

UNIVERSITY OF ANTWERP

INSTITUTE OF DEVELOPMENT POLICY AND MANAGEMENT

Dissertation

**FOREIGN AID AND GOVERNMENT FISCAL BEHAVIOUR IN
ZAMBIA**

Jones Mulenga Bowa

Master of Development Evaluation and Management

Supervisor: Prof. Dr. Danny Cassimon

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Dedication

I dedicate my dissertation to my loving parents, Mulenga J. and Margaret C. Bowa.

Your words of encouragement and never ending support have been the difference.

Thank you for being there.

Preface

First and foremost, I would like to give all the glory and praise to my Almighty God for granting me the grace to take on and successfully complete this paper. It was a very fulfilling experience and one that I am very grateful to have had the opportunity to undertake.

My paper explores the relationship pertaining to foreign aid and government fiscal behavior. My main motivation behind the choice of this topic has been my concern over efficient and effective public financial management. Coming from a country like Zambia, I have been fortunate to experience firsthand how the management of public finances greatly affects people in developing countries. It was my hope that I could take on a topic that would help me gain more insight into how governments manage their public resources given the different financial constraints they face. At the same time, I wanted the challenge of being innovative in coming up with solutions to the many trials still affecting developing countries today. In the end, the learning process helped me gain valuable knowledge into the ever changing aspects affecting governments' fiscal behavior. I am optimistic that this journey won't stop here but that I will continue in my future endeavors to apply myself and promote good practice in public policy in my country.

I to take this opportunity to give thanks to my supervisor Prof. Dr. Danny Cassimon who offered me great advice and helped by giving me clear guidance throughout the whole process which allowed me to accomplish this piece of work. To the amazing staff at Institute of Development Policy and Management (IOB), to you I say kudos. I would also like to give thanks to my family, my church and friends for their prayers and moral support. It helped make the journey much easier. Lastly, to you the reader, may it be a pleasant and rewarding reading experience.

Thank You,

Jones Mulenga Bowa

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List of Acronyms

DAC	Development Assistance Committee
ESAF	Enhanced Structural Adjustment Facility
FRM	Fiscal Response Model
GDP	Gross Domestic Product
GFATM	Global Fund to Fight AIDS, Tuberculosis and Malaria
GFS	Government Financial Statistics
GNP	Gross National Product
GRZ	Government of the Republic of Zambia
HPIC	Highly Indebted Poor Countries Initiative
IFS	International Financial Statistics
IMF	International Monetary Fund
LIC	Low Income Country
MDGs	Millennium Development Goals
MDRI	Multilateral Debt Relief Initiative
ODA	Official Development Assistance
OECD	Organisation for Economic Co-operation and Development
PRBS	Poverty Reduction Budget Support
PRS	Poverty Reduction Strategy
SAF	Structural Adjustment Facility
SAP	Structural Adjustment Program
SDGs	Sustainable Development Goals
UN	United Nations
VAR	Vector Autoregression
VEC	Vector Error Correction
WEO	World Economic Outlook

Executive Summary

There has been high momentum in the scaling up of foreign aid in recent years. The turn of the millennium saw calls by the development community to increase foreign aid to development countries so as to assist them in attaining the Millennium Development Goals. The mechanisms through which foreign aid flows are transmitted to recipient countries require that the aid resources are channeled through the government. Thus, for foreign aid to have any meaningful impact is highly dependent on how governments respond to inflows of aid.

The paper investigates the relationship between foreign aid and government fiscal behavior. An overview of the global trend of foreign aid flows over the last few decades is provided, as well as literature and research on fiscal response studies that have aimed to examine how these aid flows influence the fiscal decisions of aid recipient governments. The paper assesses the impact of foreign aid flows on fiscal aggregates, taking into focus the case of Zambia. In particular, the paper goes into detail examining how government investment, consumption, revenue and domestic borrowing are associated with both aggregated and disaggregated aid.

The paper adopts a mixed methods approach in its analysis by triangulating between qualitative and quantitative sources of information. A Vector Error Correction approach was used to estimate the relationship between foreign aid and fiscal aggregates data for Zambia over the period 1970-2014. The econometric estimation used annual data and analyzed both short-run and long-run effects. The following were the findings:

Foreign aid flows were found to be positively associated with government investment, consumption and domestic borrowing. While, government revenue was negatively associated with foreign aid. In the short-run, it was observed that grants were used to reduce the level of the country's domestic debt stock. Whereas, net foreign loans were seen as a substitute to domestic revenues and were used to finance the budget deficit. The paper concluded by providing a number of recommendations which suggested improvement in government's revenue mobilization efforts, effective management of the country's domestic debt and the deliberate action to direct revenue resources towards investment expenditure. In order to achieve sustained growth and ensure the effective use of aid, donor partners were recognized as important actors in supporting the government's fiscal policy direction.

CHAPTER 1: INTRODUCTION

One of the most vital problems that most nations have faced in the past 50 years is economic growth, and this has been more crucial for less developed countries. Developing countries face the challenge of raising the desired levels of finance needed to fuel investment from their own resources. As such, foreign aid has been an ideal means to supplement the shortfall needed to accelerate development efforts (Senbet and Senbeta, 2007). The post-colonial period saw many poor countries begin their paths to development. Former colonial powers assisted in the facilitation of the development process through the provision of foreign aid resources. This principle guided foreign aid flows from the 1960s and still remains one of the main objectives of foreign aid today (Bandyopadhyay and Vermann, 2013).

In the year 1970, aid was formally institutionalized when the United Nations (UN) made the decision to set a goal for its higher income members to provide 0.7% of their Gross National Product (GNP) for development aid. Since 1970, this target has been continually reaffirmed by the UN, country leaders and heads of international institutions (OECD/DAC, 2010). For many countries, foreign aid remains a principal source of revenue. For instance, during the mid- to late-90s, foreign aid inflows were approximately equal in magnitude to taxation and constituted nearly half of all public expenditure in low-income countries (McGillivray and Morrissey, 2001).

Following from this, in the year 2000 the international community experienced an aid paradigm shift and committed to scaling-up aid and improving methods of aid delivery to developing countries to help these nations meet the Millennium Development Goals (MDGs). The development goals were a necessary initiative at the time because the late 1990s was a period characterized by aid fatigue as most development assistance efforts proved futile. The MDGs brought a new hope in the fight against poverty and if well implemented, the goals would have facilitated sustainable growth for these poor countries (UNCTAD, 2006).

Moreover, momentum for scaling-up aid to developing countries increased with the 2002 UN Conference on Financing for Development held in Monterrey. There was wide consensus amongst the donor countries in attendance and the various multilateral agencies on the need to provide a push in order for the MDGs to be achieved by 2015 (Mavrotas and Ouattara, 2007). The meeting was a step in the right direction for those advocating for the renovation of the aid agenda following the slow-down of the late 1990s. The consensus that was reached advocated for more aid as a

necessary measure to meet the MDGs, likewise opened the door to the exploration of new sources of development finance, improved domestic resource mobilization and improvements in aid effectiveness (Mavrotas and Ouattara, 2007).

The orthodox nature of official development assistance is that most of it is channeled through the public sector. This means that for there to be any real impact of foreign aid on economic growth and poverty reduction, it is highly dependent on how the public sector reacts to inflows of aid resources, and in this case the public sector being the recipient government (McGillivray and Morrissey, 2001). In turn, governments respond to scaled-up aid flows through fiscal policy, which simply put is the government's way of using spending and taxation to influence the economy (Horton and El-Ganainy, 2009).

Fiscal policy in developing countries plays a key role in helping make the development process effective. The effective use of resource flows requires sound fiscal management. It is for this reason that aid recipient governments need to frame their spending with a medium- to- long-term perspective in mind. Additionally, they need to ensure alignment of budget priorities with those of donor financing, as well as strengthen critical fiscal institutions. This helps recipient countries absorb foreign aid in a sustainable way (Gupta *et al.*, 2007).

The recent calls for scaling-up foreign aid to finance the development agenda has created an opportunity for researchers and policy makers to investigate the macroeconomic consequences that arise to due increased resource flows. There have been ongoing concerns about whether developing countries are able to effectively absorb additional foreign aid, also related are issues pertaining to the diminishing returns associated with foreign aid and possible adverse effects on macroeconomic aggregates such as the real exchange rate and inflation. Further, attention has also been directed towards the possible crowding-out effects that may be created by incremental aid and the soundness of policy response from recipient governments (Mavrotas and Ouattara, 2007).

Then again, the question of whether foreign aid has been successful in bringing out desired change is still a difficult one to conclude on. Different studies have yielded varying results. For example, studies by Burnside and Dollar (2000), Khan (1998) and Gomanee *et al.* (2003) have argued that foreign aid has a positive impact but only in countries with a good policy environment. Others like Bräutigam and Knack (2004) found evidence of a negative impact of foreign aid. While, Mosely *et al* (1987) and Boone (1996) argued that foreign aid had no demonstrable effect.

Regardless of standpoint, the aim of this paper is to empirically investigate the relationship between foreign aid and government fiscal behavior and in particular in Zambia. This will require assessing the impact that foreign aid has on government spending, government revenue collection and domestic borrowing. Zambia was chosen for this study because it possesses a unique history, both economically and politically. The country has been through some political shifts and has also been affected by a number economic shocks which have been significant in explaining how external financing in the form of foreign aid has impacted government's fiscal response over the last few decades.

1.1 Background

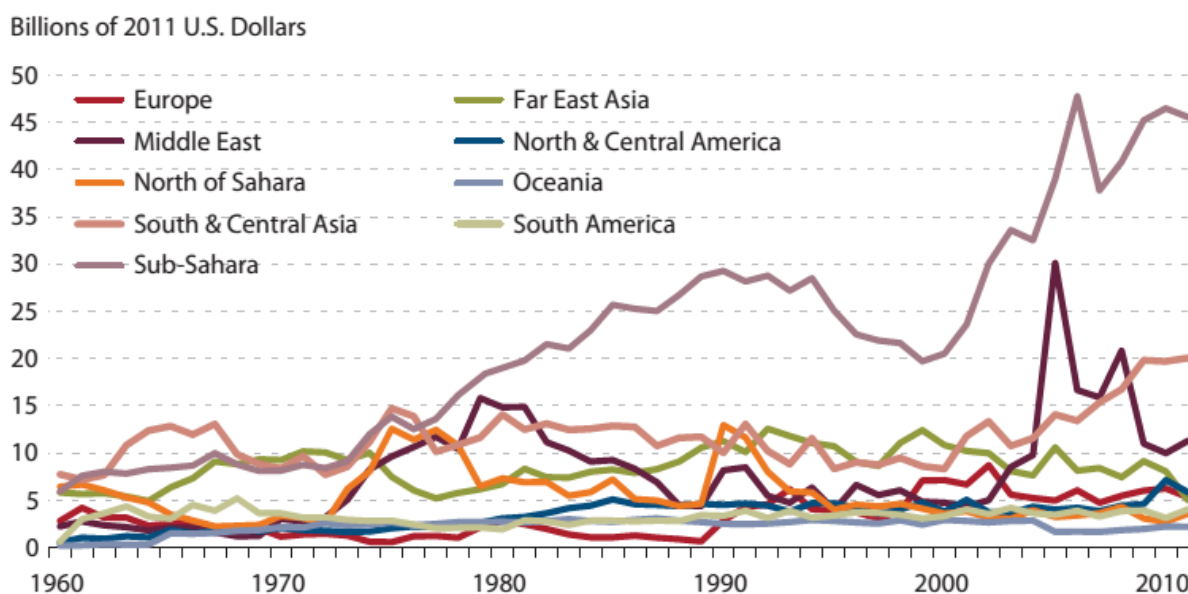
The history of foreign aid flows to developing countries has evolved over time, particularly flows aimed towards the sub-Saharan region. What is evident from a review of the aid flows is that there has been a progressive rise in official development assistance (ODA) since 1960 and it is still on the rise till today. Foreign aid flows have surged from approximately \$6 billion in 1960 to \$46 billion in 2011 (Bandyopadhyay and Vermann, 2013). This has all been in support of the big push theory, where foreign aid was traditionally viewed as a tool for overcoming the savings gap experienced in most developing countries, thereby releasing them from the plague of the poverty trap (Abuzeid, 2009).

Traditional growth theories revealed that foreign aid would be the necessary key that would enable developing countries transform their economies. These theories showed that the impact of aid was dependent on its effects on savings, investment and government behavior (McGillivray and Morrissey, 2001). Conventionally, it was assumed that foreign aid was meant to support domestic saving, meaning foreign aid was to finance investment and not consumption expenditure. This notion was supported by a number of early studies on the fiscal effects of foreign aid (McGillivray, 2000). However, with time the assumption that aid was only meant to finance capital expenditure received wide criticisms and was challenged by a number of researchers who not only suggested that it was possible to allocate aid to consumption but that aid could actually reduce domestic savings thus creating a cycle of aid dependency (McGillivray, 2000; Senbet and Senbeta, 2007).

Figure 1 below gives the historical trend of ODA flows to the different regions of the world. We notice that a major portion of ODA flows after the mid-1970s have mostly been directed to sub-Saharan Africa. The rest of the regions have on average experienced constant flows, with the

exceptions of the Middle East and South & Central Asia who have experienced increased ODA flows since the mid-2000s.

Figure 1: Net ODA to Regions (1960-2011)



Source: OECD

Studies on the fiscal effects of foreign aid have been addressed by two perceptions in literature. Namely, fungibility studies and fiscal response studies. Fungibility studies are concerned with identifying whether foreign aid intended for particular expenditure items is actually allocated towards those areas. Whereas, fiscal response studies explicitly model how the impact of aid is mediated by government fiscal behavior (Franco-Rodriguez, 2000; McGillivray and Morrissey, 2001). More will be said about the two concepts in the next section, but for feasibility purposes this paper focuses primarily on government fiscal response in Zambia.

1.1.1 Zambia Case Overview

During the first few years after Zambia gained its independence in 1964, the country was one of the best performing economies in the world. It was relatively prosperous as it built its economy on trade in mineral resources, mainly copper which is Zambia's main export good. The country was able to finance much of its development from the domestic resources it collected, and external financing was mainly used to support government initiated projects and to strengthen diplomatic ties (Wohlgemuth and Saasa, 2008).

In the 1970s, a combination of internal and external shocks hit the nation. Due to the oil crisis, prices of the commodity went up and this was coupled by a fall in copper prices. This affected the country's revenue position and this was the beginning of Zambia's debt crisis. The country borrowed to finance most of its expenditures and by the early 1980's, Zambia's economy was in serious trouble (Anderson *et al.*, 2000; Wohlgemuth and Saasa, 2008). Soon after the crisis period, Zambia had no choice but to become a major aid recipient and foreign aid has been fluctuating in an increasing trend ever since. For most part of the 1980s, the country subscribed to a number of International Monetary Fund (IMF) and World Bank structural adjustment programmes (SAPs) in order to deter its slipping economy (Anderson *et al.*, 2000).

During the 1990s, Zambia was regarded as one of the poorest nations in the World. It performed poorly in terms of human development compared the rest of sub-Saharan Africa, with its social indicators way below the region's averages. Further, Zambia's domestic and foreign debt levels reached unsustainable levels, which in turn affected the country's macro-economic performance. These and many other factors led to the country to becoming highly dependent on foreign aid. From 1991, ODA inflows averaged around 30% of Gross Domestic Product (GDP) and by 1995 went as high as 56%. (Anderson *et al.*, 2000).

The country's economic performance improved considerably after the year 2000. Real annual GDP growth averaged 4.6 per cent in the five years from 2002 to 2007, reversing the negative trend in previous periods. The country reached a major milestone in 2005, when it reached its completion point under the Heavily Indebted Poor Countries (HIPC) initiative, triggering significant debt cancellation. Zambia's foreign debt was reduced to US \$4.0 billion, down from the \$7.1 billion registered at end 2004. That same year Zambia also became eligible for debt relief under the G8 initiative, which proposed cancellation of all of the country's debts to the IMF, the African Development Bank and the World Bank. After the G8 commitments were effected through the Multilateral Debt Relief Initiative (MDRI), Zambia's total external debt was reduced to some \$500 million (MoFAD, 2010; Wohlgemuth and Saasa, 2008).

However, much of the progress was thwarted as a result of the global financial crisis in 2008. The economic state of the country was weakened as a result of the impact on copper prices. Further, donor confidence was undermined by concerns about fiduciary risk, particularly following a major corruption scandal in the Ministry of Health in 2009 and concerns about the road sector. As a

result, the Global Fund to Fight AIDS, Tuberculosis and Malaria (GFATM) and a number of Poverty Reduction Budget Support (PRBS) disbursements were suspended for some time in 2009. The situation likely weakened perceptions of the government as a responsible foreign aid recipient. However, the effects of this were off-set against Zambia's relatively positive assessment on a number of governance indicators (Prizzon, 2013).

An assessment of recent happenings has shown that Zambia's new middle-income status and improved access to international capital markets has changed the aid landscape in the country. It is now characterized with falling ODA volumes, and the ODA/GDP ratios are now well below the Low Income Country (LIC) average. This means Zambia is no longer an aid dependent country as it once was in earlier years (Prizzon, 2013). The move from aid dependence to self-reliance will heavily depend on the country's ability to create inclusive institutions and have prudent fiscal and macroeconomic management. This has to be joined with the right set of incentives from donors in order to get the best results out of the current aid support the country is receives (Bräutigam, 2000)

1.2 Aid Effectiveness

The coordination of aid efforts by the donor community is paramount in ensuring the effective use of foreign aid. A number of ingenuities have emerged over the years aimed at improving the way foreign aid is managed. Some of the most important initiatives include the following; the Declaration of Aid Harmonization by aid donors in Rome in February 2003, the Paris Declaration on Aid Effectiveness in March 2005, the Accra Agenda for Action in September 2008 and the Busan Partnership for Effective Development Co-operation in November 2011 (Mavrotas and Outtara, 2007; OECD, 2011).

