The Impact of Government Spending on Agricultural Growth: A Case of Zambia, Malawi, South Africa and Tanzania

By

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Thesis presented in partial fulfilment of the requirements for the degree of Master of Science in Agriculture (Agricultural Economics) in the Faculty of AgricSciences at Stellenbosch University

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March 2017

DECLARATION

By submitting this thesis electronically, I declare that the entirety of the work contained therein is my own original work, that I am the sole author thereof (save to the extent explicitly otherwise stated), that reproduction and publication thereof by Stellenbosch University will not infringe any third party rights, and that I have not previously in its entirety or in part submitted it for obtaining any qualification.

March, 2017

ACKNOWLEDGEMENTS

Firstly, I would like to thank the Almighty for His grace that enabled me to complete this thesis. *"Being confident of this very thing, that He which hath begun a good work in you will perform it until the day of Jesus Christ"* Philippians 1:6 (KJV).

I am grateful to my supervisor Ms. Lulama Traub for her continuous support, motivation and patience. Without your knowledge and guidance, it would not have been possible to produce this work.

My sincere thanks go to Prof Vink and the department staff for allowing me to be part of their team and develop this thesis. I also thank the department of agricultural economics for the department bursary.

I would like to take this opportunity to thank Ms. Chantal Swartz and the International Office for their assistance financially through the merit bursary and the BEIT Trust fund.

It gives me great pleasure in acknowledging the assistance of Ms. Debra Shepherd, lecturer in the department of economics at Stellenbosch. I am indebted to you for your encouragement and support extended to me whenever I was in need. May the good Lord bless you.

My sincere thanks also goes to Dr. C. Punt, lecturer in the department of Agricultural Economics at Stellenbosch, for assistance with Abstract translation to Afrikaans and also for making some comments on my work.

A special thanks to my colleagues and friends, Motselisi Ledicia Ratii, Benjamin Nkurunziza, Tatenda Chatukuta, Chanda Chiseni and Lindelani Makuvha for being there to share this wonderful experience during my stay at Stellenbosch University.

Lastly, from the deepest of my heart, I would like to thank my family for their unconditional love and support. Thank you for being there for me all the way, both spiritually and financially.

ABSTRACT

The objective of this study is to determine the component of public expenditure that is more growth enhancing for the agricultural sector. In order to address this objective, an analysis is conducted on government spending, disaggregated by expenditure categories for Zambia, Malawi, South Africa and Tanzania between 2000 and 2014. The vector error correction model (VECM) is used to test the impact of public expenditure, private investment and net trade on agricultural GDP growth. The results from the empirical analysis reveal that agricultural growth responds differently to the agricultural spending types across the countries. In Zambia, the bulk of public expenditure goes to support the input subsidy programs (ISPs) and price support programs (PSPs). However, the empirical analysis indicated that infrastructure development, which only received third priority, was more growth enhancing among the spending types. Results also suggested a negative relationship between agricultural growth and expenditures on ISPs, PSPs and agricultural research in Zambia. In the case of Malawi, the results of the empirical analysis indicated that spending on agricultural research has a higher impact on growth, and unlike Zambia there is evidence of a positive relationship between agricultural growth and spending on PSPs.

While infrastructure development in Tanzania received the bulk of the budget, the regression results indicated a negative relationship between spending on infrastructure and long-run economic growth. In contrast, South Africa allocates public expenditure to spending categories with the highest returns. For instance, priority is given to agricultural research in South Africa. Given the study results, there is a need to re-direct public investments in favor of growth-enhancing expenditure categories. The recommendation is for governments to shift their spending priorities and focus more on areas that stimulate growth to the sector. More efficient targeting of public investments by the governments stimulate growth in the agricultural sector and ultimately reduce poverty and hunger within the sub-Saharan region. This information is also vital to various international bodies including African Union (AU) and United Nations (UN) aiming to achieve goals like the Malabo declaration by 2025 and Sustainable development goals (SDGs) by 2030, respectively.

OPSOMMING

Die doel van hierdie studie is om vas te stel watter komponent van openbare besteding meer groei bevorder vir die landbousektor. Ten einde hierdie doelwit aan te spreek, is 'n ontleding gedoen op regeringbesteding, ingedeel volgens bestedingskategorieë vir Zambië, Malawi, Suid-Afrika en Tanzanië tussen 2000 en 2014. Die vektor foutkorreksie model (VECM) word gebruik om te toets wat die impak van openbare besteding, private investering en die handelsbalans op landbou se groei in BBP is. Die resultate van die empiriese ontleding dui daarop dat landbou groei verskillend reageer op die tipes landbou-uitgawes in die verskillende lande. In Zambië gaan die grootste deel van openbare besteding ter ondersteuning van die insette subsidie programme (ISPs) en die prys ondersteuningsprogramme (PSPs). Maar die empiriese ontleding het aangedui dat die ontwikkeling van infrastruktuur, wat net derde prioriteit was, het meer groei aangemoedig as die ander tipes uitgawes. Resultate het ook daarop gedui dat daar 'n negatiewe verhouding is tussen landbou groei en besteding op ISPs, PSPs en landbounavorsing in Zambië. In die geval van Malawi, het die resultate van die empiriese ontleding aangedui dat besteding aan landbounavorsing 'n groter impak het op groei en, in teenstelling met Zambië, is daar 'n bewys van 'n positiewe verhouding tussen landbou groei en besteding op PSP.

Terwyl die ontwikkeling van infrastruktuur in Tanzanië die grootste deel van die begroting ontvang, het die regressie resultate getoon dat 'n negatiewe verhouding tussen infrastruktuurbesteding en langtermyn ekonomiese groei bestaan. In teenstelling hiermee, het Suid-Afrika openbare besteding toegeken aan uitgawe kategorieë met die hoogste opbrengs. Byvoorbeeld, prioriteit is gegee aan landbounavorsing in Suid-Afrika. Gegewe die studie resultate, is daar 'n behoefte om direkte openbare investering te kanaliseer ten gunste van bestedingskategorieë wat groei verbeter. Die aanbeveling vir regerings is om hul bestedingsprioriteite te verskuif en meer te fokus op areas wat groei in die sektor stimuleer. Deur openbare investering meer doeltreffend aan te wend kan regerings groei in die landbousektor stimuleer en uiteindelik armoede en hongerte binne die sub-Sahara-streek verminder. Hierdie inligting is ook noodsaaklik vir verskeie internasionale liggame insluitend die Afrika-Unie (AU) en die Verenigde Nasies (VN) wat ten doel het om doelwitte soos die Malabo verklaring teen 2025 te bereik en die volhoubare ontwikkeling doelwitte (SDGs) teen 2030.

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LIST OF ABBREVIATIONS

AISP	-	Agricultural Input Subsidy Program
AR	-	Agricultural Research
ARE	-	Agricultural Research and Extension
AU	-	African Union
ACP	-	Agricultural Commodity Program
ADMARC	-	Agricultural Development and Marketing Cooperation
ASDP	-	Agricultural Sector Development Program
CAADP	-	Comprehensive African Agriculture Development Program
CASP	-	Comprehensive Agricultural Support Program
ERP	-	Economic Recovery Program
FAO	-	Food and Agriculture Organization
FDI	-	Foreign Direct Investment
FISP	-	Farmer Input Subsidy Program
FNDP	-	Fifth National Development Plan
FRA	-	Food Reserve Agency
FSDP	-	Farmer Support Development Program
FSP	-	Fertilizer Support Program
GDP	-	Gross Domestic Product
GNP	-	Gross National Product
GOM	-	Government of Malawi
GOT	-	Government of Tanzania
GRZ	-	Government of Zambia
IAPRI	-	Indaba Agricultural Policy Research Institute
IFDC	-	International Fertilizer Development Center
IFPRI	-	International Food Policy Research Institute
IDP	-	Infrastructure Development Program

IMF	-	International Monetary Fund
ISP	-	Input Subsidy Program
ITC	-	International Trade Centre
MACO	-	Ministry of Agriculture and Cooperatives
MDGs	-	Millennium Development Goals
MGDS	-	Malawi Growth and Development Strategy
MK	-	Malawian Kwacha
MoF	-	Ministry of Finance
NAMBOARD	-	National Agricultural Marketing Board
NEPAD	-	New Partnership for Africa's Development
OECD	-	Organization for Economic Cooperation and Development
OLS	-	Ordinary Least Squares
PAE	-	Public Agricultural Expenditure
PE	-	Personal Emoluments
PER	-	Public Expenditure Review
PPE	-	Priority Poverty Expenditures
PPP	-	Purchasing Power Parity
PSP	-	Price Support Program
SAP	-	Structural Adjustment Programs
SARPN	-	Southern African Regional Poverty Network
SDGs	-	Sustainable Development Goals
SSA	-	Sub-Saharan Africa
TAFSIP	-	Agriculture and Food Security Investment Plan
Tshs	-	Tanzanian Shillings
TSLS	-	Two Stage Least Squares
UN	-	United Nations
US	-	United States
VAR	-	Vector Auto Regression

VECM	-	Vector Error Correction Model
WB	-	World Bank
ZMK	-	Zambian Kwacha

CHAPTER 1 : INTRODUCTION

"Most of the world's poor people earn their living from agriculture, so if we knew the economics of agriculture we would know much of the economics of being poor"

- Theodore Schultz, 1979

1.1 Background

As agriculture remains the economic engine of rural Africa, promoting economic transformation in Africa will depend largely on stimulating agricultural growth. The underlying premise is that through broad-based smallholder-led structural transformation, Africa can achieve the derived level of poverty-reducing growth (Mashindano et al., 2011; Kimenyi et al., 2012; Tomsik et al., 2015). This notion that agricultural sector is the engine of economic growth can be traced back to the 1950s. Mellor (1976) indicated a development strategy for rural and developing countries with increasing agricultural productivity as the starting point. However, it was only until the 1990s that policy makers prioritized agriculture and by 2000, it became a key area when discussing development and growth.

