appendix F - Robustness Checks

Table 8 - Robustness checks with aid variable

	(1)	(2)	(3)	(4)
	5-year rolling average of tax revenue excl. resource and trade taxes (% of GDP)			
ODA (% of GDP)	0.067*			
	(0.04)			
$(ODA)^2$ (% of GDP)	-0.001**			
	(0.00)			
5-yr avg ODA/GDP		0.116*		
		(0.06)		
(5-yr avg $AID/GDP)^2$		-0.002**		
		(0.00)		
Grants (% of GDP)			0.004	
			(0.04)	
$(Grants)^2$ (% of GDP)			-0.000	
			(0.00)	
5-yr avg grants/GDP				-0.010
				(0.09)
(5-yr avg $grants/GDP)^2$				-0.001
				(0.00)
Loans (% of GDP)			0.150*	
			(0.08)	
$(Loans)^2$ (% of GDP)			-0.004*	
			(0.00)	
5-yr avg loans/GDP				0.383**
				(0.17)
(5-yr avg $loans/GDP)^2$				-0.018**
				(0.01)
Constant	-3.996	-5.426	-2.737	-3.483
	(6.00)	(6.37)	(5.97)	(6.47)
CONTROLS	YES	YES	YES	YES
Adjusted R-square	0.83	0.83	0.83	0.84
N	1625	1625	1625	1625

Country-level clustered standard errors in parentheses.
All models are run with all controls.
+ p<0.15, * p<0.10, ** p<0.05, *** p<0.01

Table 8 - Robustness checks with dependent variable

	(1)	(2)	(3)	(4)	(5)	(6)
	Ln Fiscal capacity		Change in fiscal capacity		5-year rolling average of tax revenue excl. resource and trade taxes (% of GDP)	
ODA (% of GDP)	0.012**		-0.003		0.067*	
	(0.01)		(0.01)		(0.04)	
$(ODA)^2$ (% of GDP)	-0.000**		0.000		-0.001**	
	(0.00)		(0.00)		(0.00)	
Grants (% of GDP)		0.003		-0.015*		0.004
		(0.01)		(0.01)		(0.04)
$(Grants)^2$ (% of GDP)		-0.000		0.000*		-0.000
		(0.00)		(0.00)		(0.00)
Loans (% of GDP)		0.021*		0.015		0.150*
		(0.01)		(0.02)		(0.08)
$(Loans)^2$ (% of GDP)		-0.001*		-0.000		-0.004*
		(0.00)		(0.00)		(0.00)
Constant	1.359+	1.551*	1.965**	2.199**	-3.996	-2.737
	(0.83)	(0.83)	(0.85)	(0.84)	(6.00)	(5.97)
Adjusted R-squared	0.81	0.81	0.07	0.07	0.83	0.83
N	1625	1625	1615	1615	1625	1625

Country-level clustered standard errors in parentheses.
All models are run with all controls.
+ p<0.15, * p<0.10, ** p<0.05, *** p<0.01

Table 10 - Robustness checks with standard errors

Outcome: 5-year rolling average of tax revenue excl. resource and trade taxes (% of GDP)

	Robust standard errors		Unadjusted standard errors		Clustered standard errors at the polity level	
	(1)	(2)	(3)	(4)	(5)	(6)
ODA (% of GDP)	0.067***		0.067***		0.067*	
	(0.02)		(0.02)		(0.04)	
$(ODA)^2$ (% of GDP)	-0.001***		-0.001***		-0.001**	
	(0.00)		(0.00)		(0.00)	
Grants (% of GDP)		0.004		0.004		0.004
		(0.02)		(0.02)		(0.04)
$(Grants)^2$ (% of GDP)		-0.000		-0.000		-0.000
		(0.00)		(0.00)		(0.00)
Loans (% of GDP)		0.150***		0.150***		0.150*
		(0.04)		(0.04)		(0.08)
$(Loans)^2$ (% of GDP)		-0.004**		-0.004***		-0.004*
		(0.00)		(0.00)		(0.00)
Constant	-3.996*	-2.737	-3.996**	-2.737	-3.996	-2.737
	(2.10)	(2.07)	(1.95)	(1.93)	(6.00)	(5.97)
CONTROLS	YES	YES	YES	YES	YES	YES
Adjusted R-squared	0.83	0.83	0.83	0.83	0.83	0.83
N	1625	1625	1625	1625	1625	1625

All models are run with all controls.
+ p<0.15, * p<0.10, ** p<0.05, *** p<0.01