There are five principles that were agreed upon at these different fora which act as the pillars supporting the aid effectiveness debate. These are the encouragement of local ownership; the alignment of development programs around a country's development strategy; the harmonization of practices with the aim of reducing transaction costs; the avoidance of fragmented efforts by donors and the creation of results-based frameworks (OECD, 2005; OECD, 2008; OECD, 2011).

Issues of absorptive capacity constraints additionally determine how much foreign aid can be spent in the short-term. Depending on the institutional capacity of the government, some foreign aid might need to be saved in order to prevent negative macroeconomic effects on the economy. Stable

or smoothed spending is the preferred option as it enables recipient governments to increase expenditure in a sustainable manner over the medium term (Gupta *et al.*, 2007).

Aid ineffectiveness is likely to be due to low productivity of aid-financed investments just as much as foreign aid which is diverted to unintended uses. Fungibility, which is defined as the transfer of aid resources towards items not accounted for¹, does play a role in ensuring effective use of foreign aid but a minimal one in most cases. According to McGillivray and Morrissey (2001), this does not mean that donors are not able to influence how foreign aid is used but that their influence is less than complete. There has been a push for more emphasis on aid effectiveness to be focused on government policy direction and general expenditure rather than categorical aid expenditure.

1.2.1 Aid Volatility

Aid volatility and uncertainty are issues of concern that affect the effective implementation of fiscal policy. Foreign aid flows are said to be 40 times more volatile than tax revenues, and more volatile than remittances (Gupta *et al.*, 2007). These complications brought about by aid volatility are more pronounced when large parts of government spending are financed by foreign aid. Therefore, it is necessary to monitor the outcomes from scaling up aid in relation to this subject and explore different mitigation strategies against it.

The impact of aid volatility should be judged on the influence it has on achieving the actual goals set out for foreign aid, together with any negative side effects that might be identified. Despite the limitations of studying aid volatility at an aggregated level, it is still vital to assess how foreign aid flows have evolved over time as this information can be useful for policy direction in recipient countries (Hudson, 2012).

1.2.2 Aid Heterogeneity

Foreign aid support to developing countries is disbursed in different forms. Some of these different financing modalities include; concessional loans, grants, project aid, program aid, technical assistance, development food aid and humanitarian assistance. Likewise, these different aid modalities are meant to fulfil different developmental purposes.

Aid modalities are instruments that allow for the transfer of foreign aid from donors to recipient countries. They give a description of the mode of aid delivery and the recipient government

¹ As defined by White and Dijkstra (2003: 468)

programs, projects, systems and institutions which the aid intends to finance (Leiderer, 2012). There is no universally accepted definition of aid modalities but the majority of development organizations accept that aid can be categorized by the different modes listed above.

Project aid is generally used for specific projects while program aid is generally distributed for non-project based activities. Donors have greater control over the use of project aid, whereas the opposite is true for program aid. Program aid goes through the recipient government budget thereby reducing the control donors have over the use of such funds (Mavrotas and Ouattara, 2007).

The relative efficiency of loans and grants likewise plays a role in determining aid effectiveness. Grants are transfers of resources, either in monetary terms or in kind, for which no payment is required. Concessional loans are monies lent at below market interest rates, extended by governments and official agencies (OECD, 2016). The preconceived view is that loans are a better measure for meeting development objectives due to their demand of efficient use because they are to be repaid. On the other hand, one can argue that recipient governments prefer grants because they do not have to be repaid and can then be used to substitute for domestic revenues (Gupta et al., 2003)

Studies by Mavrotas (2002), Gupta *et al.* (2003), Mavrotas and Ouattara (2003), and Clements *et al.* (2004) have revealed that different aid modalities yield varying effects on aid recipient economies. Therefore, it is vital to investigate the impact that these different aid modalities have on the fiscal aggregates.

1.3 Problem Statement

Much of aid effectiveness literature has focused on the effects of foreign aid on economic growth. In as much as research carried out on this topic is important, it is vital as well to understand the macroeconomic impact of foreign aid on a wide array of other factors which are just as critical in measuring the effectiveness of aid in a recipient economy. Similarly, it is equally important to assess if indeed foreign aid was used to finance public expenditure as this has an impact on the final outcome of improving the livelihoods of people in recipient countries (McGillivray and Morrissey, 2001).

As earlier mentioned, foreign aid is given to governments and as such assessing the fiscal effects of foreign aid requires an in-depth understanding of how the government is affected by external resource inflows. Accordingly, the effectiveness of aid will crucially depend on the fiscal response of recipient governments. Unfortunately, the link between foreign aid and government fiscal behavior is not straight forward because recipient governments have different priorities which they intend to pursue despite donor motives. How they allocate aid funds amongst consumption and investment is different from country to country, and some part of the aid is fungible so may be used for other purposes such as debt reduction.

Furthermore, it is significant to test what effect different aid modalities have on the fiscal behavior of the government. Aforementioned, different aid modalities have varying effects on government's fiscal response. Hence, the study takes into account aid heterogeneity and creates estimation models that test the impact of disaggregated aid on the fiscal aggregates. The modalities of interest chosen for this study are concessional loans and grants.

Finally, the post-2015 development agenda which was formally adopted by the UN General Assembly presented the Sustainable Development Goals (SDGs). These development goals are the blueprint guiding development efforts from the year 2016- till- 2030 and are to be an enhancement from their predecessors the MDGs. They have been set ambitiously and in order to avoid failure, one way is to investigate previous performance of development efforts and create policies that address shortfalls identified in the different specific country contexts (CDP, 2015). Thus, it is through fiscal response studies that policy makers are informed on the best way to influence fiscal policy given increased aid resource inflows.

1.4 Research Objective

Literature on aid effectiveness and government fiscal behavior has been growing in number but still remains limited. Most studies investigating foreign aid and fiscal spending have focused on economic growth and fungibility, and these have provided little analysis on the impact of foreign aid on total government spending (Morrissey, 2015).

The objective of this paper is to add to the body of knowledge on fiscal response studies by determining the impact of foreign aid on government expenditure, revenue and domestic borrowing in Zambia.

More specifically, the paper will go into detail and:

- 1) Assess the trend of fiscal flows and ODA to Zambia from 1970 to 2014.
- 2) Measure the impact of net foreign aid inflows and disaggregated aid on government revenue.
- 3) Measure the impact of net foreign aid inflows and disaggregated aid on government expenditure. Government expenditure has been categorized into consumption and investment expenditure.
- 4) Measure the impact of net foreign aid inflows and disaggregated aid on domestic borrowing.

1.5 Structure of the Study

The paper is split into five sections. The first section introduces the topic, giving a brief background of the study. It introduces some important concepts, states the research problem and gives the research objective. The second section is the literature review, this section presents theoretical foundations and empirical case studies on the topic at hand. The third section is the methodology, presented here are the fiscal response model, the process of model estimation, as well as data issues that may be of concern. The fourth section gives the empirical results, this section discusses the findings of the study and highlights some of the study limitations. The last section is the conclusion and recommendations. From this, the main conclusions from the paper are presented and some policy implications and recommendations are drawn.

CHAPTER 2: LITERATURE REVIEW

The early works of Harrod (1939), Domar (1946), Chenery and Bruno (1962), and Chenery and Strout (1966) all provided the foundation for the necessity of foreign aid. According to early growth theories, developing countries struggled with domestic capital accumulation and external assistance was seen as the best option to assist these countries break from the trap of poverty. For economic development to take place, domestic savings and foreign exchange reserves had to be supplemented by additional resources from foreign aid otherwise there would be a constraint on long-term growth in these developing countries (Omoruyi, 2014).

Over the years many more studies, both theoretical and empirical, have been conducted on the topics of foreign aid, growth, aid effectiveness and fiscal response. The fiscal response method provides the foundation of the framework of this paper. This section will review some theoretical literature and empirical studies that have been conducted on the impact of foreign aid over the years, paying particular attention towards the fiscal effects of aid.

2.1 Theoretical Review

Despite the fact that most of the studies exploring the effect of foreign aid on growth have produced conflicting results, the early growth models supported the notion that foreign aid was beneficial to recipient countries as it supplemented the domestic savings and eased foreign exchange shortage. By means of relating to fiscal response studies, no such well-developed theories were available at the time which could explain the influence that foreign aid had on government fiscal behavior (Omoruyi, 2014).

The beginning of fiscal response studies can be traced back to the work of Heller (1975). He developed the fiscal response model to gain insight into the interactions among several categories of public expenditure and of domestic and foreign revenue. It was argued that foreign capital inflows resulted in increased public consumption rather than increased investment, taxes were also squandered on non-productive forms of public consumption and the consequence of this was that foreign capital inflows contributed less to growth. He sought to examine these questions using econometric techniques through the fiscal response model described in the next section.

Over the years, Heller's specification of the fiscal response model was adopted and modified to consider current trends in development practice or to address country context specificities. For

example, Mosley *et al.* (1987) adjusted the model to examine the influence that overseas capital had on growth when channeled through private and public investments. In their study, foreign aid had to be indirectly captured through prices in the private investment function, and growth was a function of both private and public capital stock thus the indirect effect of foreign aid was captured from both fronts.

Gang and Khan (1999) in one of their latter studies suggested that Heller's model was impractical based on the argument that governments should not place the same weights for over and undershooting of their target variables. As such, their study proposed an alternative quadratic-ratio loss function which sought to minimize the deviations of target variables by attaching different weights, unlike the previous studies which took the deviations as linear.

Franco-Rodriguez *et al.* (1998) as well made some adjustments to earlier model specifications by treating aid as an endogenous variable in their quadratic utility function and included inequalities in their budget constraint, differing with previous studies. Further, Franco-Rodriguez *et al.* (1998) allowed for domestic borrowing to be a funding instrument for government consumption unlike previous studies which limited it to funding investment. Many other authors have made their own modifications depending on which hypotheses they planned to test in their studies, some of these including White (1994), Khan (1998), McGillivray (2000) and Mavrotas and Ouattara (2007). The trend of altering the fiscal response model through-out the years has been necessary for broadening the knowledge base of literature in the field of fiscal response studies.

2.1.1 Foreign Aid and Government Expenditure

Focusing on the expenditure side, theory does directly support the hypothesized intention of giving of foreign aid. As earlier explained, this has generally been to avail additional resources to recipient governments for funding their expenditure (Bandyopadhyay and Vermann, 2013). Most studies on this interaction have been centered on fungibility, assessing whether donors or governments spend foreign aid on its intended purpose. Nevertheless, numerous studies have found that even in situations where aid has been found to be fungible, the effectiveness of aid has not been lessened. To add on, studies based on fiscal response of governments have offered more analysis on the effect of foreign aid on total expenditure (Omoruyi, 2014).

McGillivray and Morrissey (2004) conducted a study to check whether aid in general was fungible, this test was done to assess if the effectiveness of aid is lessened due to the diversion of external

finance from funding public investment to consumption expenditure. Nonetheless, McGillivray and Morrissey (2000) put forward an argument mentioning that the distinction between the two types of expenditure needn't be necessary as government consumption comprises essential recurrent expenditures that are used to maintain and operate investment projects. From the studies reviewed, it was evident that both government investment and consumption spending were vital in ensuring that foreign aid was effective in accomplishment its target. Therefore, it is then necessary that any upsurge in government spending does not coincide with a fall in domestic revenue, whether foreign aid is fungible or not, such a counteraction does not have positive effects on the fulfilment of development assistance goals.

2.1.2 Foreign Aid and Government Revenue

As for government revenue, the few studies that have been done concerning aid and tax collection have not provided solid evidence that aid has a behavioral effect on revenue collection. Foreign aid may have a positive fiscal effect and spring up government revenue collection efforts. Though such a condition is more likely in situations where donors tie the aid to specific projects and the government has to mobilize domestic revenues to fund part of the project, or in situations where certain revenue collection conditionalities accompany the development assistance (Omoruyi, 2014). However, most of the studies in fiscal response have hypothesized that foreign aid inflows may actually lessen government's revenue mobilization efforts (Heller, 1975; Mosley *et al.*, 1987). This is particularly likely to be more prone in countries with weak institutional setups. This is so because such recipient governments view the foreign assistance as a direct resource substitute to domestic revenues that can be used to fund their expenditures (Gupta *et al.*, 2003).

In addition, some policy reforms associated with aid conditionality are difficult to address when they tend to reduce government revenue. Morrissey (2015) gives an example of economic liberalization as one such policy reform that is characterized by aid increases but is associated with revenue reductions. According to the World Bank's (1998) argument, in a situation where foreign aid inflows reduce domestic revenue, there are misguided policies, encouraged acts of corruption, incompetence within the recipient government and ultimately the hindrance of growth. Therefore, it is important that foreign aid inflows to a recipient country are accompanied by corresponding increases in government revenue.

2.1.3 Foreign Aid and Domestic Borrowing

As posited above, the effect of foreign aid on fiscal spending is generally positive but in most instances is rarely fully additional. In some cases, this may be due to the fact that aid is fungible. But more importantly, it is because foreign aid is used by recipient governments to support reductions in domestic borrowing. For most multilateral agencies, reducing levels domestic borrowing is one of the requirements that a recipient government has to meet in order to obtain external assistance (Morrissey, 2015). As well, most developing countries have limited capacity to affect domestic revenues in the short term. Thus, domestic borrowing, which is much easier to manipulate, acts as a major determinant for government spending depending on the amount of foreign aid that it receives and the public fiscal policies it has in place (Morrissey, 2015).

2.1.4 Disaggregated Aid and Fiscal Aggregates

Foreign aid in its disaggregated form provides the opportunity to look at the dynamics of aid from a different perspective. This paper has focused on two modalities in particular, aid grants and net foreign loans. Each of these aid modalities has its own characteristics in terms of disbursement, composition and concessionality. As such, the choice of modality for aid delivery serves to fulfil different purposes both for donors and recipient governments (Mavrotas and Ouattara, 2007). The main aim behind the investigation of the impact of grants and net foreign loans was to understand if there exists a significant difference in the way each of these aid modalities affects the different fiscal aggregates.

In terms of revenue collection, there are concerns that have been highlighted in different literature about aid discouraging tax effort if it is given purely in grant form. The reason for this is that grants have no repayment obligations. On the other hand, loans have to be repaid and are then viewed to encourage tax effort in order to make it possible for recipient governments to meet loan repayments (Gupta *et al.*, 2003). Furthermore, due to the same differences of non-repayment and repayment between grants and loans respectively, it is expected that grants are more likely to be directed towards consumption while loans are to be directed towards investment (Gupta *et al.*, 2003). As for domestic borrowing, both grants and loans are expected to reduce the amount of domestic borrowing but given the characteristics of both modalities, it is expected that recipient governments would be more in favor of grants to serve this purpose.

In general, a number of different research studies have revealed that the impact of foreign aid as a whole and in its different distinctions, on government expenditure, revenue and in some cases domestic borrowing, differ from study to study. What has been evident is that the government's spending has depended on three basic sources of revenue which are; foreign aid, government revenue, and domestic borrowing. Therefore, it should not be assumed that if all the foreign aid that goes through the government budget is spent then all these resources are spent on public expenditure. Spending might increase by more or less the amount of aid received depending on the other dynamics at play amongst the fiscal variables (Morrissey, 2015). Therefore, it is important to examine the outcomes from some empirical cases that have tested these hypotheses so as to assess their validity.

2.2 Empirical Studies

To begin with, we look at some of the early empirical studies on fiscal response with the first being that of Heller (1975). Heller's paper considered the impact of different kinds of aid on public expenditure, domestic borrowing and government revenue. The study used cross-section time series data from eleven African countries, distinguishing between English-speaking and French-speaking countries. Results revealed that public consumption and investment expenditure were strongly interdependent on each other and were positively influenced by aid. Increases in tax revenue also positively influenced public expenditure and corresponded with a reduction in net borrowing. Disaggregating aid between loans and grants, the author noticed that both loans and grants reduced domestic borrowing and taxes. Heller (1975) also observed that loans were more pro-investment while grants were pro-consumption. In addition, the reduction of taxes contributed indirectly towards private consumption. The results from Heller's study confirmed that public decision makers differed in their preferences amongst the two types of expenditure and the mode in which these expenditures were to be financed.

Gang and Khan (1991) later adopted Heller's model and empirically investigated the fiscal behavior of the Indian government to foreign financial inflows. They employed time series data for the period 1961-1984. The study proposed a two-step procedure that firstly tested the effect of foreign aid on public investment, taxation and government consumption. Secondly, they estimated the impact of public investment and consumption on growth and income distribution. After using a non-linear three-stage least square (3SLS) method of estimation, Gang and Kang (1991) found that their results varied with earlier empirical work. Grants and loans were found not to have a

significant effect on government consumption. Though, results concerning tax revenues were similar with Heller's findings in that tax revenues were used to fund consumption. Their work received some criticisms from other authors, including White (1994) who critiqued their work placing concern over theoretical and methodological aspects.

Now turning the focus towards some recent studies on fiscal response in select sub-Saharan countries, we begin with McGillivray and Ouattara (2003) who applied a fiscal response model to look at the interactions between foreign aid and government fiscal behavior in Cote d'Ivoire during the period 1975-1999. Their paper differed from previous works as it recognized the significant impact that debt service expenditure had on other fiscal aggregates and foreign aid. Their findings showed that a significant amount of foreign aid was used to service public debt compared to other types of government expenditure. Foreign aid induced a reduction in taxation effort, though the authors noted that this could have actually benefited the private sector by indirectly increasing private sector consumption. In addition, inflows of foreign aid did not correspond with reductions in the level of public debt entailing that aid and public debt were not substitutes for financing government expenditure contrary to conventional thinking (McGillivray and Ouattara, 2003).

According to Osei *et al.* (2003), they found similar results in terms of taxation and domestic borrowing. Their study analyzed the effect of aid on fiscal behavior in Ghana using annual data over the period 1966-1998 within a cointegrating Vector Autoregressive (VAR) framework. Results from their study revealed that the impact of aid on tax revenues and government spending was relatively insignificant with the two estimates almost having identical magnitudes. Furthermore, results suggested that domestic borrowing had been the main long-term financing instrument for the government and that aid was used as a short- to medium-term measure to alleviate budget constraints (Osei *et al.*, 2003).