The year 2000 saw the inception of the Millennium Development Goals (MDGs) by United Nations (UN) member states. One of these goals was to eradicate extreme poverty and hunger by 2015 (UN, 2015). To assist in achieving the MDGs, the African Union (AU) heads of state established the Comprehensive African Agricultural Development Program (CAADP) in 2003. The overall objective of CAADP is to improve food security and reduce poverty through agricultural-led development strategy. To achieve this overall goal, governments targeted a 6% annual agricultural growth rate by 2015 (NEPAD, 2014). The AU member states also pledged to increase their share of public expenditure on agriculture up to 10%. Agricultural spending is one of the direct and effective tools for enabling sustainable economic growth in developing countries (Fan et al., 2008; Ngene et al., 2012; Bahta et al., 2014).

Countries that adopted CAADP since its inception in 2003, by investing 10% of their national budgets to the agricultural sector experienced an annual increase in their agricultural productivity of around 5.9% to 6.7%. On the contrary, those countries that did not implement the CAADP goals had farm productivity growth of less than 3% (Badiane, Benin, and Makombe, 2016). Therefore, agricultural spending has a bigger role to play in transforming the African communities in the decades to come.

However, government interference in agricultural markets through spending depends on a country's wealthy as well as the government's objectives. The major investment areas in the sector include input subsidy programs, price support programs, agricultural research and extension as well as infrastructure development programs. In low-income countries, governments mainly intervene

through input subsidies and price support programs to enhance social welfare and growth (Clark et al., 1993; Van De Walle, 1998; Summer, 2008). The government spending through subsidies or price supports is justified by the fact that they arise because of the related market failure. On the other hand, many studies have argued that the greatest contribution to poverty reduction comes from investments in infrastructure development programs such as roads improvement. Spending on agricultural research programs has also been recognized as one area of investment which can bring high returns to agriculture in the long run (Fan and Rao, 2003; Benin and Yu, 2012).

African governments have been providing these different kinds of support programs to the agricultural sector with the aim of achieving various economic objectives such as the Sustainable Development Goals (SDGs) (Soyeju, 2015). The first two of these goals include eliminating both hunger and poverty by 2030. The African Union (AU) also established various declarations since the early 2000s to help ameliorate the agricultural support programs and achieve increased farm productivity. These commitments include the Maputo Declaration of 2003, the Abuja Declaration of 2006 and the Malabo Declaration of 2014 (Hill, 2012; OECD, 2014).

Even though government spending on agriculture is crucial for economic growth, many have questioned the effectiveness and consequences of such programs. According to OECD (2014), regardless of the commendable goals achieved by public spending on agriculture, there are various distortions associated with the policy. The following questions continue to dominate recent debates and discussions regarding government spending. What is the impact of the public expenditure on productivity, growth, incomes and the well-being of individuals? Which area should the government give more priority in terms of its allocation of funds? Which component of spending contributes more to agricultural growth?

This study aims to answer these questions and provide recommendations based on the empirical analysis results. The study first analyses the trends in government expenditure in four different countries including Zambia, Malawi, South Africa and Tanzania making use of time series data. With time series data, both the contemporaneous effects and the lagged effects of government spending types on growth can be determined. Secondly, this study compares the relative contribution of different government spending categories on production growth based on the error correction model approach. Thus, determining what drives growth among government spending on agricultural research, infrastructure development, price supports and subsidies. Governments will have an intuitive understanding of which areas they should disburse more money to achieve sustainable economic growth.

1.2 History and Evolution of CAADP

1.2.1 Introduction

Despite having abundant resources such as arable land, water, and human resources with a potential of being transformed into increased production and higher incomes for rural people, Africa has faced many challenges with regard to agriculture and food security for decades. The continent remains a region with the largest proportion of people suffering from chronic hunger and living below the poverty line. Eradication of this extreme poverty and hunger became one of the eight MDGs adopted by the UN general assembly in September 2000 (UN, 2015). In response to the MDGs, the African countries came up with a commitment to pursue economic growth through agriculture. In July 2003, the AU established CAADP as part of the New Partnership for Africa Development (NEPAD). The goal was to improve agricultural growth thereby reducing poverty, eliminating hunger and expanding exports (NEPAD, 2008; IFPRI, 2013; Kimenyi et al., 2012; NEPAD, 2014).

1.2.2 Definition and Intentions of CAADP

NEPAD (2009) defined CAADP as a common framework, tool, and process to restore agricultural growth and food security in Africa. It assists in national and regional strategies for development in the continent (Cooksey, 2013). CAADP also facilitates African countries in achieving goals such as the Sustainable Development Goals (SDGs) through institutional and policy transformation in the agricultural sector. According to Kimenyi et al (2012), the primary goal of the CAADP is to help eradicate hunger and poverty through agriculture. To achieve this goal, the AU urged African states to target a 6% annual growth in agriculture and allocate 10% of their national budgets to the sector. The later target is the primary focus of the Maputo Declaration (NEPAD, 2014). Kimenyi et al (2012) and Cooksey (2013) mentioned four pillars of the CAADP, which include extending the area under sustainable land and water management, improving rural infrastructure and increasing food supply and reducing hunger as well as agriculture research, technology dissemination and adoption.

According to Cooksey (2013), 40 African countries had already joined in the CAADP process by 2012. About 30 states had already signed CAADP compacts while 23 of them including Zambia, Malawi and Tanzania had finalized investment plans. An improvement was then witnessed as 40 AU member states signed the CAADP compacts by late 2014 (NEPAD, 2014). Badiane et al., (2016) mentioned that about 80% of African countries have adopted the principles, targets, and goals of the CAADP agenda at present. The CAADP process has had a more positive impact on productivity, incomes, and nutrition in those countries that signed the compacts compared to the non-adopters and those countries who signed late (Badiane et al., 2016).

According to IFPRI (2013), Heads of State in Africa have come up with various declarations since the inception of CAADP in 2003. These declarations reaffirm the commitments of the CAADP and they include the Maputo declaration of 2003, The Abuja declaration of 2006 and the Malabo declaration of 2014 (NEPAD, 2014).

1.2.3 The AU Declarations

The African Heads of State established the Maputo Declaration in 2003 in Mozambique and agreed to allocate at least 10% of their national budgets to the agricultural sector. The countries were to increase their share of expenditure to agriculture with the aim of expanding agricultural productivity by 6% annually. By 2009, only Mali, Madagascar, Malawi, Niger, Namibia, Chad, and Ethiopia had reached or exceeded the 10% target of agriculture budget share. At least nine countries had managed to exceed the 6% target on productivity (NEPAD, 2009, Ngene et al., 2012). According to Benin and Yu (2012), as of late 2012, 13 countries had already surpassed the 10% target showing an improvement from 2009.

Benin and Yu (2012) came up with a report on the trends in public expenditure to agriculture in African countries. Their study assessed country performances to see if they measure up to the requirements set by the Maputo Declaration. According to Benin and Yu, (2012), even if many countries had increased their public agricultural expenditure (PAE) by 2012, Africa as a whole had not reached the 10% set target. One of the reasons why public agricultural expenditure is still very low among African countries is the small size of their revenue base. The low revenue has constrained many governments to invest in crucial economic activities such as agricultural research and infrastructure development (Benin and Yu, 2012).

The African Union Special Summit held in June 2006 in Nigeria, ended with the inception of the Abuja Declaration on fertilizer for an African Green Revolution. The AU countries reaffirmed their intention to increase agricultural productivity through expansion of fertilizer and improved seed use in the region. The first target of the Abuja Declaration was to increase the fertilizer use up to 50kgs of nutrients per ha by the year 2015 (Wanzala, 2011). Fertilizer usage across African countries shows a positive trend over the past years, however, evidence suggests that the consumption is still very low. The average fertilizer consumption across the continent is between 13 and 15kg/ha, far below the target. The Sub-Saharan Africa (SSA) alone has an average of 5 and 10kg/ha, in fertilizer usage since 1990, which is less than 10% of the world average (Camara and Edeme, 2014).

In June 2014, the African Heads of state and government met in Malabo for the 23rd AU Session and adopted the Malabo Declaration on Accelerated Growth and Transformation for Shared Prosperity

and Livelihoods. The Malabo declaration continues to build on the foundation laid by the CAADP since 2003 with the aim of transforming African economies through agriculture. The goals of Malabo include enhancing both public and private investment in agriculture, increasing current agricultural productivity levels by 50% and reducing post-harvest losses by 50% so as to end hunger and halving poverty by 2025 (NEPAD, 2014; Lorka, 2014). The Malabo declaration also puts more concern on the dependence of Africa on foreign markets for food security. One of the commitments of the declaration is to boost intra-African trade so that the AU countries may also become competitive in the global markets (NEPAD, 2014).