Moving on, Fagernäs and Schurich (2004) conducted a study that discussed movements in aid and fiscal aggregates in Malawi. The paper used several Vector Error Correction (VEC) models to estimate the fiscal effects of net ODA, aid grants and concessional loans on fiscal aggregates over a thirty-year time period. Estimation results suggested that increases in all the three types of external financing had a positive impact on government investment and a negative effect on domestic borrowing. Increases in foreign aid did not appear to discourage tax effort but in terms

of government consumption, increases in grants and net ODA had a negative association with consumption while loans were positively associated with consumption.

Another case study by M' Amanja *et al.* (2005) employed time series econometric techniques to investigate the relationship between fiscal aggregates, foreign aid and economic growth in Kenya. Tax revenues were found not to have a significant direct influence on growth but had an indirect effect on government expenditure. The effect was dependent on the consideration of either loans or grants, of which grants appeared to have a positive effect on growth in the long-run. Conversely, loans appeared to have a negative effect on growth as they substituted taxes and accordingly were used to finance fiscal deficits. Comparing these results to the study of Gupta *et al.* (2003), they found that their results contradicted one another as in their study grants were associated with reduced tax effort while loans were associated with an increase in tax effort.

The final case to be reviewed was the study by Bwire *et al.* (2013). They assessed the dynamic relationship between foreign aid and domestic fiscal variables in Uganda over the period 1972-2008. They used a Cointegrated VAR model for their empirical analysis. The key results from the study were that foreign aid and the fiscal variables formed a long-run stationary relation. A number of hypotheses of this long-run effect of aid on government fiscal behavior were tested, and the assumption of variable endogeneity held for all the variables. The findings showed that foreign aid encouraged tax effort, reduced domestic borrowing and increased public spending. Although the increases in public spending were less than proportional to incremental aid, the existence of a budget constraint suggests that foreign aid to the government was likely to be fully additional. Improved public finance management and reduced domestic borrowing are common policy conditions attached to aid, and this was the policy direction portrayed in the study as results revealed that foreign aid was either associated with or caused beneficial policy responses in Uganda. Alternatively, it could be the case that in fiscal terms, foreign aid was utilized reasonably.

From the cases above, we notice that researchers have found it difficult to generalize the effect that foreign aid inflows have on recipient governments' fiscal behavior. Findings have varied from study to study, with each case producing context specific results. To conclude the review, *Table 1* below gives a summary of other empirical studies that have investigated the association between foreign aid and government fiscal response.

Table 1: Summary Results of Selected Fiscal Response Studies					
Authors	Country/Cross Section	Impact of Aid on			
		Revenue	Investment	Consumption	Borrowing
Khan & Hoshino (1992)	Cross-section (Asia)	1.2	1.2	0.3	
Franco-Rodriguez <i>et al</i> (1998)	Pakistan	-3.6	0.1	-2.4	0.9
McGillivray & Ahmed (1999)	The Philippines	-0.1	-0.02	0.02	-1.81
Franco-Rodriguez (2000)	Costa Rica	0.05	-0.02	0.07	-0.08
Fagnäs and Roberts (2004b)	Uganda	-3.19	3.16		0.37
Ouattara (2006a)	Senegal	-0.68	0.13	-0.07	0.18
Senbet and Senbeta (2007)	Pooled data (Africa)/ <i>Grants (top)</i> <i>Loans (bottom)</i>	0.001	0.145	0.844	
		0.003	0.58	0.418	
Machado (2010)	Nicaragua	0.17	0.47	-1.47	-3.6

Note: Positive values correspond to an increase and negative values to a decrease

CHAPTER 3: METHODOLOGY

The paper adopts a mixed methods approach for its methodology, with priority given to the quantitative aspect of the research. A case study on development assistance to Zambia and government fiscal behavior is presented and research materials such as literature, quantitative data and qualitative documents were used for the analysis. For qualitative analysis, the paper reviewed different kinds of literature, mainly consisting academic journals, and policy documents that were related to the topic of interest. As for quantitative analysis, the paper used econometric estimation to calculate the impact of foreign aid on government consumption and investment, revenue collection and domestic borrowing. The use of qualitative data was to help explain quantitative findings and to examine in more detail unexpected results from the quantitative study. Moreover, aid was disaggregated to get the impact of different aid modalities on the fiscal aggregates.

3.1 The Fiscal Response Model

The model assumes that recipient governments are rational decision makers working on the principal of utility maximization. Governments receive aid flows through different channels such as; projects, budget support or debt service savings, and wish to maximize their utility subject to alternative uses of public resources at their disposal. All the causal relationships between aid flows and government spending are assumed to be dependent on the fiscal choices made by the recipient government (Bwire *et al.*, 2013).

According to Heller (1975), the alternative uses of public resources include expenditure on the following; (i) the provision of socio-economic services, (ii) the maintenance of political and bureaucratic organizations, and (iii) public fixed capital formation. In the breakdown below, government's consumption expenditure (both developmental & non-developmental) is referred to as (G), and public expenditure on fixed capital as (I_g). The finances for public expenditure are obtained from domestic and foreign sources, and categorized as follows; government revenue (tax and non-tax revenue) (R), net foreign aid disbursements (A), and borrowing from domestic sources (B) (McGillivray, 2000). The utility function of the decision makers at any time period t is represented as follows:

$$U = F(I_g, R, G, B, A) \quad (1)$$

Policy makers are expected to set yearly targets for each revenue and expenditure variable (I_g , G , R , and B), and strive to attain these targets. The target levels for each variable listed above is denoted with an asterisk. Empirical applications have proved difficult in estimating the targets because there isn't an acceptable theory that explains how governments should set revenue and expenditure targets (Mavrotas and Ouattara, 2007). Still, the standard practice used in fiscal response literature is by approximating the desired levels through econometric techniques such as cointegration. The fitted values obtained from the estimation are then used as proxies for the targets.

As well, earlier fiscal response models assumed aid to be exogenous, a number of authors have dispelled this assumption and adjusted their research hypotheses to consider the endogeneity of aid. Franco-Rodriguez (2000) argued that recipient governments have some bargaining power in negotiations that determined the amount of aid to disbursed to their country. Furthermore, since not all committed aid is expected to be disbursed, recipient governments could influence the extent to which aid is actually disbursed. Therefore, foreign aid is considered to be endogenous. Given this piece of information, the suggested utility function in *equation (1)* takes the form of the following quadratic loss function:

$$U = \alpha_0 + \left(\frac{\alpha_1}{2}\right)(I_g - I_g^*)^2 - \left(\frac{\alpha_2}{2}\right)(G - G^*)^2 - \left(\frac{\alpha_3}{2}\right)(R - R^*)^2 - \left(\frac{\alpha_4}{2}\right)(A - A^*)^2 - \left(\frac{\alpha_5}{2}\right)(B - B^*)^2 \quad (2)$$

Where, $\alpha_i \geq 0$ for $i = 1, \dots, 5$. All other variables in *equation (2)* representing actual revenues or expenditure are treated as endogenous. Therefore, the function implies that for each year the government maximizes its utility by trying to achieve the targets it has set out, any deviation from the targets results in a loss of utility (Ouattara, 2006b). Moreover, the foreign aid variable can be disaggregated either into aid loans (A_l) or aid grants (A_g).

Furthermore, the maximization problem is subject to the following constraint equation:

$$I_g + G = R + A + B \quad (3)$$

Equation (3) states that public expenditure, which is the sum of government investment and consumption, is financed by the sum of government revenue, foreign aid and borrowing from

domestic sources. The equation represents the government's overall budget and must hold at all times (Ouattara, 2006b). Additionally, we assume that spending in each revenue category is not restricted, meaning that certain proportions of revenue is fungible. For practical illustration, *equation (3)* can be broken down into two equations:

$$I_g = B + (1 - \rho_1)R + (1 - \rho_2)A \quad (4)$$

$$G = \rho_1 T + \rho_2 A \quad (5)$$

Where, coefficients ρ_i are between 0 and 1, ρ_1 is the proportion of government revenue and ρ_2 the proportion of foreign aid that goes to consumption. It is also assumed that recipient governments receive external pressures on the way they spend their revenues. Thus, *equation (5)* can be transformed into the following inequality:

$$G \leq \rho_1 R + \rho_2 A + \rho_3 B \quad (6)$$

From the inequality above ρ_3 is the proportion of borrowing that is used to finance consumption. In the event that governments choose not to borrow to finance consumption, ρ_3 equals zero. To sum it all up, the problem that governments face is maximizing their utility function, i.e. maximizing *equation (2)*, subject to the constraint equations (3) and (6).

3.2 Model Estimation

Fiscal response studies permit for the study of wider fiscal influences of foreign aid on revenue, expenditure and domestic borrowing over a period of time. Most of the early applications of the fiscal response models employed structural econometric estimation techniques and what was evident to authors at the time was that the models had numerous limitations. The fiscal response models were hard to estimate and were very sensitive to data, this often led to the production of inconsistent estimates of the core parameters. In addition, the association between the variables being estimated was assumed to be fixed over time, meaning the models did not permit for dynamics over time (Ouattara, 2006b; Omoruyi, 2014).

As a result of these limitations, recent studies have tried to address the shortfalls in estimation by undertaking time series econometric methods that portray specific benefits depending on the context being considered. Given that a long run equilibrium association can be established between foreign aid and the fiscal aggregates, econometric models can then estimate which variables are

the drivers of the association and how each variable answers back to the others. What is important for this type of fiscal response model estimation is to impose a structural relationship that depicts the response of the variables to one another, rather than one that imposes a structural association to estimate targets. Another benefit of these model estimation techniques is that they allow for the distinction in estimating long-run and short-run associations between the fiscal variables and foreign aid (Omoruyi, 2014).

Little effort was made to depart from the earlier estimation methods, but now the existence of more advanced econometric techniques has seen applications from author's such as Osei *et al.* (2003), M'Amanja *et al.* (2005), Ouattara (2006a) and Bwire *et al.* (2013). Most of these studies have estimated FRMs using the vector autoregressive (VAR) framework, in some cases complemented by impulse response functions. The structure of the VAR framework allows for the formulation and testing of a number of different hypotheses of interest on causal links between foreign aid and domestic fiscal variables. The estimation techniques uncover and describe data facts and characteristics, and take into account the interactions between macro-variables over time. There is an equation for each and every variable in the system, with each variable being explained by its own lags and lagged values of other variables (Bwire *et al.*, 2013).

Following from the work of Osei *et al.* (2003), *equation (7)* below gives a representation of the VAR equation:

$$Y_t = \sum_{i=1}^{p-1} \Phi_i Y_{t-i} + \mu + \varepsilon_t \quad (7)$$

Where, Y_t is a vector of aid and fiscal variables, Φ_i , ($i = 1, \dots, n$) is an $m \times m$ matrix of parameters, μ is a vector of deterministic components, ($i = 1, \dots, n$) is the number of lags included in the model and ε_t a vector of errors.

According to Granger's representation theorem, the VAR can be reformulated into a Vector Error Correction Model (VECM) if cointegration is detected between the series of data. The presence of cointegration means there exists Granger causality in at least one direction, therefore the data portrays a long-term equilibrium relationship between them (M'Amanja *et al.*, 2005). Using our variables of interest, which are revenues (Rev), investment (Inv), consumption (Con), domestic

borrowing (Bor) and foreign aid² (Aid), *equation (7)* can be reformulated into the following equilibrium correction system of equations:

$$\Delta Rev_t = \sum_{k=1}^r \lambda_k v_{k,t-1} + \sum_{i=1}^n \alpha_{1,i} \Delta Rev_{t-i} + \sum_{i=1}^n \alpha_{2,i} \Delta Inv_{t-i} + \sum_{i=1}^n \alpha_{3,i} \Delta Con_{t-i} + \sum_{i=1}^n \alpha_{4,i} \Delta Bor_{t-i} + \sum_{i=1}^n \alpha_{5,i} \Delta Aid_{t-i} + \mathcal{E}_{1,t} \quad (8a)$$

$$\Delta Inv_t = \sum_{k=1}^r \lambda_k v_{k,t-1} + \sum_{i=1}^n \beta_{1,i} \Delta Rev_{t-i} + \sum_{i=1}^n \beta_{2,i} \Delta Inv_{t-i} + \sum_{i=1}^n \beta_{3,i} \Delta Con_{t-i} + \sum_{i=1}^n \beta_{4,i} \Delta Bor_{t-i} + \sum_{i=1}^n \beta_{5,i} \Delta Aid_{t-i} + \mathcal{E}_{1,t} \quad (8b)$$

$$\Delta Con_t = \sum_{k=1}^r \lambda_k v_{k,t-1} + \sum_{i=1}^n \delta_{1,i} \Delta Rev_{t-i} + \sum_{i=1}^n \delta_{2,i} \Delta Inv_{t-i} + \sum_{i=1}^n \delta_{3,i} \Delta Con_{t-i} + \sum_{i=1}^n \delta_{4,i} \Delta Bor_{t-i} + \sum_{i=1}^n \delta_{5,i} \Delta Aid_{t-i} + \mathcal{E}_{1,t} \quad (8c)$$

$$\Delta Bor_t = \sum_{k=1}^r \lambda_k v_{k,t-1} + \sum_{i=1}^n \varphi_{1,i} \Delta Rev_{t-i} + \sum_{i=1}^n \varphi_{2,i} \Delta Inv_{t-i} + \sum_{i=1}^n \varphi_{3,i} \Delta Con_{t-i} + \sum_{i=1}^n \varphi_{4,i} \Delta Bor_{t-i} + \sum_{i=1}^n \varphi_{5,i} \Delta Aid_{t-i} + \mathcal{E}_{1,t} \quad (8d)$$

$$\Delta Aid_t = \sum_{k=1}^r \lambda_k v_{k,t-1} + \sum_{i=1}^n \theta_{1,i} \Delta Rev_{t-i} + \sum_{i=1}^n \theta_{2,i} \Delta Inv_{t-i} + \sum_{i=1}^n \theta_{3,i} \Delta Con_{t-i} + \sum_{i=1}^n \theta_{4,i} \Delta Bor_{t-i} + \sum_{i=1}^n \theta_{5,i} \Delta Aid_{t-i} + \mathcal{E}_{1,t} \quad (8e)$$

Where, Δ is the difference operator, $v_{k,t-1}$ represents residuals from the cointegrating equations and λ_k are the adjustment coefficients. r and n indicate the optimal lag lengths, and $\mathcal{E}_{i,t}$ are errors which are assumed to have normal white noise features.

According to Bwire *et al.* (2013), the method is an a-theoretical approach. This means that it is of less importance to estimate or test specific theoretical formulations of the planning targets, rather

² In this case, aid can represent; net foreign aid, grants or loans.

underlying theory should be invoked to choose variables to include in the analysis, and then select the appropriate normalization and to interpret the results.

The study will make use of impulse response functions to graphically present the effect of aid shocks on the fiscal variables over the short- to- medium-term. The impulse response functions measure deviations from the expected time paths. Given an aid shock, the measured flow effect is either positive or negative. A positive value indicates that the fiscal value in question increases and vice versa. Impulse response functions capture both direct and indirect effects caused by inter-relations in the lagged variables (Aregbeyan and Fasanya, 2014). The generalized impulse response effect of one standard error shock to the j^{th} equation at time t on variable X , takes the following form:

$$\psi_j(n) = \sigma_{jj}^{-0.5} A_n \Sigma e_j \quad (9)$$

Where, e_j is an $(m \times 1)$ selection vector that identifies the source of the shock, A_n is a coefficient matrix and σ_{jj} the variance of residual j .

Overall, the VECM is seen as an appropriate tool for the analysis because of its ability to jointly model the fiscal variables into a system of equations, estimate the magnitude of the effect of aid on fiscal aggregates, as well as measure the short-run and long-run effects due to aid shocks.

The study estimated three models and these models were selected based on the form of aid under consideration. The first model took on net ODA in order to measure the impact of aggregated aid on the fiscal aggregates. The remaining two models captured the impact of disaggregated aid on the fiscal aggregates as one of the models measured grants while the other measured foreign loans.

3.3 Data and Variables

The data collected for this study was based on annual data covering the period 1970–2014 and was obtained from four main sources. Data on net ODA, aid grants and net foreign loans were obtained from the OECD-DAC online database³. Two issues arise from the use of the ODA statistics obtained from the OECD. Firstly, the author acknowledges the fact that the ODA statistics differ from aid that is recorded in the budget. It is possible that injections of ODA do not have a fully additional effect when it comes to governments fiscal response because the data is not operating

³ The foreign aid data can be accessed at <http://data.oecd.org>

under a closed system. Therefore, there is the prospect of under- or over-estimating the magnitude of the impact of aid. Nonetheless, ODA does directly and indirectly have a fiscal effect on government's policy decisions and the author proceeds with this view in mind. Secondly, the maximum and minimum values of the ODA statistics tend to stand out. These figures can be taken as outliers and they correspond to debt relief that the country received in 2006. A more detailed explanation about the figures is given in the next section.

Moving on, national accounts data on government consumption and public investment were obtained from the United Nations online database⁴. While, data on government revenue was obtained from the World Bank *World Development Indicators*⁵. No complications were found with the national accounts data. Finally, data for domestic borrowing was obtained from the *International Financial Statistics* (IFS) and the *World Economic Outlook* (WEO). Once more, the maximum values of domestic borrowing are evidently quite high and this is due to the high debt-to GDP ratio that the experienced over the period.

As a check for consistency and correction for any gaps found in the data, more information was obtained from the *Government Financial Statistics* (GFS)⁶ and the *African Development Indicators*. To allow for comparability of the results and ease of the estimation process, all the data were expressed in percentage of GDP. *Table 2* below provides summary statistics of the variables used in the estimation process.