1.3 Country performances towards meeting the CAADP

Zambia

The government of Zambia (GRZ) has devoted a significant share of its budget to agriculture since its independence in 1964, especially to input subsidies (Jayne, 2008; Ricker-Gilbert, 2013). Prior to the structural adjustment programs (SAP), the GRZ was mainly involved in agricultural markets through universal subsidies as well as support on maize production and marketing through the National Agricultural Marketing Board (NAMBOARD). In the early 1990s, GRZ then embarked on the SAP as recommended by international donors such as IMF, which involved the elimination of the universal subsidies, the abolishment NAMBOARD and the liberalization of markets. According to Mason et al (2013), GRZ established different forms of input subsidy programs since the structural adjustment in the 1990s. These include the Fertilizer Credit Programme from 1997/98 to 2001/02, the Fertilizer Support Programme from 2002/03 to 2008/09 and Farmer Input Support Program (FISP) from 2009/10 to present.

Figures 1.1 below presents the government budget allocation (actual amounts released in million ZMK) as well as the percentage shares of expenditure to agriculture in Zambia. Both agricultural expenditure and national expenditure increased from 2000 to 2014. However, the allocation to agriculture was very low as compared to the total national budget expenditures, indicating that other sectors were receiving more funding than the agricultural sector. There was a huge increase in agricultural spending since 2003 as the GRZ became more involved in the agricultural markets with the aim of achieving the CAADP commitments. (See Appendix A1 for figures on government expenditures in Zambia). The graph shows the percentage share of actual spending to agriculture being less than the 10% mark set by CAADP, except for the years 2007/2008, 2010/2011 and 2011/2012. (See Appendix B for the percentage shares to agricultural in the four countries under study).

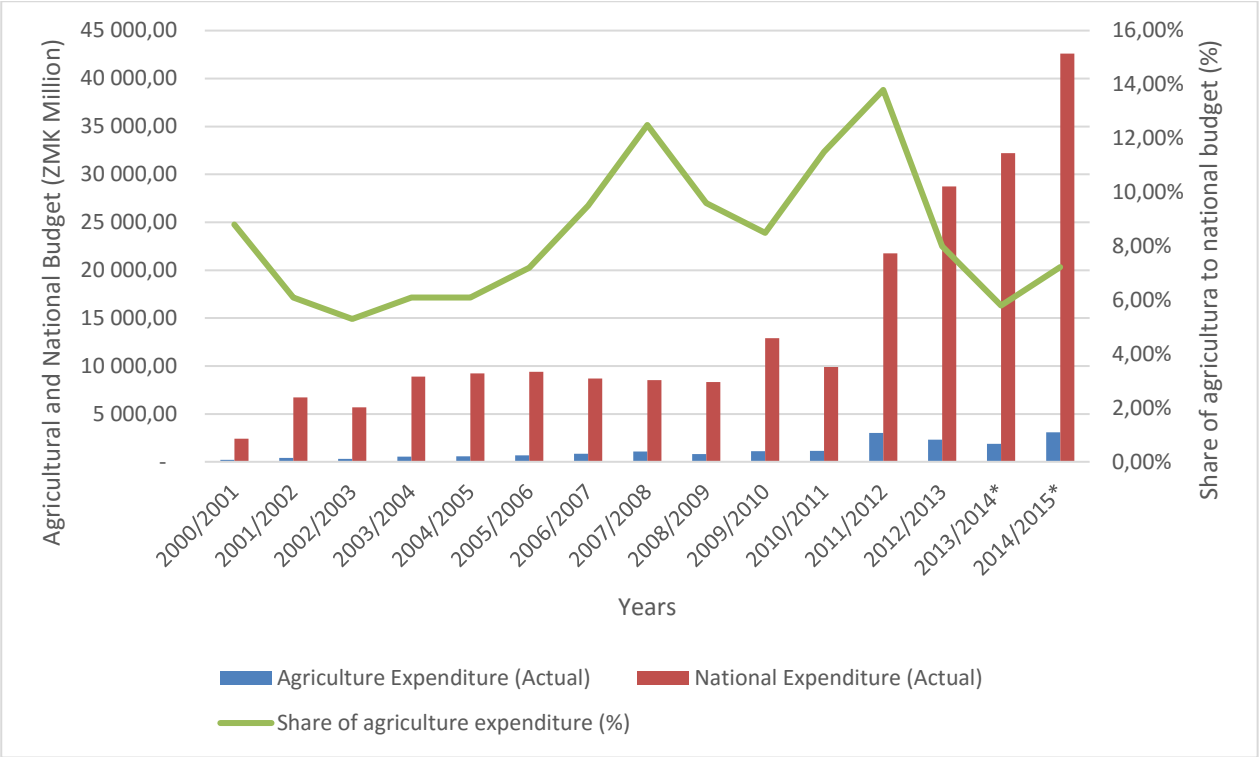

Figure 1.1: Zambia Budget Allocation from 2000 to 2014[1]

Source: Budget Reports (2007-2014), budget speeches (2000-2014) obtained from MoF and National Assembly of Zambia; Govereh et al., (2009) [2]

Malawi

From the mid-1970s to early 1990s, the government of Malawi (GOM) made use of universal subsidies, controlled the maize prices and subsidized loans through the Agricultural Development and Marketing Cooperation (ADMARC) (Dorward and Chirwa, 2011). Macroeconomic imbalances and stagnant agricultural growth witnessed in the 1980s led to the introduction of SAP whereby donors put pressure on governments to shut down their support programs (Shively and Ricker-Gilbert, 2013). After these structural adjustment programs failed to yield the expected growth and development, the government of Malawi reverted to the old policies regarding input subsidies and participation in agricultural markets through a parastatal marketing agency. The state reintroduced agricultural subsidies in 1998 making use of the starter pack program. (Kherallah et al., 2002; Milner, 2005). In response to the food crisis in 2005, GOM established the Farm Input Subsidy Program

[1] The study used actual amounts released by governments except for recent years where data was not available. The asterisk * represents years in which budget estimates were used.

[2] Govereh et al (2009) provided data on public expenditures to agriculture in Zambia from 2000 – 2008.

(FISP) with an intention to improve smallholder farmers' access to advanced agricultural inputs (Shively and Ricker-Gilbert, 2013).

Figures 1.2 presents the Malawi budgetary allocation in millions Malawian Kwacha (MK) as well as the trends in percentage shares of public expenditure to agriculture. Figure 1.2 reflects the actual amounts released by the government of Malawi. The early years witnessed lower agricultural spending mainly because the international donors were not supportive of the government intervention in the agricultural markets. The poor harvest witnessed in 2005 led to an increase in agricultural expenditure as the government decided to provide support for the affected smallholders. The year 2014 recorded the highest agricultural spending of about 150 000 million MK. (Appendix A2 displays figures on government expenditures to Malawi in local currencies from 2000 to 2014). Malawi is one of the countries that have been successful in achieving the CAADP commitments. As seen in figure 1.2, since 2005 the percentage share of agricultural spending has been over the 10% mark set by CAADP.