Variable	Mean	SD	Max	Min
Net Foreign Aid	14.20	8.24	51.04	2.42
Net Foreign Loans	2.47	9.21	37.02	-41.78
Aid Grants	11.73	9.13	60.83	2.73
Government Revenue	18.20	4.29	33.22	8.88
Government Consumption	10.03	2.27	14.93	4.79
Government Investment	15.59	11.95	38.45	2.37
Domestic Borrowing	125.34	66.21	277.53	28.80
Note: Values in percentages				

⁴ The national accounts data can be accessed from <http://data.un.org>

⁵ The WDI can be accessed from <http://data.worldbank.org/indicator>

⁶ The IFS, GFS & WEO can be accessed from <http://data.imf.org>

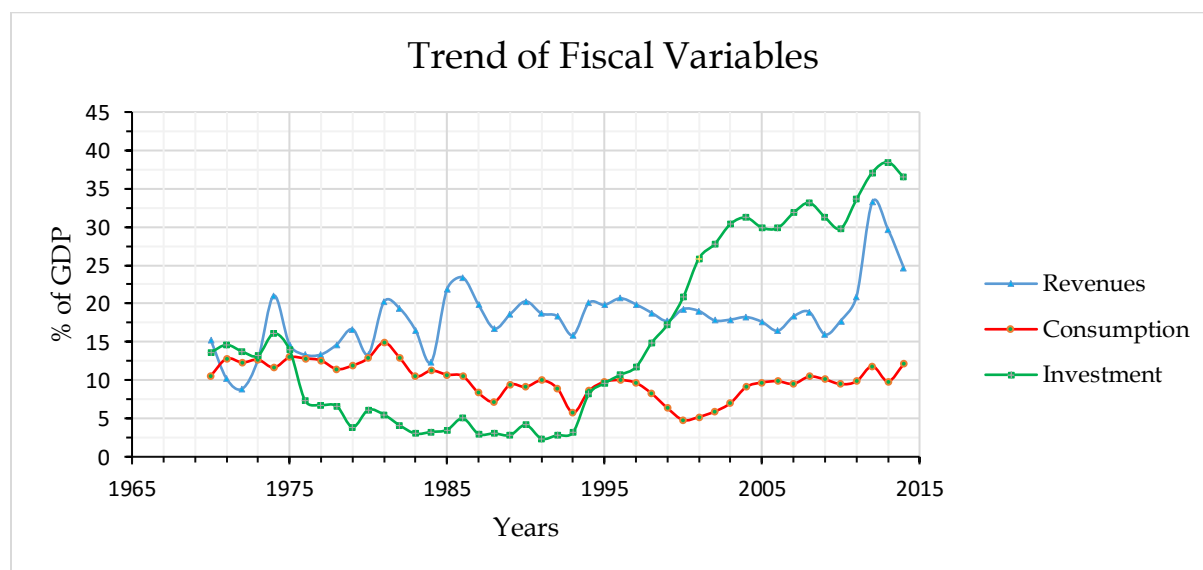
CHAPTER 4: EMPIRICAL RESULTS

This section presents the findings from the analysis of foreign aid and fiscal response in Zambia. Firstly, a descriptive illustration on the evolution of foreign aid, revenue and expenditure flows in Zambia is given to provide a broad picture of the trend that has existed from 1970 to 2014. This is followed by the presentation of results from the econometric estimation of the VECM models. This focuses on the impact of aid from the quantitative viewpoint, and lastly, the section ends by giving a brief summary of the major findings.

4.1 Trend of Foreign Aid and Fiscal Aggregates

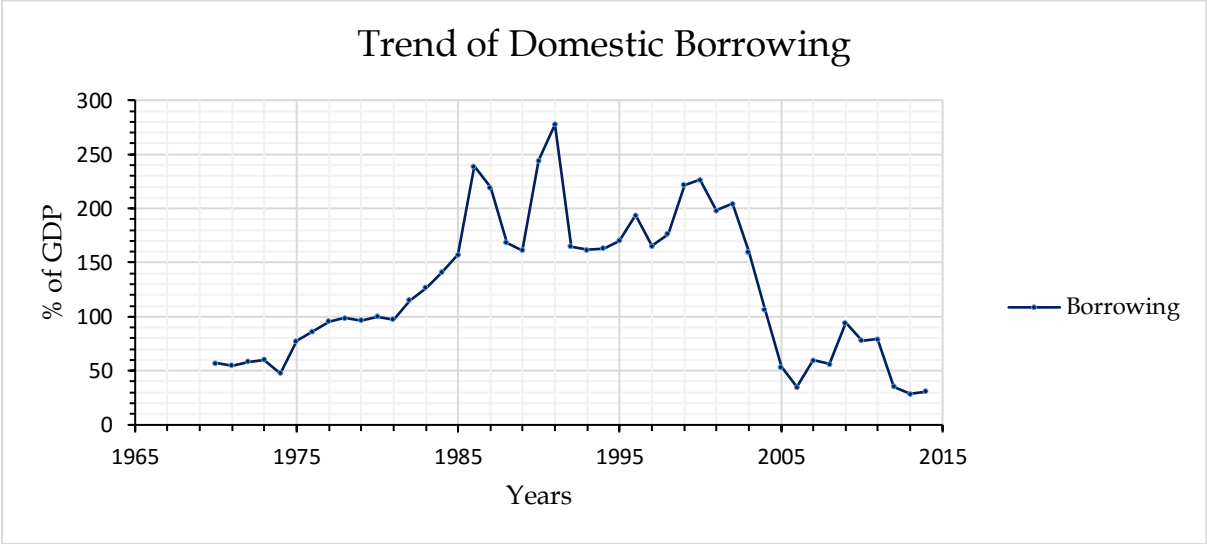
For each fiscal variable, it was observed that the revenue and expenditure flows over the period portrayed different trends. *Figure 2* below graphically illustrates this relationship for three fiscal aggregates; revenue, consumption and investment. In terms of revenue, the trend depicted a progressive increase over the time period and it was characterized by a period average of 18%. On the other hand, consumption showed a steady constant movement at about 10% of GDP from 1970 to 2014 with some slight variations. Lastly, a look at investment revealed two contrasting periods, the first a dip in the share of investment from 1970 up to 1993 then a sharp increase from then onwards up to 2014. The period average for investment was found to be 16% of GDP.

Figure 2: Revenue and Expenditure Flows in Zambia (1970-2014)



Domestic borrowing was more volatile than the other fiscal aggregates. What could be stated about the variable is that the share figures for most of the period averaged over 100% of GDP. *Figure 3* below shows the trend of the domestic borrowing variable.

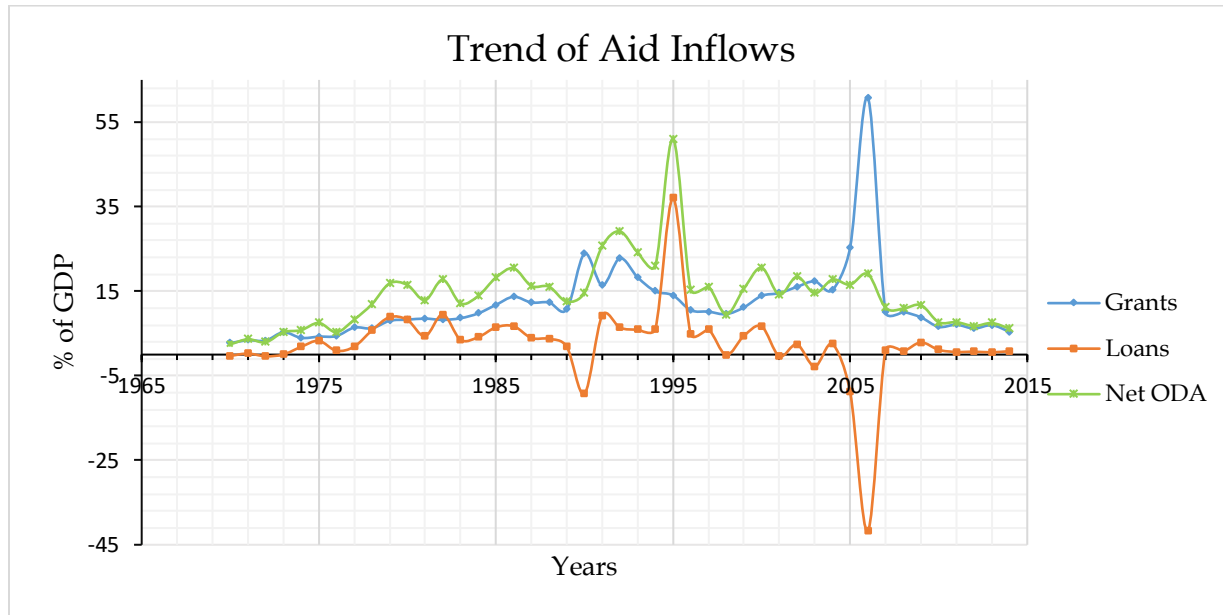
Figure 3: Trend of Domestic Borrowing in Zambia (1970-2014)



Foreign aid inflows to Zambia have been steadily increasing since 1970 despite a slowdown in recent years. Net ODA, grants and loans have averaged around 14.2%, 11.73% and 2.47% of GDP respectively. At first glance at the trend of aid flows in *Figure 4* below, two years in particular stand out, these are 1995 and 2006. The two years are exceptional years in that they represent periods of significant release of development funds and debt relief.

In 1995, total aid flows to Zambia reached a high of 50% of GDP. This was the first time the country experienced such levels of development assistance and the explanation behind the sudden rise in ODA was attributed to the release of Structural Adjustment Facility (SAF) and Enhanced Structural Adjustment Facility (ESAF) funds which amounted to over \$1 billion at the time (Carlsson *et al.*, 2000). The second talking point is in 2006 when Zambia, like many other developing countries, qualified for the HIPC and MDRI initiatives. In order to be eligible for debt relief, the country had to carry out structural and social reforms, implement its Poverty Reduction Strategy (PRS) for at least one year, improve on its debt burden indicators and maintain a track record of macroeconomic stability. As explained earlier, these debt relief initiatives ensured that the majority of the country’s debt stock was either reduced to manageable thresholds or was completely cancelled upfront (AfDB, 2005).

Figure 4: Foreign Aid Flows to Zambia (1970-2014)



In the year 2000, the country reached its decision point and from then onwards began to receive interim debt relief annually. This went on for five years until Zambia successfully reached its completion point in 2005. After reaching its completion point, a total stock of debt relief in excess of \$4 billion was further committed to Zambia and it is for this reason that the values of grants and net foreign loans reached extreme levels of 61% and -42% of GDP respectively. The purpose behind the inclusion of debt relief figures in the study analysis is that debt relief improves the debt position of the country and frees up resources for social spending. Zambia benefited from the HIPC and MDRI initiatives by gaining extra resources through debt service savings that could now be used to increase its expenditure towards developmental purposes in sectors such as health, education and as well as in other social services (AfDB, 2005). Therefore, debt relief does play a vital role in influencing government fiscal policy decisions.

Another important phenomenon to note in the figure above is the difference in the distribution of grants and net foreign loans. It can be inferred that Zambia, on average received more grants than loans over the period. The mode of aid delivery could also be significant in explaining why donors chose to extend much their development assistance in form of grants as Zambia over the period experienced a worsening debt crisis (Carlsson *et al.*, 2000).

4.2 Unit Root and Cointegration Analysis

A series of stationarity and cointegration tests were run on the variables and VEC models. Unit root tests were conducted using the Augmented-Dickey Fuller (ADF) test and the Phillips-Peron (PP) test. The null hypothesis for both tests is that there exists the presence of unit root in the variables. The results of the tests supported each other. It is evident that not all the variables were found to be stationary in levels but were all stationary after first differencing at 1% level of significance. Accordingly, the author decided it was necessary to consider first differencing when modelling the data for all the variables so as to maintain consistency in analysis. *Table 3* presents the results from the two tests.

Variable		Augmented-Dickey Fuller Test		Phillips-Perron Test	
		Level	First Difference	Level	First Difference
Revenues		-4.026**	-6.952***	-3.911**	-7.846***
Investment		-1.599	-5.098***	-1.607	-4.992***
Consumption		-2.070	-6.767***	-2.116	-6.884***
Borrowing		-1.498	-5.976***	-1.351	-6.016***
Total Aid		-3.607**	-10.605***	-3.531**	-12.839***
Grants		-4.366***	-9.485***	-4.402***	-10.911***
Loans		-5.239***	-10.037***	-5.250***	-12.239***
Critical Values	1%	-4.205	-4.214	-4.205	-4.214
	5%	-3.524	-3.528	-3.524	-3.528
	10%	-3.194	-3.197	-3.194	-3.197
Note: *, ** and *** denote significance at levels 10%, 5% and 1% respectively					

Tests for cointegration were carried out using the Johansen Test for Cointegration. The process required the selection of an optimal lag length for each model. The selected lag length had to be small enough to allow for estimation but high enough to satisfy the condition that the errors are approximately white noise. The selection criteria used found the optimal lag length for all the three the models to be two. See *Table 4* below for the lag order selection criteria.

Table 4: VAR Lag Order Selection Criteria

lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	-720.24				6.9e+08	34.5352	34.611	34.7421
1	-587.88	264.72	25	0.000	4.2e+06	29.4229	29.8778*	30.6641*
2	-555.765	64.231	25	0.000	3.1e+06*	29.084*	29.9181	31.3596
3	-530.978	49.574*	25	0.002	3.6e+06	29.0942	30.3074	32.404

Note: * denotes the lag order selected. LR: Sequential Modified LR Test Statistic; FPE: Final Prediction Error; AIC: Akaike Information Criterion; HQIC: Hannan and Quinn Information Criterion; SBIC: Schwarz Bayesian Information Criterion.

The cointegration rank was estimated using Johansen’s approach. The maximum Eigen value test and trace test were applied to determine the number of cointegrating vectors in the series. Both the trace test and maximum Eigen test rejected the null hypothesis that there are no cointegrating vectors. Cointegrating equations were observed and this implies that the series were cointegrating among the variables in the long-run⁷. The results of the trace test and maximum Eigen test are presented in *Table 5* below.

Table 5: Johansen Test for Cointegration

maximum rank	parms	LL	eigenvalue	trace statistic	5% critical value	1% critical value
0	105	-484.85099		119.1432	68.52	76.07
1	114	-456.58789	0.75663	62.6170	47.21	54.46
2	121	-439.13028	0.58225	27.7018*1*5	29.68	35.65
3	126	-431.89467	0.30356	13.2306	15.41	20.04
4	129	-426.83148	0.22366	3.1042	3.76	6.65
5	130	-425.27937	0.07467			

maximum rank	parms	LL	eigenvalue	max statistic	5% critical value	1% critical value
0	105	-484.85099		56.5262	33.46	38.77
1	114	-456.58789	0.75663	34.9152	27.07	32.24
2	121	-439.13028	0.58225	14.4712	20.97	25.52
3	126	-431.89467	0.30356	10.1264	14.07	18.63
4	129	-426.83148	0.22366	3.1042	3.76	6.65
5	130	-425.27937	0.07467			

Note: * denotes significance level

⁷ Cointegration tests for the grants and net foreign loans models can be found in Appendix B

4.3 Vector Error Correction

After determining that there exists a long-run relationship among the variables, the study proceeded to estimate the fiscal response model using the VEC approach. As mentioned above, three models were selected each specifically measuring the impact of one of the categorized aid variables. Diagnostic tests were also carried out to check the stability of each VEC model by testing the residuals for normality, heteroscedasticity and autocorrelation. The results for these tests are stated in the respective estimation tables for each model. Below is the overview of the empirical findings from estimation process.

4.3.1 Model of Net Foreign Aid

After applying the VECM procedure, results on the long-run relationship between net foreign aid and the fiscal aggregates was obtained. Net foreign aid had a negative impact on revenues, but a positive effect on the remainder of the fiscal variables. This meant that given an injection of aid, the government responded by reducing its revenue mobilization efforts, increasing both investment and consumption expenditure, and to some extent increased its level of domestic borrowing. As expected, net foreign aid increased public spending as the availability of resources helped to support the government's budgetary commitments in the long-run (Heller, 1975; Gang and Khan, 1991). The negative effect in this regard would be the fact that aid inflows led to reduced revenues and increased domestic borrowing. These two outcomes are not desirable for both donors and recipient governments. The World Bank (1998) in their report explicitly describe the adverse effects that reduced revenue collection efforts have on a recipient country, and it goes without saying that an increasing debt burden does not help with the situation. All the outcomes were significant and results are presented in *equation (10)*.

$$\begin{aligned} \text{Net ODA} = & 2.59\text{Inv} + 15.23\text{Con} - 1.9\text{Rev} + 0.57\text{Bor} - 244.96 \\ & (0.32) \quad (2.27) \quad (0.64) \quad (0.08) \end{aligned} \quad (10)$$

The outcomes from the short-run error correction model are given in *Table 6* below. According to the results, as anticipated net foreign aid had a significantly positive relationship with lagged consumption. Net foreign aid was also positively associated with investment and government revenue in the short-run but these results were not significant. Additionally, net foreign aid and lagged borrowing were significantly positively related and in theory, the scenario of an increased debt burden given aid inflows is one that donors and recipient governments try to avoid. The results from the short-run analysis were similar to those found by Bwire *et al.*'s (2013) fiscal response

study in Uganda but only differed on the outcome of domestic borrowing. Their study found that aid encouraged tax effort and public spending but contrastingly, reduced domestic borrowing.