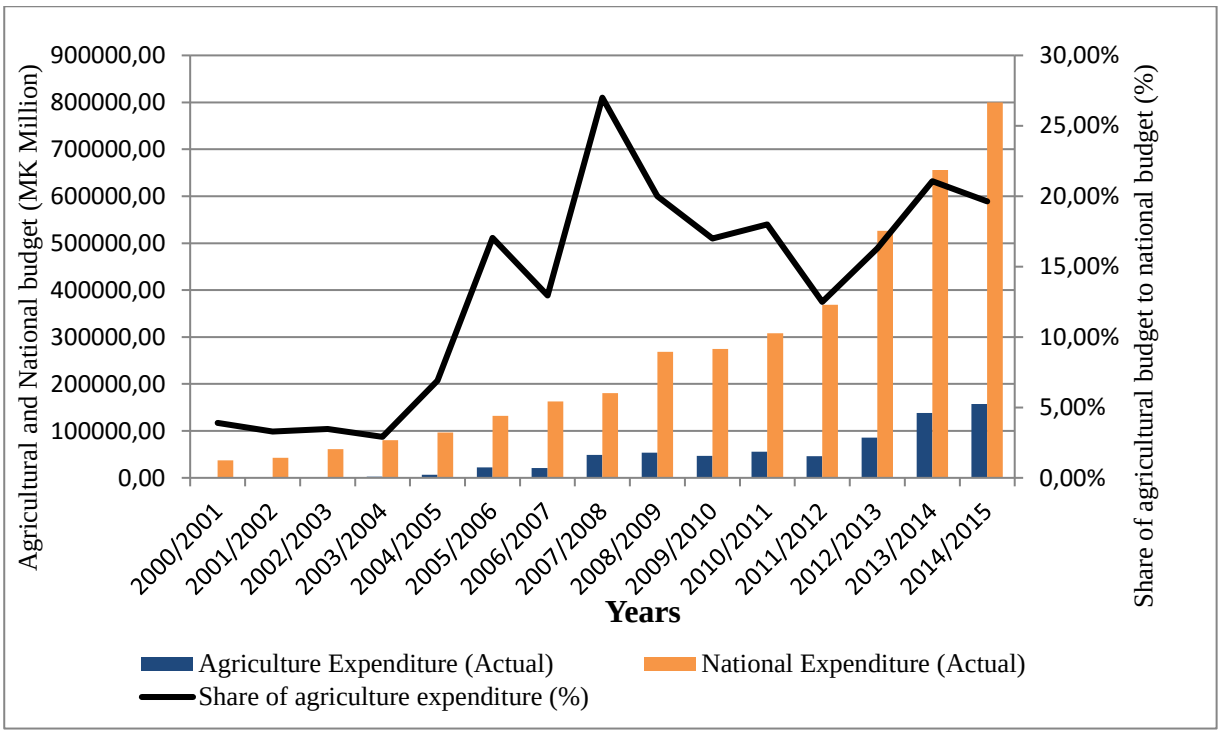

Figure 1.2: Malawi Budget Allocation from 2000 to 2014

Source: budget statements (2006-2014) obtained from MoF in Malawi, budget speeches (2000-2005) obtained from SARPN, Public Expenditure Review (2000-2012) from World Bank (2013) [3], and Dorward and Chirwa (2011)[4].

Tanzania

Tanzania is among the many African countries that pursued the use of universal subsidies from the 1960s to 1980s with an intention of stimulating agricultural development. (Dorward, 2009). The call by International Monetary Fund and World Bank for restructuring in the mid-1980s ended the state agricultural monopoly in Tanzania (Putterman, 1995; Cooksey, 2002). According to Crawford et al (2006) input use and agricultural productivity in Tanzania declined in the 1990s following the inception of the SAP. Tanzania is among the countries that followed the example of Malawi government, which pioneered the return of large-scale subsidies in 1998.

Figure 1.3 below shows the trends in actual national expenditures and the amount of spending released on the agricultural sector. The national expenditure graph shows a continuous steep slope as the government was increasing its public expenditures for the period of study. The expenditure on

[3] World Bank (2013) public expenditure review (PER) provided data on agricultural expenditures in Malawi from 2000-2012.

[4] Dorward and Chirwa (2011) contributed with data on public expenditures in Malawi for the period 2005 to 2009.

agriculture also increased steadily for the same period with some fluctuations in recent years (See Appendix A4 for data on agricultural expenditures to Tanzania). As depicted in figure 1.3 below, the trend in the percentage share of the budget to agriculture has fluctuations from year to year over the past years. The percentage share of agricultural spending still falls short of the 10% target set by CAADP (see figure 1.3 below).

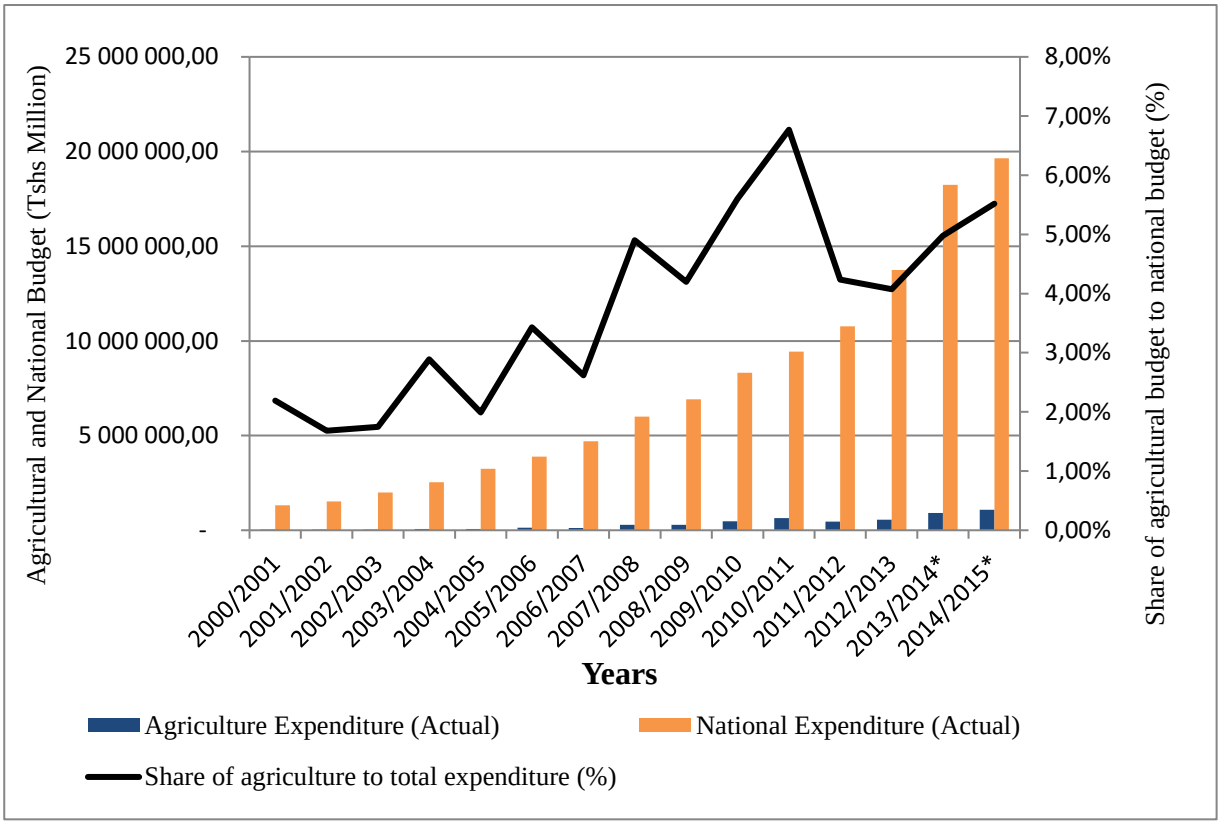

Figure 1.3: Tanzania Budget Allocation from 2000 to 2014

Source: budget speeches (2001-2014), citizens' budget (2011-2014), budget digest (2004-2010), Medium Term Budget Framework (2009-2014) obtained from MoF in Tanzania and Public Expenditure Reviews (2000-2014) by World Bank (2014)

South Africa

South Africa has also been subject to structural adjustment programs of privatization, commercialization, and deregulation of markets following the recommendations of the Kassier Committee (Van Rooyen et al, 1995, Bernstein, 1996). The intention of the adjustment programs was to decrease the size of the public sector and expose farmers to competitive market forces. Since the closure of control boards, the government of South Africa has largely abstained from direct subsidization of farm inputs and loans (Kassier and Groenewald, 1992). However, the government continues to intervene in the agricultural sector by building partnerships with the private sector and

by providing selective support services that promote investment in the sector especially for the land reform beneficiaries (Ministry of Agriculture and Land Affairs, 2016).

The share of agriculture to national budget in South Africa has been very low over the past years; its percentage being less than 1% (See figure 1.4 below). The government spending structure in South Africa shows a shift in spending away from agriculture to other sectors of the economy such as the services sector. Figure 1.4 shows an increase in the national expenditure trend since 2000. The agricultural expenditure trend also increased significantly from 2000 to 2014 (See appendix A3 for data on public expenditures to South Africa in local currencies from 2000 to 2014). While the progress witnessed in several countries over the past years proves the goals of CAADP to be a reality in the continent, the low budgetary allocations to agriculture in South Africa indicate that the sector has not been receiving much priority.

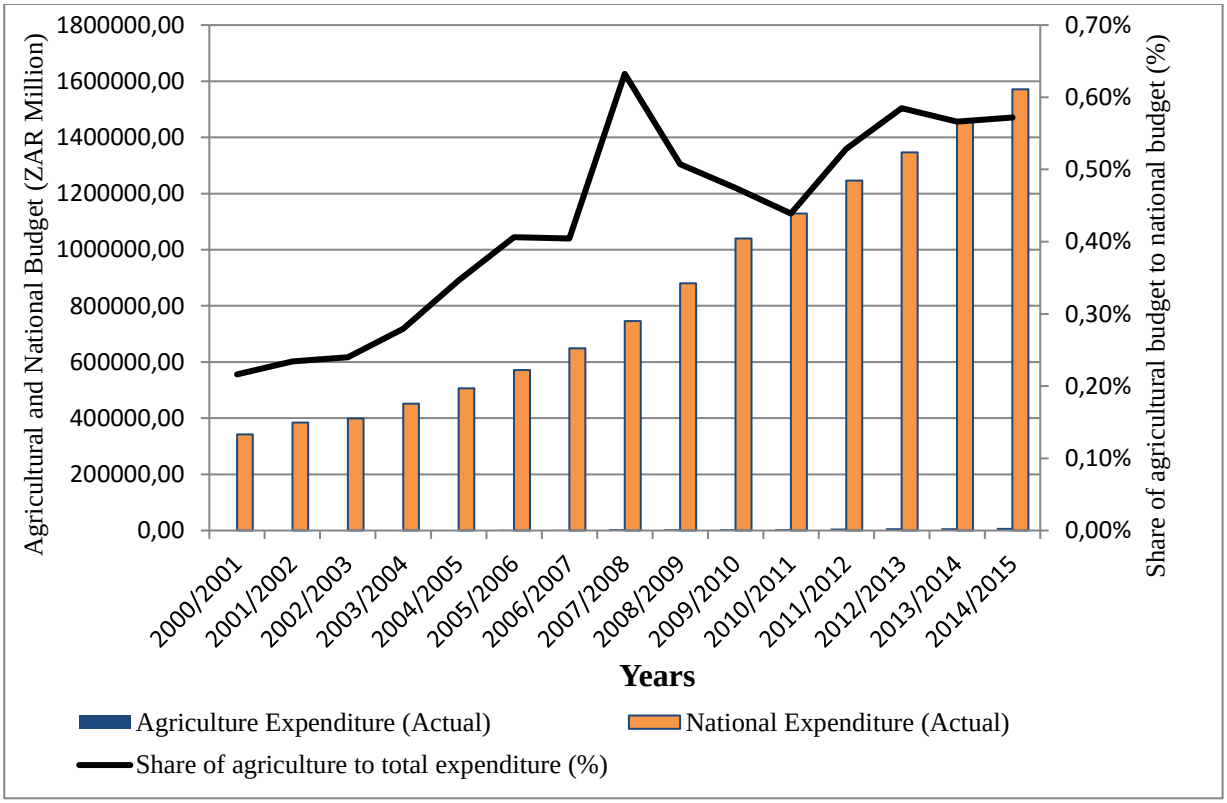

Figure 1.4: South Africa Budget Allocation from 2000 to 2014.

Source: National budget reviews (2000-2014), budget speeches and budget highlights (2000-2014) obtained from the Department of National Treasury, South Africa.

1.3.1 A comparison of the Agricultural Expenditures in the 4 countries

This section attempts to compare the performances of the four countries in terms of their spending on the agricultural sector. Figure 1.5 below displays a graphical comparison of agricultural expenditures

in the four countries in millions of US dollars[5]. In absolute terms, South Africa spent more money on agriculture than any other country over the past years (See figure 1.5). The graph shows South Africa increasing its agricultural expenditures from a value of US$ 449 million in 2000 up to a maximum value of about US$ 2052 million in 2012. Malawi has been the second highest spender from 2000 to around 2007 due to the outstanding performance of its national economy. As shown in figure 1.5 below, there was a steep increase in agricultural spending by the government of Malawi in recent years and it became the highest spender from 2013. This steep increase was mainly due to the motivation by the "2007 Malawi Miracle" which further encouraged the Malawi government to spend more on agriculture.

Malawi experienced a severe drought in 2005 which led the government to introduce the agricultural input subsidy program (AISP) which later became the FISP. Using a voucher system, the National Assembly of Malawi distributed coupons to farmers to subsidize the purchase of inorganic fertilizers and improved seeds despite the disapproval of foreign donors such as World Bank. Malawi experienced a two fold increase in corn production in the 2005/2006 season. By late 2007, the former starving nation had begun exporting corn to Zimbabwe. This program became popularly known as the "Malawi Miracle" (GRAIN, 2010, Chinsinga, 2010, Mason & Ricker-Gilbert, 2012). The progress by Malawi inspired other countries like Zambia and Tanzania, which also substantially increased their agricultural expenditures from 2008. For the period under study, Tanzania has been the third spender whilst Zambia allocated the least amount of US dollars among the four countries (Figure 1.5 below).

[5] The study converted the expenditures in local currencies to international dollars using the exchange rates in 2005 purchasing power parity (PPP). Therefore, this study was able to translate and compare expenditures for different countries using the US dollar as the common reference point. (See Appendix D for purchasing power parity (PPP) exchange rates obtained from World Bank indicators).

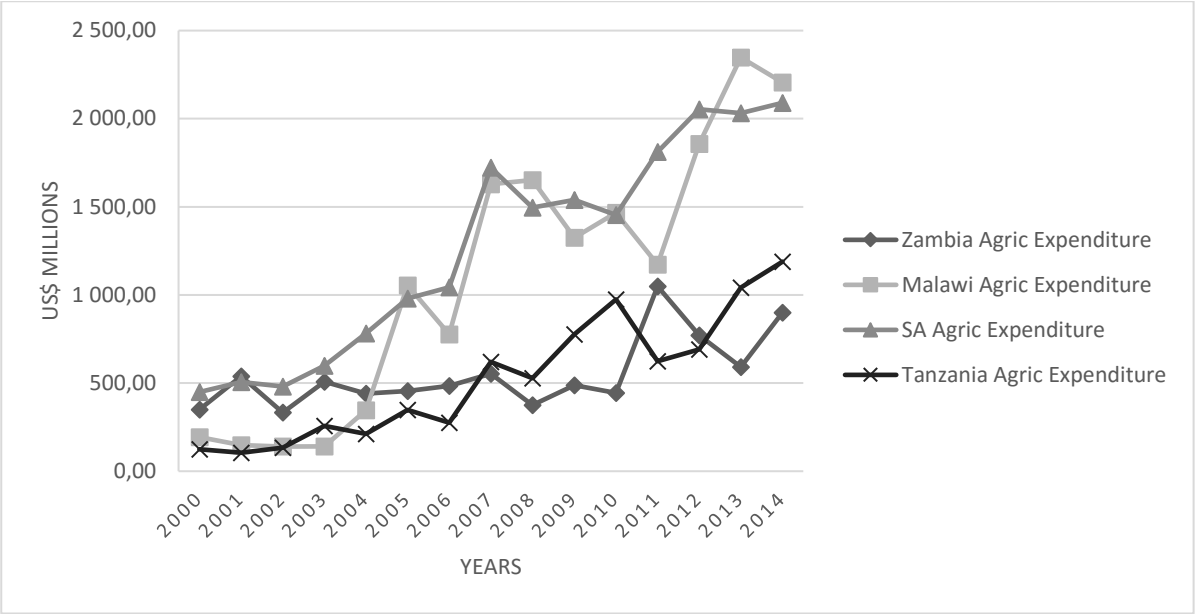

Figure 1.5: Comparison of Agricultural Expenditures across four countries since 2000

Source: Compiled using data from Ministries of Finance for the different countries.

The figure 1.5 above provides important information on the amounts allocated to the agricultural sector. However, the graph does not really help in comparing the performances of these countries in terms of how they are committed towards spending on the agricultural sector. These countries spend depending on the amount of funds available as well as the size of their revenue base (Benin and Yu, 2012; Olomola et al., 2014). Therefore, wealthier countries will tend to spend more in US dollars than the low-income countries. To have a better understanding of how each country is committed towards meeting the CAADP goals; it is rather more beneficial to compare the countries in terms of their share of total expenditure on agriculture. The figure 1.6 below compares the trends in the shares of agricultural expenditures for each country.

Even though South Africa spent more than all the other three countries in terms of US dollars, it was the least among the four countries under study in terms of the share of agricultural expenditure. Malawi was the second spender in terms of US dollars; however, its percentage share of agricultural expenditure was above all the other countries. Malawi is one of the countries that have achieved the CAADP goal and allocated more than 10% of national budgets to agriculture. This is mainly due to its subsidy programs that gave agricultural spending a boost especially after 2005. In terms of being committed towards the agricultural sector through spending, Zambia was in the second position followed by Tanzania (See figure 1.6 below).

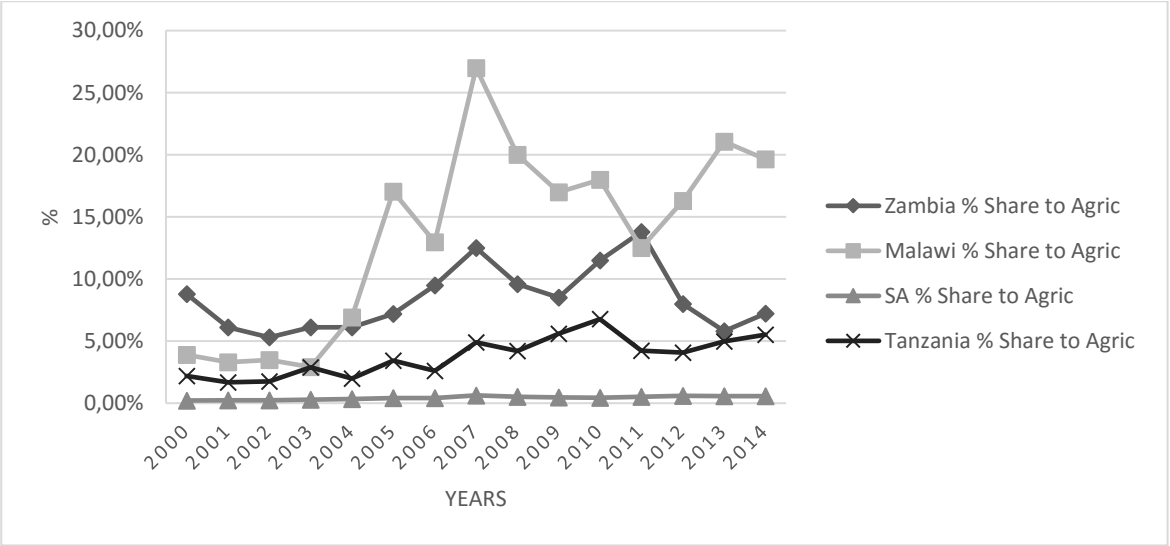

Figure 1.6: Agricultural Expenditure as percentage share of Total National Expenditure

Source: Compiled using data from the different Ministries of Finance in the four countries.