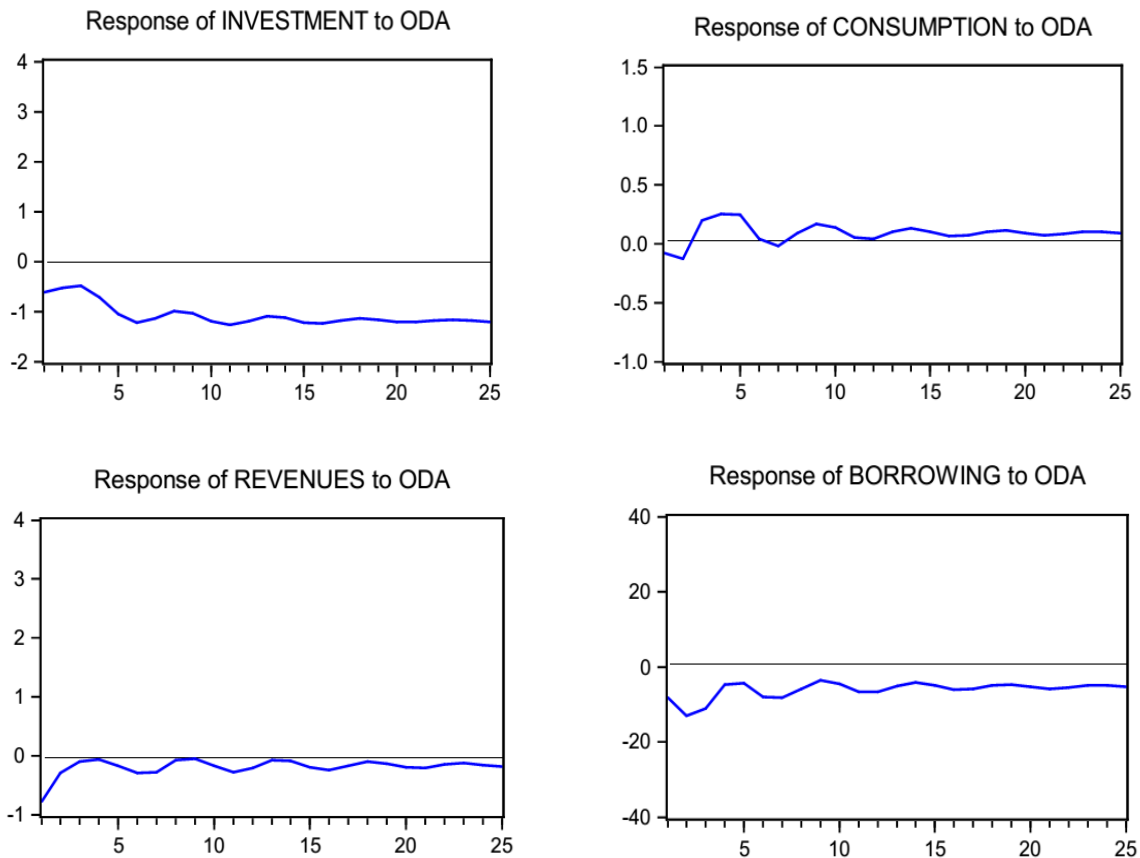
Table 6: Vector Error Correction Estimates					
Equation/Variable	D(ODA)	D(Inv)	D(Con)	D(Rev)	D(Bor)
ECM_{t-1}	-0.161 (0.111)	0.055* (0.030)	-0.058*** (0.021)	0.067 (0.053)	-1.520*** (0.488)
$D(ODA_{t-1})$	-0.429*** (0.158)	0.011 (0.043)	0.027 (0.029)	0.080 (0.075)	0.464 (0.691)
$D(ODA_{t-2})$	-0.141 (0.151)	-0.022 (0.041)	0.029 (0.028)	0.001 (0.072)	-0.572 (0.660)
$D(Inv_{t-1})$	0.372 (0.628)	0.221 (0.171)	0.234** (0.116)	0.374 (0.299)	1.191 (2.751)
$D(Inv_{t-2})$	-0.380 (0.555)	0.130 (0.151)	0.013 (0.102)	-0.580** (0.264)	-0.907 (2.429)
$D(Con_{t-1})$	2.334* (1.312)	-1.087*** (0.357)	0.502** (0.241)	-0.047 (0.625)	10.591* (5.748)
$D(Con_{t-2})$	-0.453 (1.197)	-0.645*** (0.325)	.318 (0.220)	-0.468 (0.570)	10.302** (5.242)
$D(Rev_{t-1})$	0.084 (0.394)	0.1788* (0.107)	-0.179** (0.073)	-0.183 (0.188)	0.495 (1.727)
$D(Rev_{t-2})$	-0.244 (0.343)	-0.323*** (0.093)	-0.033 (0.063)	-0.480*** (0.163)	-1.059 (1.501)
$D(Borr_{t-1})$	0.085* (0.044)	-0.018 (0.012)	0.017** (0.008)	0.006 (0.021)	0.579*** (0.194)
$D(Borr_{t-2})$	0.062 (0.049)	-0.023* (0.013)	0.003 (0.009)	-0.043* (0.023)	0.136 (0.215)
Constant	0.461 (1.127)	0.320 (0.306)	-0.015 (0.207)	0.763 (0.537)	0.295 (4.937)
R-squared	0.549	0.485	0.382	0.425	0.432
Log likelihood	-573.47				
AIC	30.4				
SIC	33.1				
Autocorrelation-L1	24.34 [0.50]				
Autocorrelation-L2	24.46 [0.49]				
Normality	12.29 [0.26]				
Heteroskedasticity	329.93 [0.49]				
Note: *, ** and *** denote significance at levels 10%, 5% and 1% respectively					

Other results to note were that; consumption and borrowing portrayed a positive relationship, which meant that the government's budget deficit was partly financed by the increase in domestic borrowing; revenues were negatively associated with borrowing after two lags, meaning that as

the government improved on its revenue collection in the short-run the less financing it had to seek through the domestic markets; and finally, as investment increased, consumption reduced significantly indicating a trade-off between the two types of expenditure.

Impulse response analysis was also conducted to measure the impact of one standard deviation shock to net foreign aid on the fiscal aggregates over a 25-year period. Cholesky innovations were employed and the respective impulse response functions are shown in *Figure 5* below. The resolve behind the use of impulse response functions was that they would give a different picture from the error correction coefficients as the responses reflect the other relations between the variables summarized in the VECMs. One notable feature that was observed from the impulse responses was that some responses did not die out to zero but approached some nonzero value. The phenomenon was observed in the next two models as well. However, Lütkepohl (2005) argues that this is a normal feature for VECMs where such an effect reflects the nonstationarity of the system where an impulse can have permanent effects on the responding variables.

Figure 5: Impulse Response Functions



The response of investment to a unit shock in net foreign aid was found to be instantaneously negative. Net foreign aid seemed to initially increase investment in the first four years but it eventually reduced and permanently steadied at a negative value after the 20-year mark. Furthermore, the shock led to an increase in consumption though the impact slowly began to vanish after the 15-year mark. Net foreign aid was also found to increase revenues and domestic borrowing over the first few years, though the initial effects appeared to be negative.

4.3.2 Model of Grants

The grants model substitutes net foreign aid with grants and repeats the estimation procedure. The model portrayed some specification issues as the error correction term was found to be positive, this meant that variables in the long-run did not converge towards equilibrium. A remedy to this would have been to increase the number of lags, but the model could not be adjusted due to the number of observations in the sample which didn't allow for enough degrees of freedom to obtain robust estimates from the variations. The long-run equation found that grants negatively impacted government revenues. This finding has been hypothesized by a number of authors such as Heller (1975), Mosley *et al.* (1987) and Gupta *et al.* (2003) where aid grant inflows lessened government's tax collection efforts. In contrast, investment, consumption and domestic borrowing were all found to be positively related to grants. Yielding a similar outcome as the preceding model. The long-run equation is presented in *equation (11)* below.

$$\begin{aligned}
 Grants = & 3.43Inv + 18.11Con - 2.85Rev + 0.75Bor + 1.47Lon - 292.82 \\
 & (0.43) \quad (2.99) \quad (0.82) \quad (0.11) \quad (0.34)
 \end{aligned} \tag{11}$$

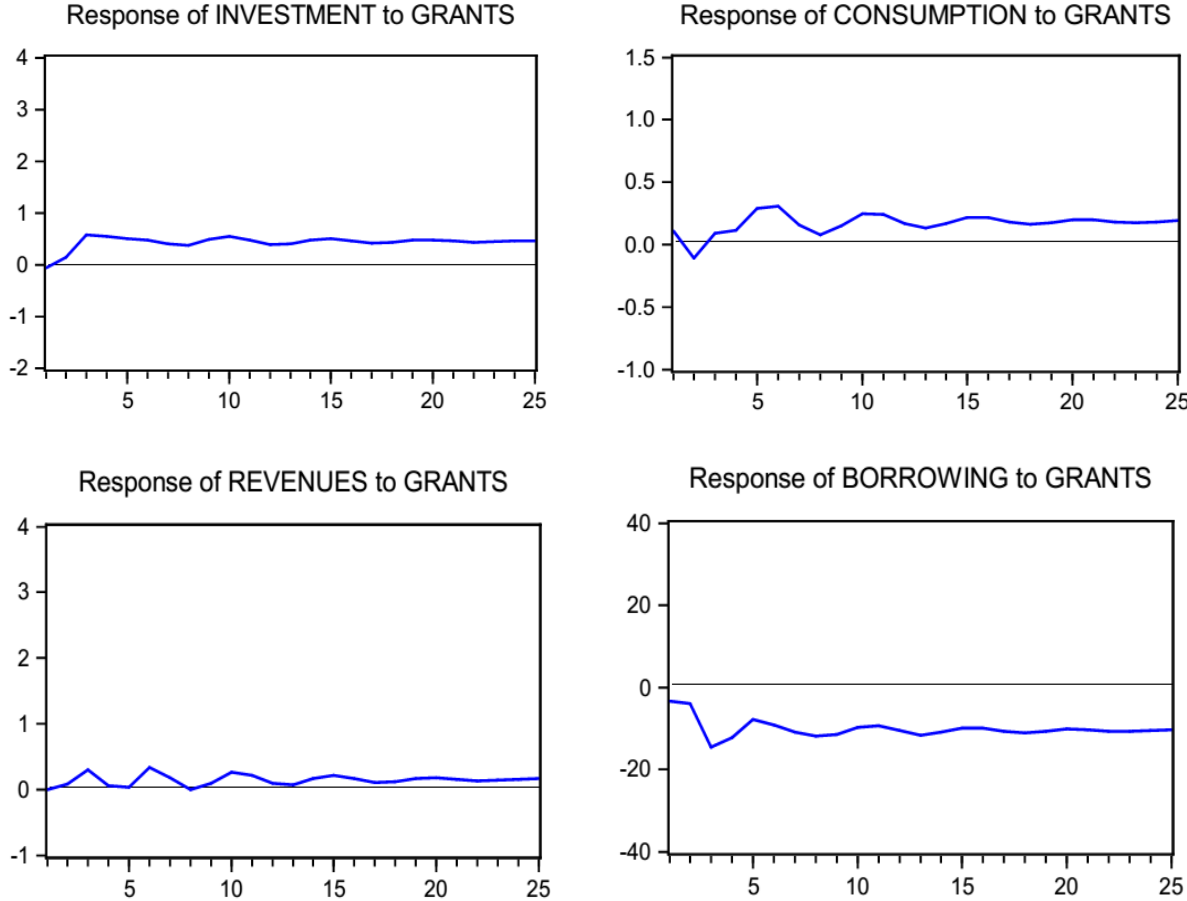
According to the results of the error correction model, grants in the short-run were insignificantly negatively associated with investment, consumption and domestic borrowing. From these results, it is evident that grants were used to reduce the government's debt stock. The fact that grants were used for the purpose of reducing government domestic debt is not surprising as grants have no repayment obligations. Osei *et al.* (2005) and Ouattara (2006) found similar results in their studies for Ghana and Senegal respectively where aid was employed to lessen the levels of domestic borrowing. Alternatively, government revenue had a positive relation with grants in the short-run, though this relationship was also found to be insignificant. Recalling the words of Senbet and Senbeta (2007), it is possible for aid to upsurge government revenue collection efforts particularly when aid is tied to certain projects and government is obliged to mobilize domestic resources to cover part of the project costs. *Table 7* below shows the estimates of the VEC model.

Table 7: Vector Error Correction Estimates						
Equation/Variable	D(Gra)	D(Inv)	D(Con)	D(Rev)	D(Bor)	D(Lon)
ECM_{t-1}	0.15 (0.13)	0.04* (0.02)	-0.04** (0.02)	0.06 (0.04)	-1.13*** (0.34)	-0.27 (0.12)
$D(Grants_{t-1})$	-0.51* (0.27)	0.02 (0.05)	0.01 (0.03)	0.07 (0.09)	0.63 (0.73)	0.14 (0.26)
$D(Grants_{t-2})$	-0.21 (0.26)	0.003 (0.05)	0.03 (0.03)	0.01 (0.09)	-1.32* (0.72)	0.08 (0.25)
$D(Inv_{t-1})$	-1.34 (0.97)	0.19 (0.18)	0.24* (0.13)	0.32 (0.32)	2.04 (2.63)	1.83** (0.92)
$D(Inv_{t-2})$	0.32 (0.87)	0.12 (0.16)	0.02 (0.11)	-0.63** (0.28)	-0.16 (2.34)	-0.54 (0.82)
$D(Con_{t-1})$	-1.01 (1.88)	-1.01*** (0.34)	0.37 (0.24)	-0.04 (0.61)	7.96 (5.07)	3.27* (1.78)
$D(Con_{t-2})$	-1.34 (1.72)	-0.63** (0.31)	0.22 (0.22)	-0.47 (0.56)	9.14* (4.66)	0.80 (1.64)
$D(Rev_{t-1})$	0.49 (0.62)	0.20* (0.11)	-0.18** (0.08)	-0.15 (0.20)	0.17 (1.68)	-0.47 (0.59)
$D(Rev_{t-2})$	0.02 (0.52)	-0.29*** (0.09)	-0.05 (0.07)	-0.45*** (0.17)	-2.01 (1.41)	-0.33 (0.50)
$D(Borr_{t-1})$	-0.09 (0.07)	-0.02 (0.01)	0.01 (0.01)	0.002 (0.02)	0.63*** (0.18)	0.18*** (0.06)
$D(Borr_{t-2})$	-0.08 (0.08)	-0.21 (0.01)	-0.001 (0.01)	-0.05* (0.03)	0.09 (0.21)	0.15** (0.07)
$D(Loans_{t-1})$	-0.01 (0.25)	-0.003 (0.05)	0.03 (0.03)	0.07 (0.08)	0.67 (0.67)	-0.43* (0.23)
$D(Loans_{t-2})$	0.08 (0.23)	-0.04 (0.04)	0.03 (0.03)	-0.01 (0.08)	-0.25 (0.63)	-0.22 (0.22)
Constant	0.30 (1.70)	0.32 (0.31)	-0.02 (0.22)	0.78 (0.55)	0.07 (4.59)	0.09 (1.61)
R-squared	0.30	0.57	0.39	0.46	0.55	0.54
Log likelihood	-691.59					
AIC	37.17					
SIC	40.85					
Autocorrelation-L1	31.67 [0.68]					
Autocorrelation-L2	29.79 [0.76]					
Normality	99.55 [0.00]					
Heteroskedasticity	542.49 [0.53]					
Note: *, ** and *** denote significance at levels 10%, 5% and 1% respectively						

What can be inferred from Zambia's case is that grants facilitated for improved fiscal management of government resources as increased levels of revenue collection allowed for the support of public expenditure in the short-run. While, at the same time the debt burden was reduced. Other findings show that more resources were channeled towards investment as compared to consumption.

The Cholesky approach was once more used to generate impulse responses of the fiscal aggregates to a one-standard deviation shock to grants. The graphical illustrations are presented in *Figure 6* below. The impact of a shock to grants led to a positive effect on investment in the first few years, after the 3-year mark the effect stabilized at a much higher point than the starting equilibrium. As well, there was a permanent positive impact on consumption. The initial response of consumption was a decline in the first two years before it began to rise and stabilized after the 15-year mark.

Figure 6: Impulse Response Functions



The shock to grants had a marginal effect on domestic revenues, characterized with slight positive shifts but eventually returning to equilibrium. On the other hand, the net impact of grants on domestic borrowing was permanent and negative with the effect dying out after the 10-year mark. The analysis supports earlier assertions that grants were used to reduce domestic borrowing in the short-run, but due to the neutral impact of grants on revenues in the long-run this effect is cancelled out.

4.3.3 Model of Net Foreign Loans

The third model featured net foreign loans and proved to be more stable compared to the grants model. No complications were found with the diagnostic tests and the variables in the long-run converged towards equilibrium. A look at the long-run fiscal relation revealed that all the variables identified in model were significant and the long-run impact of net foreign loans on investment, consumption and domestic borrowing was found to be positive. Otherwise, government revenues were negatively associated with net foreign loans. The results of the long-run relationship between net foreign loans and the fiscal aggregates conforms with the findings from the previous two models assessed. Thus, the interpretation of the fiscal outcomes is taken to be the same. Results of the long-run relationship are shown in *equation (12)*.

$$\begin{aligned} Loans = & 2.33Inv + 12.32Con - 1.93Rev + 0.51Bor + 0.68Gra - 661.89 \\ & (0.29) \quad (2.11) \quad (0.57) \quad (0.07) \quad (0.19) \end{aligned} \quad (12)$$

An evaluation of the short-run error correction estimates in revealed that net foreign loans had a significant positive impact on government investment, consumption and domestic borrowing in the short-run. However, government revenues were negatively associated with net foreign loans but this impact was found to be insignificant. Therefore, the government in the short-run had to increase domestic borrowing to fund its budget deficit as reduced government revenue mobilization efforts made it difficult for the collected revenues to cover government's public expenditure.