Figure 1.7 below depicts the percentage allocation to agriculture as a percentage share of the agricultural GDP. Expressing the agricultural expenditure as a percentage of GDP enables us to measure how the countries spend relative to the size of their economies (Olomola et al., 2014). Among the four countries, Malawi spends the most on agriculture as a percentage of agricultural GDP. The graph shows a sharp increase in agricultural spending trend by Malawi government since the inception of Maputo declaration in 2003. The percentage share of agricultural expenditure in agricultural GDP in Malawi rose from less than 20% in 2003 to more than 80% in 2005. The Zambian government spent between 20% and 60% relative to the size of its economy, making it the second spender among the four countries. Surprisingly, the spending by South Africa relative to its agricultural GDP has been increasing for the period of study, being more than Tanzania. This indicates that among the four countries, Tanzania spent the least in agriculture relative to the contribution of the sector to the national economy (See figure 1.7).

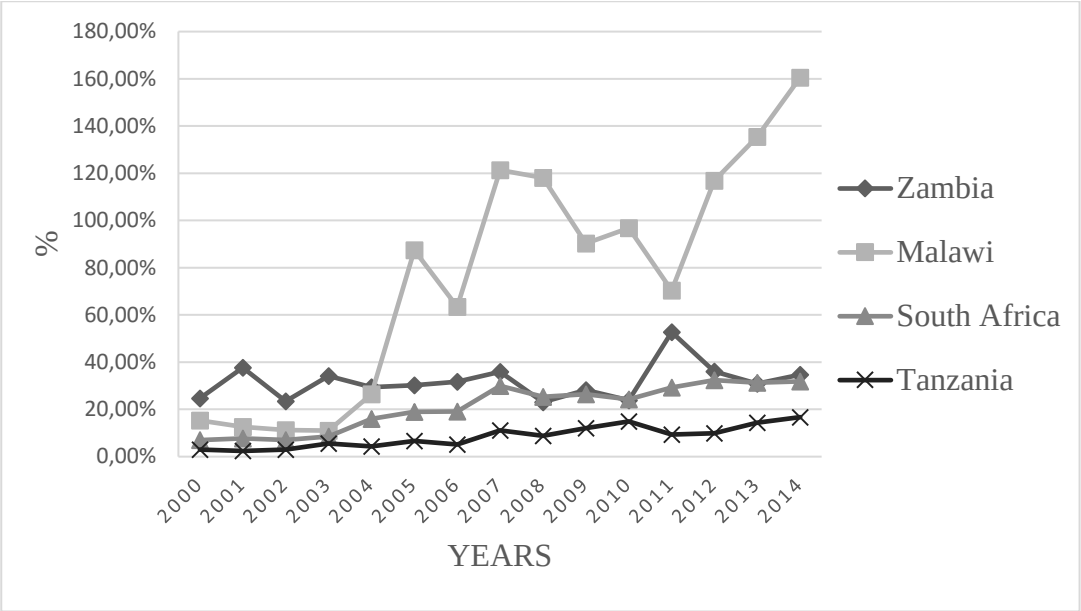

Figure 1.7: Agricultural Expenditure as a percentage of Agricultural GDP

Source: Compiled using data from the different Ministries of Finance in the four countries

1.4 Government expenditure and the Political Economy.

Many African countries at present are more concerned with improving food security in the continent. Increasing food production is one way of attaining this food and nutritional security (Kimenyi et al., 2012). IFPRI (2013) mentioned that the agricultural sector has a crucial role to play especially in African economies. The Green Revolution in Asia provides evidence that the agricultural sector is important in reducing poverty and enhancing growth in developing countries. Making agriculture a priority is essential for eradicating poverty since about 78% of Africa's poor depend on farming (Diao et al., 2010). Agriculture is the largest sector in most African states in terms of its share of GDP. The sector employs almost two-thirds of the labor force and the majority of the poor in rural areas depend on it for their livelihood (Ngene et al., 2012; Fan and Saurkar, 2006).

However, evidence suggests that Africa's agricultural growth at present is very low. According to Ngene et al (2012), the low growth in the agriculture sector witnessed over the past years is mainly due to the poor levels of investment. This low agricultural growth has made African economies to be more dependent on imports. Africa is still the only continent with an increase in food aid, about 45% of its population is living under a $1 per day and the number of food emergencies has tripled since the 80s (NEPAD, 2009; Ngene et al., 2012). The IFDC (2013) paper identified many hurdles to the agriculture sector, especially for smallholders. These include low agricultural productivity, soil nutrient depletion, a decrease in arable land per capita and high population growth resulting in more

pressure on resources. These challenges have made the efforts of alleviating poverty and food insecurity in the continent to be futile (Tittonell and Giller, 2012).

In order to overcome these challenges related to the agricultural sector, it is imperative for African governments to redirect their financial resources towards improving the sector. Increasing budgetary allocations to agriculture can assist African countries in reaching high economic growth through agriculture-led development. Fan et al (2008) mentioned that government spending is one of the direct and effective tools to enable economic growth. This, in turn, will eliminate poverty; reduce hunger and food insecurity in the continent as well as enabling the expansion of exports, which are the commitments of the Malabo declaration.

Regardless of the importance of investing in agriculture, spending by African developing countries is still very low when compared with other developing countries. A study by Fan et al (2008), estimated a model to determine the amount of agricultural spending required to achieve the first Millennium Development goal of halving poverty by 2015. During the Green Revolution, agricultural spending in Asia was approximately 15% of the total expenditures. Currently, Africa's spending on agriculture is around 4 to 5%, which is by far less than the expected spending needed for growth (Fan et al., 2008). The current budgetary allocations by African countries are inadequate to stimulate agricultural productivity as expected by CAADP. Many African states have been increasing their agricultural expenditures but they still fall short of the 10% Maputo Declaration commitment.

As the governments are focusing on increasing their public agricultural expenditure, there is a need for more investigation on the different areas to allocate such spending. Over the past years, there have been debates on which area should receive more funding to maximize the economic growth of a country. Improving budgetary expenditures through input subsidies can significantly reduce the poor agricultural performance by expanding the fertilizer usage by farmers. According to IFDC (2013), fertilizer usage can help in eliminating the farming obstacles such as soil nutrient depletion and change the lives of the farmers. Adoption and intensification of improved seed and fertilizer innovations by these smallholders can enhance their production. However, the opportunity cost associated with fertilizer subsidies has made them be a less preferable way of spending on the sector.

Many studies have argued that the greatest contribution to economic growth and poverty reduction comes from investments in infrastructure such as irrigation and roads development. In a study on assessment of how different categories of expenditure impact growth, Gemmell et al (2012) also looked at the argument concerning allocation of government spending. They attempted to assess how long run growth responds to changes in expenditure. Their study showed that spending on infrastructure is beneficial to long-run growth.

Kristikova et al (2016) recognized spending on agricultural research as one area of investment, which can bring high returns to agriculture in the future. According to Fan and Saurkar (2006), spending on agricultural research is the most crucial type of expenditure to enable agricultural growth. Their study showed that over the past three decades, agricultural research allocations as a percentage of agricultural GDP have been increasing. Agricultural research brings new improved technologies to agriculture, which benefits the poor and smallholder farmers (Alene and Coulibally, 2009). Several other studies have suggested that spending money on research has proved to be more beneficial in the long run than input subsidies (Seck et al., 2013; Stads and Beintema, 2015, Asare and Essegbey, 2016).

Reaching an agreement on these debates and discussions has proved futile over the past years. According to Jayne and Rashid (2013), the main reason that has led to this elusiveness when it comes to reaching an agreement regarding the government spending in Africa is the differences in values, interests, worldviews and beliefs. Nevertheless, policymakers have preferred spending through subsidies and price supports, mainly because the programs have immediate short-term results (IFPRI, 2013). According to Jayne and Rashid (2013), these input subsidy programs and price support programs are likely to remain because they provide tangible evidence of government support. They present a demonstrative way for politicians to show their support to constituents.

To provide better understanding concerning these arguments and debates, this study analyses agricultural budgetary expenditures for different countries and try to assess the influence of agricultural spending types on growth. A deeper understanding of this impact of government on economic growth can contribute to policy solutions, which consequently promote economic development. The study analyses agricultural expenditures to different areas with the aim of understanding the component of spending that enhances more growth. The study then compares the empirical analysis results with how the governments have been prioritizing their expenditures over the past years. This sheds some light on the past misallocation of funds at the same time indicating how governments should allocate their funds in the future. The study further provides recommendations that can assist policy makers and governments for more effective allocations of expenditures in the future.

1.5 Thesis Statement

The AU established CAADP in 2003 with the primary goal of eradicating hunger and poverty through agriculture. To achieve this goal, the AU encouraged African states to target a 6% annual agricultural growth and allocate 10% of their national budgets to the sector. Since then, African governments have been aiming towards improving farm productivity through government spending. This increased

productivity results in poverty and hunger reduction, which are the first two priorities of the Sustainable Development Goals of 2015. The "Malawi Miracle" is one of the success stories witnessed where the country turned into a major exporter of corn through public agricultural spending. This success prompted more countries to focus on increasing their expenditures to agriculture. Since the governments allocate this total spending to different sub-sectors, it is important to determine the component of agricultural expenditure that enhances more growth. This study aims to assess the relationship between agricultural GDP growth and government spending on input subsidies, agricultural research, price support programs and infrastructure development across countries.

1.6 Objectives of the Study

- To investigate the trends in agricultural growth and government expenditures over the past years.
- To analyze the mismatch between the actual expenditures and the allocated expenditures to agriculture.
- To assess the Impact of government spending types on agricultural GDP growth.

1.7 Limitations and delimitations of the study

Studies that involve quantitative assessments of the impact of government expenditure usually require substantial data. In developing countries, this type of data such as time series data is not readily available. In recent years, there has been considerable improvement in data collection and data availability in some countries but it is still a challenge in many countries. An assessment across different countries would be more effective in providing appropriate and relevant judgments. However, finding the time series data on agricultural expenditures for many countries was a major limitation in this study. Therefore, this study only focused on the impact of government spending on growth in four countries where data was available.

1.8 Chapter overview/outline

The remainder of this study is organized as follows. Chapter 2 provides the theoretical framework of the study. This section assists in understanding the evolution of different growth models over the past decades in the discipline of development economics. This section also reviews the implications of these different growth theories on the role of government in the economy. Chapter 3 is concerned with the methodology of the study, which consists of the research design, sampling technique, data collection procedure, data analysis and the STATA software used in the analysis. A report on the allocation of government expenditures for the four countries is given in this section. Chapter 3 concludes with methods of estimation. Chapter 4 consists of empirical results, data presentation and

discussion of the main findings. Chapter 5 concludes the study with the summary, conclusion, and recommendations.

CHAPTER 2 : THEORETICAL FRAMEWORK

2.1 Introduction

Sen (1999) and Barret (2007) defined development economics as a discipline that focuses on how the allocation of resources, institutional arrangements, human behavior as well as private and public policy influences human conditions, the standard of living, people's choices, their access to knowledge and how they participate in their economy. Development economics can be viewed as a multi-dimensional concept which does not only focus on the well-being of people but rather on the characteristics of the political, social, economic and financial system and how it creates opportunities for people as well as expanding their choices, capabilities and freedom (Evans, 2002; Barder, 2012). Identifying the proper role of the government in facilitating this economic development and economic growth has been a challenge over the past years. Various economists have argued that government investment in areas such as infrastructure development and human capital can boost economic growth in a country. On the other hand, government interference in markets through public spending has been associated with a transfer of resources from the private sector to the government (Mallick, 2008; Chiawa et al., 2012; Torruam et al., 2014).

In a presentation on "Development and Complexity", Barder (2012) examined how various development economists have modeled economic growth and development with an intention of understanding how other countries grow faster than other countries. Growth models have evolved over the last 60 years with development economists trying to understand how the concepts of government intervention, technology, savings, capital, and labor contribute towards stimulating development in a country. The next sections look at some of the theories in development economics that have provided much insight on the role of the government in stimulating growth. These include classical economics, Keynesian theory, Harrod-Domar growth theory, Rostow's theory, Solow's Neo-classical theory and the Washington Consensus.

2.2 Classical Economics

Classical economics stems from the works of various economists in the late 18^{th} and early 19^{th} centuries including Adam Smith, David Ricardo, John Stuart Mill, and Jean-Baptiste Say. The classical school of thought recommended free markets for maintaining economic stability rather than government intervention. In his book referred to as "The Wealth of Nations", Adam Smith in 1776 laid the foundation for classical economics and regarded free markets as an ingenious mechanism that regulates itself through supply and demand (Smith, 1976; Baumol and Blinder, 2011). The main idea behind the classical economic theory was the *Laissez-Faire* philosophy, which suggested that buyers

and sellers should be in control of what happens in the market. Say's law is one of the economic theories that supported the *Laissez-Faire* approach and indicated that any distortions that occur in the market are temporary and will automatically return to balance without any government involvement (Say, 1971). Building on Adam Smith's economic theory, Jean-Baptiste Say argued that supply could create its own demand; therefore, it is not possible to have overproduction in the market. In the event of overproduction or underproduction, the producers would adjust either their price or their production until they sell all the commodities (Steven, 2003; Cowen, 2010).

The figure 2.1 below explains how markets move towards equilibrium in the event of overproduction (surplus) or underproduction (shortage), without any state intervention. In an equilibrium, where the quantity demanded is equal to the quantity supplied, the price of the commodity will be P. When the price is at P1, a surplus develops because the quantity supplied exceeds the quantity demanded, as many consumers cannot afford the commodity. To reduce this surplus, the producers should lower their prices. Eventually, as the price falls the quantity demanded starts increasing while the quantity supplied will be declining until the price reaches equilibrium again.

When the price is lower, at P2, a shortage develops. This is because the quantity demanded is now more than the quantity supplied, as many consumers can afford the commodity. This puts an upward pressure on the price and an increase will be seen until it reaches P again (Mankiw and Taylor, 2006).

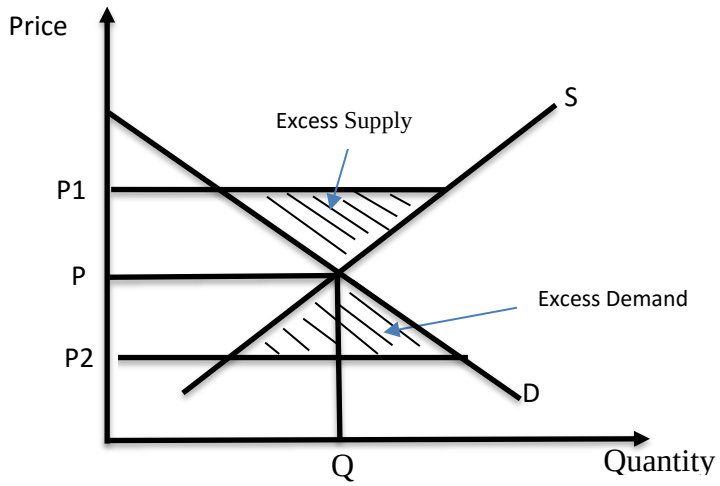

Figure 2.1: Price changes in a market without state interference

Source: Mankiw and Taylor, 2006.

In the classical school of thought, the role of the government was considered productive in areas such as adult education and the army. However, government interference in the economic process through programs such as input subsidies and price supports was associated with inefficiency and high prices in the future (Summer, 2008; OECD, 2014). Classical economists associated fiscal policies with

crowding out of private investment spending. According to Mallick (2008), raising government expenditures replaces private goods with public goods thereby causing a decline in private spending on services such as transportation. Economists prefer to look at economic efficiency when evaluating the market outcomes of government intervention through support programs. According to Pindyck and Rubinfeld (2013), economic efficiency occurs when there is the maximization of aggregate consumer and producer surplus. This section, therefore, focuses on the changes in both consumer and producer surplus to explain the distortions of government involvement in markets through subsidies.

The government can influence the input prices either as being the major market leader or through the subsidy programs. By using the subsidy programs, the farmers pay less than the market price, while the producers receive a higher price than what the farmers are paying (IFDC, 2013). According to Dwivedi (2012), a subsidy refers to the support, which can be in the form of money, given by the government to producers for a certain commodity so they can increase their production and supply. A subsidy on fertilizer influences the market by reducing the price paid by the farmers at the same time increasing the quantity sold. The amount of the subsidy is the difference between what the producers are receiving and what the farmers are paying. The figure 2.2 below assists in explaining what happens in the market when the government decides to interfere through input subsidies.

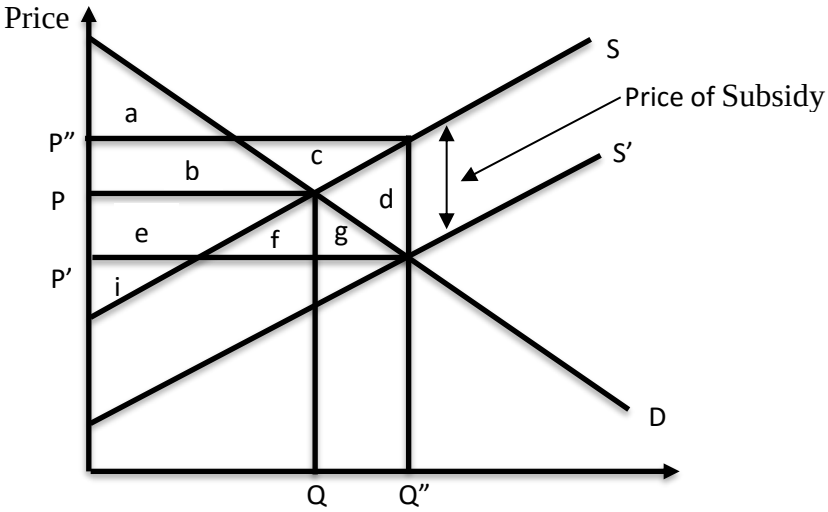

Figure 2.2: Impact of Subsidies in a market

Source: Dwivedi, 2012

Where:

P is the market price

P' is the price the buyers will pay after the subsidy

P" is the amount receive by the sellers after the subsidy

Q is pre-subsidy quantity

Q" is the post-subsidy quantity.