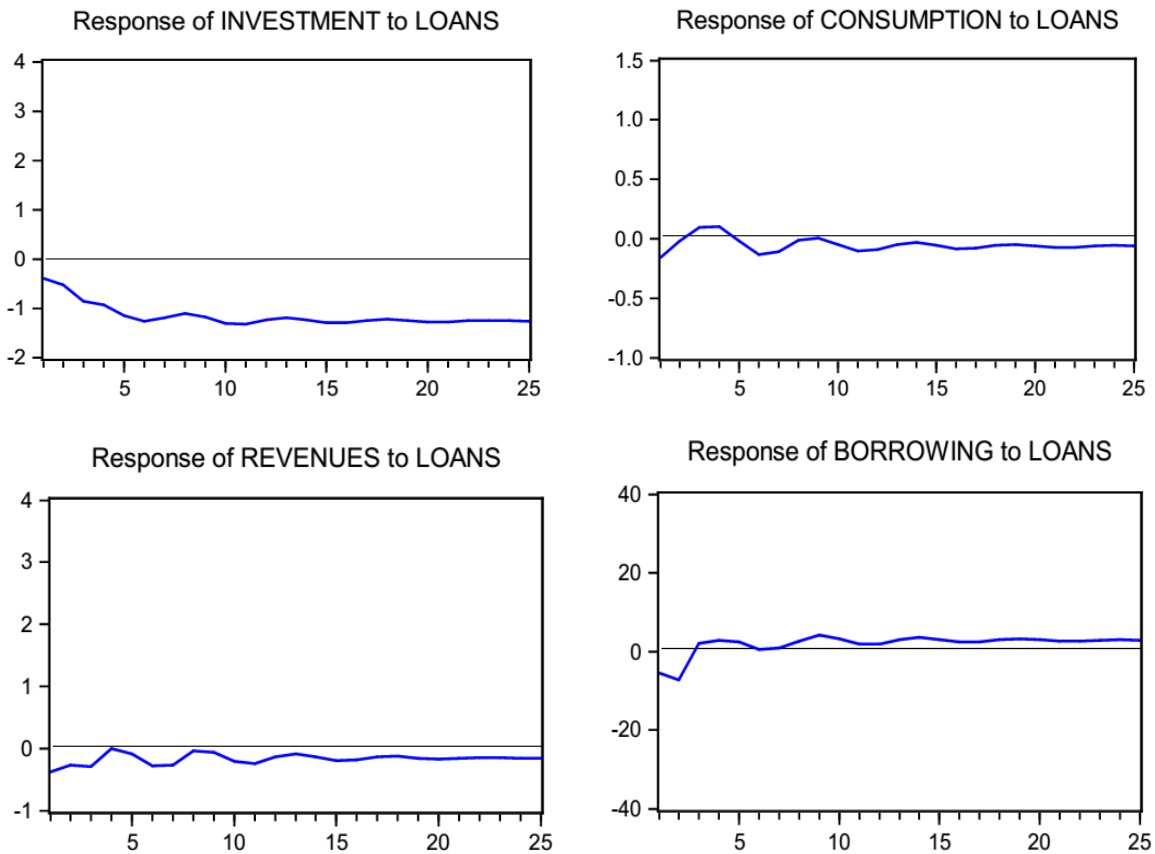
Morrissey *et al.* (2007) found similar results in their study of fiscal response in Kenya. Due to unexpected fiscal deficits, the Kenyan government responded by increasing their level of domestic borrowing to cover additional public expenditure costs. Comparing these findings with those of Gupta *et al.* (2003), net foreign loans would have been associated with higher government revenue mobilization efforts. According to their argument, it would be expected that the government would increase its revenue mobilization efforts given the repayment obligations that are associated with net foreign loans. This would enable the government to sustain its public expenditure and cover loan repayment responsibility costs at the same time without straining its debt position by resorting to domestic borrowing. *Table 8* below presents the findings from the estimation of the net foreign loans VECM.

Table 8: Vector Error Correction Estimates						
Equation/Variable	D(Loans)	D(Inv)	D(Con)	D(Rev)	D(Bor)	D(Gra)
ECM_{t-1}	-0.40** (0.18)	0.06* (0.03)	-0.05** (0.02)	0.08 (0.06)	-1.66*** (0.50)	0.21 (0.19)
$D(Loans_{t-1})$	-0.43* (0.23)	-0.003 (0.05)	0.03 (0.03)	0.07 (0.08)	0.67 (0.67)	-0.01 (0.25)
$D(Loans_{t-2})$	-0.22 (0.22)	-0.04 (0.04)	0.03 (0.03)	-0.01 (0.08)	-0.25 (0.63)	0.08 (0.23)
$D(Inv_{t-1})$	1.83** (0.92)	0.19 (0.18)	0.24* (0.13)	0.32 (0.32)	2.04 (2.63)	-1.34 (0.97)
$D(Inv_{t-2})$	-0.54 (0.82)	0.12 (0.16)	0.02 (0.11)	-0.63** (0.28)	-0.16 (2.34)	0.32 (0.87)
$D(Con_{t-1})$	3.30* (1.78)	-1.01*** (0.34)	0.37 (0.24)	-0.03 (0.61)	7.96 (5.07)	-1.01 (1.88)
$D(Con_{t-2})$	0.80 (1.64)	-0.63** (0.31)	0.22 (0.22)	-0.47 (0.56)	9.14** (4.66)	-1.34 (1.72)
$D(Rev_{t-1})$	-0.47 (0.59)	0.20* (0.11)	-0.18** (0.08)	-0.15 (0.20)	0.18 (1.68)	0.49 (0.62)
$D(Rev_{t-2})$	-0.33 (0.50)	-0.29*** (0.10)	-0.04 (0.07)	-0.45*** (0.17)	-2.01 (1.41)	0.02 (0.52)
$D(Borr_{t-1})$	0.18*** (0.06)	-0.02 (0.01)	0.01 (0.01)	0.003 (0.02)	0.63*** (0.18)	-0.09 (0.07)
$D(Borr_{t-2})$	0.15** (0.07)	-0.02 (0.01)	-0.001 (0.01)	-0.05* (0.03)	0.09 (0.21)	-0.08 (0.08)
$D(Grants_{t-1})$	0.14 (0.26)	0.02 (0.05)	0.01 (0.04)	0.07 (0.09)	0.62 (0.73)	-0.51* (0.27)
$D(Grants_{t-2})$	0.08 (0.25)	0.003 (0.05)	0.03 (0.03)	0.01 (0.09)	-1.31* (0.72)	-0.21 (0.27)
Constant	0.09 (1.61)	0.32 (0.31)	-0.02 (0.22)	0.78 (0.55)	0.07 (4.60)	0.30 (1.70)
R-squared	0.54	0.56	0.39	0.46	0.55	0.30
Log likelihood	-691.59					
AIC	37.17					
SIC	40.85					
Autocorrelation-L1	31.67 [0.68]					
Autocorrelation-L2	29.79 [0.76]					
Normality	13.84 [0.31]					
Heteroskedasticity	542.49 [0.53]					
Note: *, ** and *** denote significance at levels 10%, 5% and 1% respectively						

Figure 7 below shows the response of the fiscal aggregates to a net foreign loan shock. The impulse response analysis suggests that a loans shock drives investment down and the effect was sustained in the long-run. Alternatively, the impact on consumption was positive in the first couple of years but the effect stabilized back to equilibrium in the long-run. From this analysis, it seemed that the

government channeled more net foreign loan resources towards support of consumption expenditure as compared to investment expenditure which was quite ambiguous given the findings from the VEC estimation. Although, McGillivray and Morrissey (2000) do argue that this does not have to be a bad thing as consumption spending is a vital complement to public investment.

Figure 7: Impulse Response Functions



Furthermore, the initial impact of a shock to net foreign loans on domestic revenues led to a slight increase in the first 4 years, the impact then began to fluctuate in subsequent years. The final effect in the long-run was positive but this change was small. Lastly, the response of domestic borrowing to a shock in net foreign loans was also positive and this impact was sustained above equilibrium in the long-run.

4.4 Results Summary and Study Limitations

In summary, the long-run impact of aggregated and disaggregated aid on the different fiscal variables for the three error correction models was clear and consistent for all the three different aid categorizations. Given increased foreign aid flows to the country, a positive impact was

estimated on investment, consumption and domestic borrowing. Conversely, foreign aid inflows had a negative impact on revenue collection. The increase in public expenditure was expected for both aggregated and disaggregated aid and was in line with the initial hypothesis that foreign aid increases the amount of resources available to recipient governments to increase their levels of public spending (Gunatilake *et al.*, 2011). The negative impact that foreign aid had on revenue collection efforts indicated that the government substituted domestic revenues for foreign aid. Consequently, this meant that domestic borrowing had to increase in order to meet the shortfall in resources to cover the government's fiscal deficit brought about by the fall in government revenue (Gupta *et al.*, 2003).

Moreover, the short-run effects of foreign aid on the different fiscal aggregates varied amongst the different error correction models. This signaled that in the short-run the government's fiscal policy direction was influenced by the channels through which foreign aid was delivered as this determined what purposes the aid would be used for. Analysis of the disaggregated aid models revealed that grants had a negative effect on investment, consumption and domestic borrowing. Alternatively, grants had a positive association with government revenue. In contrast, net foreign loans positively impacted investment, consumption and domestic borrowing. While, government revenue was negatively associated with net foreign loans. What was inferred from these findings was that, the government in the short-run preferred to use net foreign loans and domestic borrowing to cover its public expenditure whereas grants were used as an instrument for public debt reduction. Furthermore, the majority of the share of net foreign loans was allocated towards investment expenditure as compared to consumption expenditure giving the indication that the government put into consideration the repayment requirements of the loans in its public spending decisions.

Schmidt (1964) argues that national governments should use both grants and net foreign loans equally but that the right balance should be established in their usage. However, he goes on to argue that the provision of grants in the short-run would be more ideal to recipient governments as they offer more incentives for growth under the right conditions. This proponent could be noticed in the grants model, as grants not only reduced the levels of domestic borrowing but correspondingly encouraged revenue collection efforts in the short-run. Though it is important to note that the estimates from the grants model were likely to be influenced by the large amounts of debt relief that the country received in 2006.

Lastly, aggregated aid had a positive impact on all the fiscal aggregates in the short-run. The only concerning result from the outcome was the level of increased domestic borrowing. It seemed that net foreign aid and domestic revenues were not enough to cover the government’s fiscal deficit in the short run and the government covered the spending gap through borrowing from the domestic market. The summary of the results from the fiscal response analysis are shown in *Table 9*.

Table 9: Impact of Foreign Aid on Fiscal Aggregates				
Variable		Net ODA	Grants	Net Loans
Investment	LR	Positive	Positive	Positive
	SR	Positive	Negative	Positive
Consumption	LR	Positive	Positive	Positive
	SR	Positive	Negative	Positive
Revenues	LR	Negative	Negative	Negative
	SR	Positive	Positive	Negative
Domestic Borrowing	LR	Positive	Positive	Positive
	SR	Positive	Negative	Positive
Note: LR denotes long-run and SR denotes short-run				

The study was not without some limitations. Firstly, we refer to the ODA data issue mentioned in the previous section. The study used ODA statistics which technically speaking are different from aid found in the budget. This means the system was operating under an open system, thereby including non-monetary variations of aid such as scholarships, research assistance and technical assistance, in addition to monetary aid resources which do not get channeled to the government. An example of this would be portions of ODA that are used by the Central Bank to build up reserves. By itself, this leads to complications in coming up with accurate estimates of the output. The author intuitively relied on the assumption that foreign aid that is not channeled through the budget still affects governments fiscal policy decisions because these alternative uses foreign aid have an indirect fiscal impact on the fiscal variables.

The second study limitation involved the presence of debt relief in the development assistance data. An exploration of the data revealed that there was the presence of outliers in the data and that this could have had a significant impact on the study findings. An alternative analysis of the VECM estimation was done, this time excluding debt relief, and the findings presented in Appendix C.

The results obtained from the two procedures were compared for all the three models and it was found that only the net foreign loans model portrayed significant changes to those found in the earlier estimation process. The impact of net foreign loans seemed to suggest that loans in the long-run were generally used to reduce the government's debt burden, which contradicts the assertions put down by a number of authors in the fiscal response studies that were reviewed. Nonetheless, the findings might prove useful in determining how the government reacts to foreign aid delivered through loans.

Lastly, the analysis of impulse responses proved problematic as there was uncertainty in the interpretation of certain responses. Some of the impulse response functions did not decay towards 0 but rather had permanent effects on the fiscal aggregates. Lütkepohl (2005) has argued that this problem might be due to variables being integrated of order one or the presence of estimation uncertainties of VEC impulse response functions. Nevertheless, this made it unclear as to whether the impulse responses obtained reflected the actual reactions of the variables.

CHAPTER 5: CONCLUSION AND RECOMMENDATIONS

This paper has investigated the relationship between foreign aid flows and government fiscal behavior in Zambia using time series data on foreign aid and fiscal aggregates over the period 1970-2014. The study employed the VECM approach in its estimation of the fiscal response model and the following findings were observed:

- (i) Foreign aid flows to Zambia over the period had significant beneficial effects on government spending in the long-run, both investment and consumption expenditure increased over the time period regardless of the aid modality considered.
- (ii) The impact of foreign aid flows on government revenue showed that aid discouraged domestic revenue collection efforts in the long-run, and this was coupled by an increase in domestic borrowing. This result is supported by findings from fiscal response literature by Heller (1975) and Mosely *et al.* (1987) where they have found that foreign aid inflows are used as an alternative to domestic revenue collection.
- (iii) On the other hand, the analysis of the short-run fiscal effects of foreign aid revealed more varied responses from the fiscal aggregates depending on the form of aid that was being considered. Grants appeared to have a negative effect on government spending and domestic borrowing while they had a positive effect on domestic revenues. The implication of the finding was that an injection of grant aid into the economy led to reductions in the level of public debt, signaling that the government preferred to use grants as a measure of decreasing its debt burden.
- (iv) Net foreign loans were positively associated with government spending and domestic borrowing, and negatively associated with government revenue in the short-run. This meant that loans were a substitute for government revenue in financing budget deficits. In addition, the results revealed that priority in the apportionment of net foreign loans was given to investment expenditure rather than consumption expenditure in the short-run.

In general, the long-run fiscal effects of foreign aid flows were consistent with the trend analysis, as well as a previous specific country application that was carried out by Fagernäs and Roberts (2004c). Based on the above evidence, this paper proposes the following policy recommendations:

There was enough evidence to purport that foreign aid led to reduced government revenue mobilization. Hence, for there to be improved public finance management, it is important for the

government to follow on increased foreign aid flows to the country with improved methods of domestic revenue collection. Donors can provide incentives that might allow the government to rely less on foreign aid and domestic borrowing, and encourage the improvement in their revenue mobilization techniques. This can be done by setting terms and conditions that require the government to source part of the financing of aid programs and projects through its own resources, as Crivelli and Gupta (2016) have shown that conditionalities may offset the depressing effect of aid on revenues.

Capacity in revenue collection can also be built through the harmonization of revenue collection practices between the donor partners and the government, along with the adoption of fair trade policies in order to enhance the country's levels of export revenues through trade given that Zambia is largely an importing country. These measures would allow for the government to formulate beneficial fiscal policies that would encourage the effective use of foreign aid and guarantee economic growth in the long-run.

Secondly, it was observed from the analysis that foreign aid inflows corresponded with increased domestic borrowing. Ali Abbas and Christensen (2007) highlight a number of cons to domestic debt such as; the crowding out the private investment, fiscal sustainability and the macroeconomic effect on growth, inflation and domestic savings. Although, if managed properly domestic borrowing can boost domestic savings and stimulate investment. Above all, a high debt burden on the government leads to the pulling of resources away from government expenditure. Therefore, it is important for the government to manage its domestic debt in order to allow the government to improve on its fiscal planning and ensure the effective use of its resources.

Foreign aid should only be used to reduce domestic debt when the levels of debt stock threaten debt sustainability. In any case, it is advised that if the government wishes to allocate foreign aid towards the reduction of domestic borrowing, priority should be given to aid in the form of grants. This would lessen the constraint of debt servicing placed on the domestic economy and would accord the government with the prospect of increasing expenditure towards more developmental purposes. In general, such a recourse should be encouraged in countries that have good fiscal policies in place and have demonstrated good financial management of public resources.

Thirdly, it was observed that the allocation of foreign aid towards investment and consumption expenditure differed in the long-run and short-run. Much more weight was given to investment

spending in the short-run and more weight was given to consumption spending in the long-run. The author recommends that more aid resources should be channeled to investment expenditure as this offers a more sustainable return in the long-run. Zambia has been a foreign aid recipient for many years now but the country still struggles with high poverty rates and a fluctuating domestic economy due to an un-diversification and its dependence on the external actors. The more government prioritizes its fiscal spending towards investment the better its chances of attaining sustainable growth (Beuren *et al.*, 2011).

The ultimate goal for the government should be to ensure that it implements fiscal policies that render consistent flows of revenue to support its budget deficit, reduce its public debt stock to sustainable levels and reduce its reliance on external assistance to prevent itself from falling into an aid dependency trap. For deeper analysis of the aid landscape in Zambia, some of the underlying factors that have hindered the effective use of foreign aid have been covered by authors such as Beuren *et al.* (2011), Bräutigam and Knack (2004) and Masaki (2015).

In summary, Burnside and Dollar (2000) have stressed that the effectiveness of aid is greatly dependent on good governance, sound policies and strong institutions, and Zambia has made some steps in striving to achieve this kind of system. The current state of affairs guiding official development assistance in the country is governed by a document developed by the Government of the Republic of Zambia (GRZ) in 2005 called the *Aid Policy and Strategy*. It is a document whose development process involved a wide range of stakeholders and its contents set out procedures for aid receipt, application, management, monitoring and evaluation of impact. The aid policy and strategy incorporates principles from the Paris Declaration on Aid Effectiveness and strives to ensure that Zambia has a clear, systematic and well-coordinated approach to manage development assistance (GRZ, 2005). So, it is vital that donor partners align themselves to the objectives set out in the strategy in order to ensure that the government functions efficiently and effectively in implementing its policies, thereby guaranteeing that foreign aid has beneficial impacts on the domestic economy.

REFERENCES

- Abuzeid, F. (2009) “Foreign Aid and the Big Push Theory: Lessons from sub-Saharan Africa”, *Stanford Journal of International Relations*, 11 (1): 16-23.
- African Development Bank (2005) *Zambia: HIPC Approval Document – Completion Point Under the Enhanced Framework*,
<http://www.afdb.org/fileadmin/uploads/afdb/Documents/Financial-Information/ADB-BD-WP-2001-07-EN-HIPC-ZAMBIA-BOARD-APPROVAL-DOC-REVISED-ECA-18-JAN.PDF> (last consulted: 23 October 2016).
- Ali Abbas, S. and Christensen, J. (2007) “The Role of Domestic Debt Markets in Economic Growth: An Empirical Investigation for Low-Income Countries and Emerging Markets”, *IMF Working Paper*, 07 (127): 1-40.
- Anderson, P., Bigsten, A. and Persson, H. (2000) “Foreign Aid, Debt and Growth in Zambia”, *Nordiska Afrikainstitutet*, 112: 30-52.
- Aregbeyen, O. and Fasanya, O. (2014) “Fiscal Response to Foreign Aid Inflows in Nigeria”, *The IUP Journal of Applied Finance*, 20 (2): 37-56.
- Bandyopadhyay, S and Vermann, E.K. (2013) “Donor Motives for Foreign Aid”, *Federal Reserve Bank of St. Louis Review*, 95 (4): 327-336.
- Beuran, M., Raballand, G. and Revilla, J. (2011) “Improving Aid Effectiveness in Aid-Dependent Countries: Lessons from Zambia”, *Documents de Travail du Centre d’Economie de la Sorbonne*, 40: 1-31.
- Boone, P. (1996) “Politics and the Effectiveness of Foreign Aid”, *European Economic Review*, 40: 289–329.
- Bräutigam, D. (2000) “Aid Dependence and Governance”, *Expert Group on Development Issues*, 1: 1-68.
- Bräutigam, D. and Knack, S. (2004) “Foreign Aid, Institutions and Governance in Sub-Saharan Africa”, *Economic Development and Cultural Change*, 13: 255-285.

- Burnside, C. and Dollar, D. (2000) “Aid, Policies and Growth”, *American Economic Review*, 90: 847–868.
- Bwire, T., Morrissey, O. and Lloyd, T. (2013) “The Fiscal Impact of Aid in Uganda: An Application of a Cointegrated Vector Autoregressive (CVAR) model”, *Bank of Uganda Working Paper*, 7: 1-25.
- Carlsson, J., Chibbammullilo, P., Orjuela, C. and Saasa, O. (2000) “Poverty and European Aid in Zambia: A Study of the Poverty Orientation of European Aid to Zambia”, *ODI Working Paper*, 138: 1-72.
- Chenery, H. and Burno, M. (1962) “Development Alternatives in an Open Economy: The Case of Israel”, *Economic Journal*, 72: 79-103.
- Chenery, H. and Strout, A. (1966) “Foreign Assistance and Economic Development”, *American Economic Review*, 56: 679-733.
- Clements, B., Gupta, S., Pivovarsky, A. and Tiongson, E.R. (2004) “Foreign Aid: Grants versus Loans”, *Finance & Development*, 41 (3):46-49.
- Committee for Development Policy (2015) “Transitioning from the MDGs to the SDGs: Accountability for the Post-2015 Era”, *CDP Background Paper*, 25: 3-16.
- Crivelli, E. and Gupta, S. (2016) “Does Conditionality Mitigate the Potential Negative Effect of Aid on Revenues?”, *IMF Working Paper*, 16 (142): 1-28.
- Domar, E. (1946) “Capital Expansion, Rate of Growth and Employment”, *Econometrica*, 14 (2): 137-147.
- Fagernäs, S. and Roberts, J. (2004a) “Fiscal Impact of Aid: A Survey of Issues and Synthesis of Country Studies of Malawi, Uganda and Zambia”, *ODI ESAU Working Paper*, 11: 1-44.
- Fagernäs, S. and Roberts, J. (2004b) “The Fiscal Effects of Aid in Uganda”, *ODI ESAU Working Paper*, 9: 1-57.
- Fagernäs, S. and Roberts, J. (2004c) “The Fiscal Effects of Aid in Zambia”, *ODI ESAU Working Paper*, 10: 1-55.

- Fagernäs, S. and Schurich, C. (2004) “The Fiscal Effects of Aid in Malawi”, *ODI ESAU Working Paper*, 7: 1-55.
- Franco-Rodriguez, S., McGillivray, M. and Morrissey, O. (1998) “Aid and the Public Sector in Pakistan: Evidence with Endogenous Aid”, *World Development*, 26: 124-1250.
- Franco-Rodriguez, S. (2000) “Recent Developments in Fiscal Response with an Application to Costa Rica”, *Journal of International Development*, 12: 429-442.
- Gang, I. N. and Khan, A. H. (1991) “Foreign Aid, Taxes and Public Investment”, *Journal of Development Economics*, 35: 355-369.
- Gang, I. N. and Khan, A. H. (1999) “Foreign Aid and Fiscal Behavior in a Bounded Rationality Model: Different Policy Regimes”, *Empirical Economics*, 24 (1): 121-134.
- Gomanee, K., Girma, S. and Morrissey, O. (2005) “Aid and Growth in Sub-Saharan Africa: Accounting for Transmission Mechanisms”, *Journal of International Development*, 17 (8): 1055–1075.
- Government of the Republic of Zambia (2005) *Zambia Aid Policy and Strategy*, Lusaka, Ministry of Finance and National Planning.
- Gunatilake, H., Fabella, R. V. and Lagman-Martin. A. (2011) “Foreign Aid, Aid Effectiveness and the New Aid Paradigm: A Review”, *Sri Lankan Journal of Agricultural Economics*, 12-13 (1): 39-81.
- Gupta, S., Clements, B., Pivovarsky, A. and Tiongson, E.R. (2003) “Foreign Aid and Revenue Response: Does the Composition of Aid Matter?”, *International Monetary Fund Working Paper*, 3 (176): 3-22.
- Gupta, S., Schwartz, G., Tareq, S., Allen, R., Adenauer, I., Fletcher, K. and Last, D. (2007) “Fiscal Management of Scaled-Up Aid”, *IMF Working Paper*, 7 (222): 1-64.
- Harrod, R. (1939) “An Essay in Dynamic Theory”, *Economic Journal*, 49 (139): 14-33.
- Heller, P.S. (1975) “A Model of Public Fiscal Behavior in Developing Countries: Aid, Investment, and Taxation”, *The American Economic Review*, 65 (3): 429-445.

- Horton, M. and El-Ganainy, A. (2009) "Back to Basics: What is Fiscal Policy?", *Finance and Development*, 46 (2): 52-53.
- Hudson, J. (2012) "Consequences of Aid Volatility for Macroeconomic Management and Aid Effectiveness", *UNU-WIDER Working Paper*, 35: 1-26.
- Khan, A. H. (1998) *Aid and Development: What Can Africa Learn from the Macroeconomics of Foreign Aid in Some Southeast Asian Economies*, http://archive.unu.edu/hq/academic/Pg_area4/Khan2.html (last consulted: 20/06/2016).
- Khan, A. H. and Hoshino, E. (1992) "Impact of Foreign Aid on the Fiscal Behavior of LDC Government of Low-Income Countries", *Economic Journal*, 97: 446-458.
- Leiderer, S. (2012) "Fungibility and the Choice of Aid Modalities", *UNU-WIDER Working Paper*, 12 (68): 1-56.
- Lütkepohl, H. (2005) *New Introduction to Multiple Time Series Analysis*, Berlin, Springer-Verlag.
- M' Amanja, D., Lloyd, T. and Morrissey, O. (2005) "Fiscal Aggregates, Aid and Growth in Kenya: A Vector Autoregressive (VAR) Analysis", *CREDIT Research Paper*, 5 (7): 1-36.
- Machado, R. (2010) "Aid and Fiscal Policy in Nicaragua: A Fiscal Response Analysis", *Journal of International Development*, 22: 483-502.
- Masaki, T. (2015) "The Political Economy of Aid Allocation in Africa: Evidence from Zambia", *AidData Working Paper*, 5: 4-40.
- Mavrotas, G. (2002) "Foreign Aid and Fiscal Response: Does Aid Disaggregation Matter?", *Weltwirtschaftliches Archive*, 138 (3): 534-559.
- Mavrotas, G. and Ouattara, B. (2007) "Aid Modalities and Budgetary Response: Panel Data Evidence", *Review of World Economics*, 143 (22): 720-741.
- McGillivray, M. (2000) "Aid and Public Sector Behavior in Developing Countries", *Review of Development Economics*, 4 (2): 156-163.
- McGillivray, M. and Ahmed, A. (1999) "Aid, Adjustment and Public Sector Fiscal Behavior in the Philippines", *Journal of the Asia-Pacific Economy*, 4: 381-391.

- McGillivray, M. and Morrissey, O. (2000) “Aid Fungibility in Assessing Aid: Red Herring or True Concern?”, *Journal of International Development*, 12 (3): 413-428.
- McGillivray, M. and Morrissey, O. (2001) “A Review of Evidence on the Fiscal Effects of Aid”, *Centre for Research in Economic Development and International Trade Research Paper*, 1 (13): 1-37.
- McGillivray, M. and Morrissey, O. (2004) “Fiscal Effects of Aid”, in: Addison, T. and Roe, A. (eds.) *Fiscal Policy for Development*. Basingstoke, Palgrave/WIDER.
- McGillivray, M. and Ouattara, B. (2003) “Aid, Debt Burden and Government Fiscal Behavior in Cote d’Ivoire”, *CREDIT Research Paper*, 3 (5): 1-16.
- Ministry of Foreign Affairs Denmark (2010) *Evaluation of the Joint Assistance Strategy for Zambia (JASZ) 2007-10*, Esbjerg, Schultz Grafisk.
- Morrissey, O. (2015) “Aid and Government Fiscal Behavior”, *World Development*, 69: 98-105.
- Mosley, P., Hudson, J. and Horrell, S. (1987) “Aid, the Public Sector and the Market in Less Developed Countries”, *Economic Journal*, 97 (387): 616–641.
- OECD/DAC (2010) *History of the 0.7 % ODA Target*, Original text from *DAC Journal* 2002, 3 (4): III-9 – III-11, <http://www.oecd.org/dac/stats/45539274.pdf> (last consulted: 20 June 2016).
- OECD (2005) *The Paris Declaration on Aid Effectiveness*, Paris, OECD Publishing.
- OECD (2008) *The Accra Agenda for Action*, Paris, OECD Publishing.
- OECD (2011) *The Busan Partnership for Effective Development Co-operation*, Paris, OECD Publishing.
- OECD (2016) *Geographical Distribution of Financial Flows to Developing Countries 2016: Disbursements, Commitments, Country Indicators*, Paris, OECD Publishing.
- Omoruyi, E. M. (2014) “The Effectiveness of Aid and their Fiscal Response in Sub-Saharan Africa: Theoretical and Empirical Evidence”, *Journal of Economics and Sustainable Development*, 5 (3): 164-177.

- Osei, R., Morrissey, O. and Lloyd, T. (2003) "The Fiscal Effects of Aid in Ghana", *CREDIT Research Paper*, 3 (10): 1-30.
- Ouattara, B. (2006a) "Aid, Debt and Fiscal Policies in Senegal", *Journal of International Development*, 18 (8): 1005-1022.
- Ouattara, B. (2006b) "Foreign Aid and Government Fiscal Behavior in Developing Countries: Panel Data Evidence", *Economic Modelling*, 23: 506-514.
- Prizzon, A. (2013) "The Age of Choice: Zambia in The New Aid Landscape", *Overseas Development Institute (ODI) Research Report*, March 2013: 1-22.
- Schmidt, W. E. (1964) "The Economics of Charity: Loans versus Grants", *Journal of Political Economy*, 72 (4): 387-395.
- Senbet, D. and Senbeta, A. (2007) "Fiscal Response to External Finance: The Case of Sub-Saharan Africa", *International Conference on African Development Archives*, 116: 1-32.
- UNCTAD (2006) *Doubling Aid: Making the "Big Push" Work*, Geneva, United Nations Publication.
- White, H. (1994) "Foreign Aid, Taxes and Public Investment: A Further Comment", *Journal of Development Economics*, 45: 155-163.
- White, H. and Dijkstra, G. (2003) *Program Aid and Development: Beyond Conditionality*, London, Routledge.
- Wohlgemuth, L. and Saasa, O. (2008) "Changing Aid Relations in Zambia", *European Centre for Development Policy Management Working Paper*, 83: 1-16.
- World Bank (1998) *Assessing Aid: What Works, What Does not and Why*, New York, Oxford University Press.

APPENDICES

Appendix A: Variable Definitions and Raw Data

Table A1: Variable Definitions	
Variable	Description
Investment	Investment consists of outlays on additions to the fixed assets of the economy plus net changes in the level of inventories. Fixed assets include land improvements (fences, ditches, drains, and so on); plant, machinery, and equipment purchases; and the construction of roads, railways, and the like, including schools, offices, hospitals, private residential dwellings, and commercial and industrial buildings.
Consumption	General government final consumption expenditure includes all government current expenditures for purchases of goods and services (including compensation of employees). It also includes most expenditures on national defense and security, but excludes government military expenditures that are part of government capital formation.
Revenue	Revenue is cash receipts from taxes, social contributions, and other revenues such as fines, fees, rent, and income from property or sales.
Domestic Borrowing	Debt is the entire stock of direct government fixed-term contractual obligations to others outstanding on a particular date. It includes domestic and foreign liabilities such as currency and money deposits, securities other than shares, and loans. It is the gross amount of government liabilities reduced by the amount of equity and financial derivatives held by the government.
Net Foreign Aid	Net official development assistance (ODA) consists of disbursements of loans made on concessional terms and grants by official agencies of the members of the Development Assistance Committee (DAC), by multilateral institutions, and by non-DAC countries to promote economic development and welfare in countries and territories in the DAC list of ODA recipients.
Grants	Grants are defined as legally binding commitments that obligate a specific value of funds available for disbursement for which there is no repayment requirement.
Net Foreign Loans	Net foreign loans are transfers for which repayment is required. Only loans with maturities of over one year are included. Data on net loans include deductions for repayments of principal (but not payment of interest) on earlier loans. This means that when a loan has been fully repaid, its effect on total net ODA over the life of the loan is zero.

Table A2: Raw Data (in % of GDP)							
Year	Revenues	Consumption	Investment	Borrowing	Grants	Loans	Net ODA
1970	15.24	10.57	13.62	57.3	2.73	-0.30	2.42
1971	10.20	12.81	14.61	55.0	3.39	0.24	3.64
1972	8.88	12.30	13.73	58.2	3.31	-0.40	2.92
1973	12.73	12.68	13.21	60.1	5.29	0.02	5.31
1974	21.04	11.63	16.10	47.6	3.95	1.82	5.77
1975	14.65	12.98	13.97	77.3	4.24	3.26	7.50
1976	13.30	12.84	7.28	86.3	4.39	0.90	5.30
1977	13.35	12.58	6.76	95.7	6.39	1.88	8.28
1978	14.66	11.43	6.61	98.6	6.21	5.72	11.93
1979	16.66	11.91	3.87	96.5	8.00	8.86	16.86
1980	13.38	12.87	6.13	100.0	8.26	8.21	16.47
1981	20.25	14.93	5.49	97.4	8.51	4.36	12.87
1982	19.35	12.90	4.10	115.1	8.22	9.49	17.72
1983	16.52	10.52	3.02	126.5	8.60	3.51	12.12
1984	12.38	11.26	3.25	140.7	9.75	4.12	13.87
1985	21.87	10.72	3.50	157.3	11.76	6.45	18.21
1986	23.41	10.54	5.02	238.7	13.69	6.73	20.41
1987	19.85	8.34	2.97	219.1	12.32	3.93	16.24
1988	16.74	7.18	3.06	168.6	12.35	3.73	16.08
1989	18.58	9.41	2.82	161.1	10.66	1.86	12.53
1990	20.29	9.11	4.16	244.4	23.88	-9.28	14.60
1991	18.70	9.97	2.37	277.5	16.39	9.27	25.65
1992	18.35	8.94	2.82	164.7	22.80	6.36	29.16
1993	15.87	5.75	3.19	161.8	18.28	5.91	24.19
1994	20.07	8.59	8.17	163.0	14.98	6.08	21.06
1995	19.83	9.79	9.60	170.0	14.02	37.02	51.04
1996	20.68	10.01	10.68	193.5	10.50	4.83	15.34
1997	19.90	9.64	11.71	165.2	10.16	5.88	16.04
1998	18.78	8.24	14.90	176.2	9.57	-0.08	9.49
1999	17.73	6.35	17.26	221.6	11.16	4.42	15.58
2000	19.29	4.79	20.84	226.2	13.90	6.67	20.57
2001	19.02	5.20	25.90	197.9	14.55	-0.38	14.16
2002	17.80	5.91	27.77	204.2	16.03	2.41	18.44
2003	17.91	7.01	30.39	159.8	17.32	-2.81	14.51
2004	18.24	9.12	31.22	106.2	15.26	2.49	17.75
2005	17.61	9.69	29.90	53.5	25.36	-8.82	16.54
2006	16.44	9.87	29.86	35.0	60.83	-41.78	19.05
2007	18.30	9.51	31.84	59.7	10.02	1.09	11.11
2008	18.90	10.48	33.15	56.0	10.05	0.82	10.87
2009	15.96	10.09	31.25	94.1	8.81	2.89	11.70
2010	17.78	9.48	29.79	77.9	6.56	1.11	7.66
2011	20.91	9.84	33.60	79.4	7.07	0.63	7.68
2012	33.22	11.83	37.09	35.5	6.17	0.69	6.76
2013	29.69	9.84	38.45	28.80	6.97	0.55	7.47
2014	24.67	12.10	36.48	31.00	5.40	0.81	6.15

Appendix B: Cointegration Tests

Presented below are the results from the cointegration tests conducted on the grants and net foreign loans models. Despite the recommended lag order being equal to one for a number of selection criteria, two was selected as the optimal number of lags for both models as this number ensured that the VECMs and estimates obtained from the estimation were stable

lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	-866.417				4.4e+10	41.5436	41.6346	41.7919
1	-730.496	271.84	36	0.000	3.9e+08*	36.7855	37.4224*	38.5232*
2	-692.73	75.53	36	0.000	4.0e+08	36.7015	37.8843	39.9286
3	-652.808	79.845*	36	0.000	4.4e+08	36.5147*	38.2435	41.2312

Note: * denotes the lag order selected. LR: Sequential Modified LR Test Statistic; FPE: Final Prediction Error; AIC: Akaike Information Criterion; HQIC: Hannan and Quinn Information Criterion; SBIC: Schwarz Bayesian Information Criterion.

lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	-866.417				4.4e+10	41.5436	41.6346	41.7919
1	-730.496	271.84	36	0.000	3.9e+08*	36.7855	37.4224*	38.5232*
2	-692.73	75.53	36	0.000	4.0e+08	36.7015	37.8843	39.9286
3	-652.808	79.845*	36	0.000	4.4e+08	36.5147*	38.2435	41.2312

Note: * denotes the lag order selected. LR: Sequential Modified LR Test Statistic; FPE: Final Prediction Error; AIC: Akaike Information Criterion; HQIC: Hannan and Quinn Information Criterion; SBIC: Schwarz Bayesian Information Criterion.

maximum			trace		5% critical	1% critical
rank	parms	LL	eigenvalue	statistic	value	value
0	150	-595.02844		212.9665	94.15	103.18
1	161	-550.1926	0.89373	123.2949	68.52	76.07
2	170	-517.54332	0.80455	57.9963	47.21	54.46
3	177	-505.91478	0.44090	34.7392*1	29.68	35.65
4	182	-494.94455	0.42219	12.7988*5	15.41	20.04
5	185	-490.557	0.19698	4.0237	3.76	6.65
6	186	-488.54517	0.09570			

maximum			max		5% critical	1% critical
rank	parms	LL	eigenvalue	statistic	value	value
0	150	-595.02844		89.6717	39.37	45.10
1	161	-550.1926	0.89373	65.2986	33.46	38.77
2	170	-517.54332	0.80455	23.2571	27.07	32.24
3	177	-505.91478	0.44090	21.9405	20.97	25.52
4	182	-494.94455	0.42219	8.7751	14.07	18.63
5	185	-490.557	0.19698	4.0237	3.76	6.65
6	186	-488.54517	0.09570			

Table B4: Johansen Test for Cointegration (Net Loans Model)

maximum				trace	5% critical	1% critical
rank	parms	LL	eigenvalue	statistic	value	value
0	150	-595.02844		212.9665	94.15	103.18
1	161	-550.1926	0.89373	123.2949	68.52	76.07
2	170	-517.54332	0.80455	57.9963	47.21	54.46
3	177	-505.91478	0.44090	34.7392*1	29.68	35.65
4	182	-494.94455	0.42219	12.7988*5	15.41	20.04
5	185	-490.557	0.19698	4.0237	3.76	6.65
6	186	-488.54517	0.09570			

maximum				max	5% critical	1% critical
rank	parms	LL	eigenvalue	statistic	value	value
0	150	-595.02844		89.6717	39.37	45.10
1	161	-550.1926	0.89373	65.2986	33.46	38.77
2	170	-517.54332	0.80455	23.2571	27.07	32.24
3	177	-505.91478	0.44090	21.9405	20.97	25.52
4	182	-494.94455	0.42219	8.7751	14.07	18.63
5	185	-490.557	0.19698	4.0237	3.76	6.65
6	186	-488.54517	0.09570			

Appendix C: VEC Estimation Excluding Debt Relief

Vector error correction estimation was carried out on the three VEC models to investigate the impact that foreign aid had on the fiscal variables when the exclusion of debt relief is taken into consideration. The modifications on the ODA variables was done using data from the IMF's Article IV and Staff Report documents⁸. After the factoring of debt relief was done, the outliers were no longer present in the data and the estimation procedure was then repeated for all the three models.

Table C1 below presents the results of the long-run fiscal relations of the ODA variables and the fiscal aggregates. The general relationship between net foreign aid and the fiscal aggregates was similar to those originally calculated. There was a positive impact on government investment, consumption and domestic borrowing, and a negative impact on government revenue. Equally, a similar trend was observed with the grants model as the general impact of grants remained the same over the period. The only notable change came from the analysis of the net foreign loans model. Unlike the first estimation outcome, government investment, consumption and domestic borrowing were now negatively impacted by loans and government revenue depicted a positive relationship with loans.

LHS Variables	RHS Variables						
	Investment	Consumption	Revenue	Borrowing	ODA	Grants/Loans	Constant
Net ODA	2.42 (0.30)	13.34 (2.10)	-2.03 (0.59)	0.52 (0.07)	-	-	-213.47
Grants	19.87 (2.55)	154.24 (17.24)	-15.30 (4.85)	6.15 (0.64)	-	-10.48 (3.18)	-2321.02
Loans	-1.90 (0.25)	-14.72 (1.70)	1.46 (0.49)	-0.59 (0.06)	-	-0.10 (0.34)	221.42

Note: all values significant at a 1% level. Standard errors in ()

The implication behind the this finding is that, the factoring out debt relief from net foreign loans shows that the remaining loan resources were used to reduce domestic borrowing and encouraged revenue collection in the long-run. Again following from the work of Gupta *et al.* (2003), it would

⁸ The IMF documents can be accessed from <http://www.imf.org/external/country/ZMB/>

be expected that net foreign loans would be prioritized to the financing of investment expenditure, with the anticipation of repayment obligations in mind. Although, the upside of to this outcome was the fact that net foreign loans led to an increase in domestic revenues which is beneficial as the additional revenue resources could be used to finance public expenditure.

VEC estimates for the short-run analysis of the impact of foreign aid for the three models was also obtained, and the results are presented in *tables C2, C3 and C4* respectively. Most of the results were in line with earlier findings from the VECM analysis. The short-run impact of net foreign aid on the fiscal aggregates was found to be positive for all the fiscal variables (See *Table C2*).

Table C2: Vector Error Correction Estimates (Net ODA Model)

Error Correction:	D(NET_ODA)	D(INVESTME	D(CONSUMP	D(REVENUES	D(BORROWIN
CointEq1	-0.220739 (0.11476) [-1.92355]	0.060053 (0.03230) [1.85936]	-0.056112 (0.02245) [-2.49975]	0.079609 (0.05697) [1.39746]	-1.721239 (0.52762) [-3.26227]
D(NET_ODA(-1))	-0.430786 (0.15020) [-2.86800]	-0.017204 (0.04227) [-0.40696]	0.041053 (0.02938) [1.39725]	0.058860 (0.07456) [0.78939]	0.547137 (0.69060) [0.79226]
D(NET_ODA(-2))	-0.163919 (0.14221) [-1.15264]	-0.045403 (0.04002) [-1.13438]	0.033547 (0.02782) [1.20594]	-0.009967 (0.07060) [-0.14118]	-0.147837 (0.65385) [-0.22610]
D(INVESTMENT(-1))	0.666119 (0.60928) [1.09328]	0.189589 (0.17148) [1.10561]	0.242122 (0.11918) [2.03155]	0.326191 (0.30246) [1.07846]	1.668783 (2.80133) [0.59571]
D(INVESTMENT(-2))	-0.463280 (0.53578) [-0.86468]	0.122717 (0.15079) [0.81381]	0.014852 (0.10480) [0.14171]	-0.603982 (0.26597) [-2.27086]	-0.380407 (2.46338) [-0.15443]
D(CONSUMPTION(-1))	2.654820 (1.21337) [2.18798]	-1.058160 (0.34150) [-3.09860]	0.412187 (0.23734) [1.73666]	-0.062471 (0.60234) [-0.10371]	10.81311 (5.57876) [1.93826]
D(CONSUMPTION(-2))	-0.199176 (1.12186) [-0.17754]	-0.620163 (0.31574) [-1.96416]	0.253521 (0.21944) [1.15529]	-0.492936 (0.55691) [-0.88513]	10.12255 (5.15801) [1.96249]
D(REVENUES(-1))	-0.060419 (0.39021) [-0.15484]	0.194983 (0.10982) [1.77542]	-0.181188 (0.07633) [-2.37378]	-0.157058 (0.19371) [-0.81079]	-0.074397 (1.79410) [-0.04147]
D(REVENUES(-2))	-0.328128 (0.32866) [-0.99837]	-0.293999 (0.09250) [-3.17835]	-0.053038 (0.06429) [-0.82499]	-0.447988 (0.16315) [-2.74578]	-1.363115 (1.51111) [-0.90206]
D(BORROWING(-1))	0.110708 (0.04202) [2.63493]	-0.018447 (0.01182) [-1.55997]	0.014607 (0.00822) [1.77734]	0.002723 (0.02086) [0.13058]	0.583133 (0.19318) [3.01866]
D(BORROWING(-2))	0.080400 (0.04714) [1.70551]	-0.022059 (0.01327) [-1.66260]	-0.000535 (0.00922) [-0.05804]	-0.044994 (0.02340) [-1.92268]	0.163938 (0.21674) [0.75637]
C	0.486857 (1.08006) [0.45077]	0.327956 (0.30398) [1.07889]	-0.020395 (0.21127) [-0.09654]	0.777330 (0.53616) [1.44981]	0.108632 (4.96582) [0.02188]

Grants had a negative impact on investment, consumption and domestic borrowing. Whereas, the impact on government revenue was positive. Once more, grants were used to lessen the government's debt burden in the short run.

Table C3: Vector Error Correction Estimates (Grants Model)

Error Correction:	D(GRANTS)	D(INVESTME	D(CONSUMP	D(REVENUES	D(BORROWIN	D(LOANS)
CointEq1	0.009680 (0.00612) [1.58273]	-5.85E-05 (0.00341) [-0.01716]	-0.007950 (0.00207) [-3.84397]	0.004335 (0.00596) [0.72684]	-0.125213 (0.05714) [-2.19152]	-0.008708 (0.01287) [-0.67654]
D(GRANTS(-1))	-0.589913 (0.19339) [-3.05040]	-0.115164 (0.10790) [-1.06733]	0.125088 (0.06540) [1.91276]	-0.048801 (0.18857) [-0.25879]	1.060595 (1.80661) [0.58706]	0.432036 (0.40699) [1.06154]
D(GRANTS(-2))	-0.160160 (0.19610) [-0.81672]	-0.045246 (0.10941) [-0.41353]	0.156550 (0.06631) [2.36076]	-0.005876 (0.19122) [-0.03073]	-0.690933 (1.83194) [-0.37716]	0.332186 (0.41270) [0.80491]
D(INVESTMENT(-1))	-0.253979 (0.31841) [-0.79764]	0.319863 (0.17765) [1.80048]	0.193105 (0.10767) [1.79341]	0.494757 (0.31049) [1.59350]	-1.685091 (2.97458) [-0.56650]	0.663496 (0.67011) [0.99013]
D(INVESTMENT(-2))	0.066348 (0.28554) [0.23236]	0.134225 (0.15931) [0.84252]	-0.070166 (0.09656) [-0.72667]	-0.554490 (0.27843) [-1.99149]	-2.169854 (2.66747) [-0.81345]	-0.656597 (0.60092) [-1.09265]
D(CONSUMPTION(-1))	-0.109442 (0.65818) [-0.16628]	-0.600769 (0.36722) [-1.63599]	0.617550 (0.22257) [2.77464]	0.195615 (0.64179) [0.30480]	7.464830 (6.14860) [1.21407]	0.998305 (1.38515) [0.72072]
D(CONSUMPTION(-2))	-0.809969 (0.55509) [-1.45915]	-0.132304 (0.30971) [-0.42719]	0.279563 (0.18771) [1.48933]	-0.092883 (0.54127) [-0.17160]	4.568205 (5.18562) [0.88094]	-0.972443 (1.16821) [-0.83242]
D(REVENUES(-1))	0.147496 (0.18571) [0.79421]	0.087489 (0.10362) [0.84435]	-0.160334 (0.06280) [-2.55304]	-0.259207 (0.18109) [-1.43137]	1.893224 (1.73492) [1.09125]	0.182279 (0.39084) [0.46638]
D(REVENUES(-2))	-0.135896 (0.17524) [-0.77547]	-0.314287 (0.09777) [-3.21442]	-0.038043 (0.05926) [-0.64198]	-0.481581 (0.17088) [-2.81826]	-0.653036 (1.63709) [-0.39890]	-0.172519 (0.36880) [-0.46778]
D(BORROWING(-1))	-0.021455 (0.02608) [-0.82254]	-0.002252 (0.01455) [-0.15472]	0.026458 (0.00882) [2.99959]	0.008500 (0.02543) [0.33419]	0.591042 (0.24367) [2.42554]	0.067857 (0.05489) [1.23613]
D(BORROWING(-2))	-0.033118 (0.02788) [-1.18794]	-0.003524 (0.01555) [-0.22656]	0.011270 (0.00943) [1.19546]	-0.036417 (0.02718) [-1.33964]	0.094847 (0.26044) [0.36418]	0.043255 (0.05867) [0.73724]
D(LOANS(-1))	0.118916 (0.10046) [1.18376]	0.014952 (0.05605) [0.26678]	-0.056034 (0.03397) [-1.64949]	0.137065 (0.09796) [1.39926]	-1.192492 (0.93845) [-1.27070]	-0.646841 (0.21141) [-3.05960]
D(LOANS(-2))	0.016382 (0.08500) [0.19273]	-0.032227 (0.04743) [-0.67953]	-0.021507 (0.02874) [-0.74821]	0.023229 (0.08288) [0.28025]	-0.870659 (0.79407) [-1.09645]	-0.256706 (0.17889) [-1.43501]
C	0.194536 (0.57986) [0.33549]	0.351429 (0.32353) [1.08625]	0.050728 (0.19609) [0.25870]	0.737488 (0.56542) [1.30431]	1.724461 (5.41699) [0.31834]	0.119528 (1.22033) [0.09795]

Finally, net foreign loans were positively associated with government investment, consumption, revenue and domestic borrowing in the short-run.

Table C4: Vector Error Correction Estimates (Loans Model)

Error Correction:	D(LOANS)	D(INVESTME	D(CONSUMP	D(REVENUES	D(BORROWIN	D(GRANTS)
CointEq1	0.091279 (0.13492) [0.67654]	0.000614 (0.03577) [0.01716]	0.083335 (0.02168) [3.84397]	-0.045437 (0.06251) [-0.72684]	1.312509 (0.59890) [2.19152]	-0.101468 (0.06411) [-1.58273]
D(LOANS(-1))	-0.646841 (0.21141) [-3.05960]	0.014952 (0.05605) [0.26678]	-0.056034 (0.03397) [-1.64949]	0.137065 (0.09796) [1.39926]	-1.192492 (0.93845) [-1.27070]	0.118916 (0.10046) [1.18376]
D(LOANS(-2))	-0.256706 (0.17889) [-1.43501]	-0.032227 (0.04743) [-0.67953]	-0.021507 (0.02874) [-0.74821]	0.023229 (0.08288) [0.28025]	-0.870659 (0.79407) [-1.09645]	0.016382 (0.08500) [0.19273]
D(INVESTMENT(-1))	0.663496 (0.67011) [0.99013]	0.319863 (0.17765) [1.80048]	0.193105 (0.10767) [1.79341]	0.494757 (0.31049) [1.59350]	-1.685091 (2.97458) [-0.56650]	-0.253979 (0.31841) [-0.79764]
D(INVESTMENT(-2))	-0.656597 (0.60092) [-1.09265]	0.134225 (0.15931) [0.84252]	-0.070166 (0.09656) [-0.72667]	-0.554490 (0.27843) [-1.99149]	-2.169854 (2.66747) [-0.81345]	0.066348 (0.28554) [0.23236]
D(CONSUMPTION(-1))	0.998305 (1.38515) [0.72072]	-0.600769 (0.36722) [-1.63599]	0.617550 (0.22257) [2.77464]	0.195615 (0.64179) [0.30480]	7.464830 (6.14860) [1.21407]	-0.109442 (0.65818) [-0.16628]
D(CONSUMPTION(-2))	-0.972443 (1.16821) [-0.83242]	-0.132304 (0.30971) [-0.42719]	0.279563 (0.18771) [1.48933]	-0.092883 (0.54127) [-0.17160]	4.568205 (5.18562) [0.88094]	-0.809969 (0.55509) [-1.45915]
D(REVENUES(-1))	0.182279 (0.39084) [0.46638]	0.087489 (0.10362) [0.84435]	-0.160334 (0.06280) [-2.55304]	-0.259207 (0.18109) [-1.43137]	1.893224 (1.73492) [1.09125]	0.147496 (0.18571) [0.79421]
D(REVENUES(-2))	-0.172519 (0.36880) [-0.46778]	-0.314287 (0.09777) [-3.21442]	-0.038043 (0.05926) [-0.64198]	-0.481581 (0.17088) [-2.81826]	-0.653036 (1.63709) [-0.39890]	-0.135896 (0.17524) [-0.77547]
D(BORROWING(-1))	0.067857 (0.05489) [1.23613]	-0.002252 (0.01455) [-0.15472]	0.026458 (0.00882) [2.99959]	0.008500 (0.02543) [0.33419]	0.591042 (0.24367) [2.42554]	-0.021455 (0.02608) [-0.82254]
D(BORROWING(-2))	0.043255 (0.05867) [0.73724]	-0.003524 (0.01555) [-0.22656]	0.011270 (0.00943) [1.19546]	-0.036417 (0.02718) [-1.33964]	0.094847 (0.26044) [0.36418]	-0.033118 (0.02788) [-1.18794]
D(GRANTS(-1))	0.432036 (0.40699) [1.06154]	-0.115164 (0.10790) [-1.06733]	0.125088 (0.06540) [1.91276]	-0.048801 (0.18857) [-0.25879]	1.060595 (1.80661) [0.58706]	-0.589913 (0.19339) [-3.05040]
D(GRANTS(-2))	0.332186 (0.41270) [0.80491]	-0.045246 (0.10941) [-0.41353]	0.156550 (0.06631) [2.36076]	-0.005876 (0.19122) [-0.03073]	-0.690933 (1.83194) [-0.37716]	-0.160160 (0.19610) [-0.81672]
C	0.119528 (1.22033) [0.09795]	0.351429 (0.32353) [1.08625]	0.050728 (0.19609) [0.25870]	0.737488 (0.56542) [1.30431]	1.724461 (5.41699) [0.31834]	0.194536 (0.57986) [0.33549]