When the government decides to introduce subsidies on inputs, they pay the sellers a certain amount of money. The farmers now instead of paying the market price (P), they only pay price P' (figure 2.2 above) which is lower. On the other hand, the firms receive a total of P" i.e. sum of the price paid by farmers and the price of the subsidy. As shown in figure 2.2 above, when the subsidy is imposed, the supply curve shifts upwards from S to S' as the producers increase their supply. The impact of a subsidy is to reduce the price paid by the farmers but at the same time increasing the price received by the producer. Both the farmers and the firms seem to benefit from the subsidy while the government itself will be worse off.

The consumer surplus is represented by regions (a+b) before the subsidy, but after the subsidy, it increases to regions (a+b+e+f+g) as consumers are now paying a lower price (figure 2.2). This means many farmers can now afford the fertilizer needed for their production. The producer surplus represented by regions (e + i) before the government intervention, also increases to the regions (b+c+e+i) as the producers can now sell at a higher price. However, the government introducing the subsidy to assist the farmers incurs a total cost that is equal to the price of the subsidy multiplied by the post-subsidy quantity. The area (b+c+e+f+g+d) in figure 2.2 represents this cost to the government.

Initially the total surplus is region (a+b+e+i), but after government interference the overall surplus falls to (a+b+e+i-d). The costs of the subsidy are greater than the benefits to consumers and producers i.e. the subsidy costs more than the benefits it is providing. The area "d" shows the deadweight loss of the subsidy, which is the amount by which the cost of the subsidy exceeds the gains in both consumer surplus and producer surplus. The inefficiency that results from government subsidies is that there is a reduction in the net economic benefit or welfare. Thus, from the economists' point of view, subsidies are not an attractive means of government intervention.

2.3 Keynesian Economics

The great depression that occurred from 1929 to 1939 became the long economic catastrophe in world history. Countries experienced a decline in national incomes during this period. A huge decline in output levels was witnessed while the unemployment rate increased in all the sectors and regions of the world (Romer, 2004; Wheelock, 2008). The great depression gave a massive blow on the principles and assumptions of the classical economics such as the free trade and *Laissez-Faire*, which had governed economies in previous years. Classical economists believed that an economy could achieve potential output and full employment on its own without any government interference. Therefore, they expected the economy to raise itself in the long-run after the economic slump that

had occurred in the world economy. However, this was not the case as the "invisible hand" failed to restore the world economy. The notion that free competitive economy without government intervention leads to full employment was brought to questioning after the great depression (Galbraith, 2009).

After the classical theory failed to explain the huge unemployment rates that resulted from the great depression, John Maynard Keynes offered a new theory of economics in response to that huge crisis. As opposed to the classical theorists who believed government involvement to be the main cause of unemployment, the Keynesian school of thought recommended government intervention for a stable economy (Wheelock, 2008; Todaro and Smith, 2012). Keynes (1936) argued that full employment is achieved if the state controls the level of aggregate demand through fiscal policy i.e. government spending and taxation. Keynes' new framework shifted from the *Laissez-Faire* philosophy and emphasized on the role of the state in the economy. The Keynesian economics is among the proponents of government spending who view fiscal policy as crucial for economic stability in the short run and higher economic long run growth (Aschauer, 1989).

The Keynesian macroeconomic theory led to the expenditure approach to GDP as a way of measuring the total output of an economy. Keynesian theory views total spending as the primary determinant of total output and total employment in a country. The resulting Keynesian aggregate expenditure model decomposed GDP into four components including spending on consumption, investment, government and net exports (Ola, 2013). Equation 2.1 below presents the resulting model from Keynesian theory.

$$\boldsymbol{GDP = C + I + G + (X - M)} \qquad (2.1)$$

Where: GDP is the gross domestic product, C is consumption, I is investment, G is government spending, X is the value of exports and M is the value of Imports.

Keynes' model was based on two major assumptions. Unlike in classical economics, Keynesian theory assumed prices and wages to be completely rigid until the economy reaches full employment. The model also assumed a specific rate of output to be associated with full employment in an economy (Serletis, 2001; Olsson, 2013).

2.4 Post-Keynesian: Economic Growth & Development Models

Several economic growth models were established in the post-Keynesian era, which attempted to understand the role of the state in the growth of a country. These models also attempted to answer the key question in development economics of why other countries or communities are rich while others are poor. The Harrod-Domar model developed separately by Roy Harrod in 1939 and Evsey Domar

in 1946 is one of the famous post-Keynesian development models that had a huge influence in the development economics after World War 2 (Barder, 2012). In their model, the output in an economy is dependent on the quantity of capital and labor. The output of a country will rise if there is an increase in the amount of capital and the amount of labor. Equation 2.2 below shows a production function derived from the Harrod-Domar model.

$$\boldsymbol{Q = f(K, L)} \qquad (2.2)$$

Where Q is output, K is capital and L is labor.

Harrod and Domar assumed constant capital-output ratio in their model and believed that growth does not need to be sufficient in order to maintain full employment. Similar to Keynes' beliefs, the Harrod-Domar growth theory suggests that full employment and stable growth cannot be attained naturally in an economy. Their growth theory advocated for the role of government in stimulating growth (Harrod, 1939; Domar, 1946). In developing countries where savings levels tend to be low in a free market mechanism, there is a need for government involvement to increase the savings rate of such an economy. According to Shaw (1992), government budget surpluses can be used to substitute for domestic savings in an economy thereby making fiscal policy an important tool for growth and development.

In 1960, Walter Rostow introduced an approach to development, which was different from the previous models by Keynes and Harrod and Domar. In his book titled "The stages of economic growth", Rostow (1960) viewed development as a cycle in which a rise in investment would lead to a rise in capital accumulation, which then causes an increase in the output of a country. This rise in output would then lead to higher incomes for the people, allowing them to increase their savings and thus invest more (Barder, 2012). Rostow's theory considered investment as the starting point for the economic virtual cycle, which would put a country into a state of self-sustained growth (Rostow, 1960, Hershlag, 1969). In the third stage, which Rostow called "take off"; an increase in investment for poor countries to a minimum of 10% of national income would lead to higher growth in sectors at the same time creating a supportive institutional framework (Tai, 1991). Rostow's growth theory influenced development economics in the 1960s and 1970s as wealthy countries increased their foreign aid in an attempt to stimulate investment by funding infrastructure programs such as dams and roads (Barder, 2012). This also motivated governments in developing countries to intervene in their markets by investing more of their resources in agriculture and industries.

After the Harrod-Domar growth theory failed to explain why some countries grow faster than other countries, Robert Solow established neo-classical economics in the late 1950s. Solow (1956)

introduced the concept of technical change in his model and considered it the reason behind the differences in growth rates of per capita income across countries. Therefore, economic growth was decomposed into three components including growth on the labor force, capital accumulation and technical progress (Sato, 1963; Durlauf et al., 2000). The production function in equation 2.3 below presents the relative contribution of capital, labor, and technology level to the economic growth of a country.

$$\boldsymbol{Q_t = A_t f(K_t, L_t)} \qquad (2.3)$$

Where Q_t is the economic growth, A_t is the level of technology, K_t is the capital accumulation and L_t is the labor.

According to Barder (2012), even if Solow's model was introduced about 60 years ago, it still forms the basis of today's growth theory. The model has provided insight on the role of governments in development economics. Since Solow's growth theory indicated that development comes from capital and technology, governments have been intervening in their economies with the intention of increasing the capital investment. The policy implication of this theory also includes the channeling of different aids by wealthy countries towards developing infrastructures in developing countries in the 1950s and 1960s.

Regardless of the contribution to development economics by these growth models, poor countries still experienced lower output. Government policies that interfered with the proper functioning of markets were seen as the main cause for the low economic growth in these poor countries (Barder, 2012). The late 1970s saw the introduction of the Washington Consensus in an attempt to reduce the role of government in the economy. The Washington Consensus refers to a set of economic reforms laid by John Williamson in 1989 supported by policy makers in Washington (Williamson, 1990). The reforms aimed at addressing certain economic policy instruments that were perceived by international bodies such as World Bank and IMF as crucial for developing countries to stimulate their economic growth and to acquire financial support for investment. These reforms include fiscal discipline, spending priorities by governments, tax reforms, market interest rates, competitive exchange rates, trade liberalization, inward FDI, privatization of state entities, deregulation, and property rights (Williamson, 2004; Symoniak, 2010).

The Washington Consensus being one of the major opponents of Keynesian theory and the government intervention in markets, called for the reduction or elimination of subsidies and the reallocation of public spending towards services such as education, health, and infrastructure development. The period from the 1980s to 1990s, being dominated by the Washington Consensus,

experienced less government intervention in the economic process, deregulation of the economy as well as privatization of state entities (Broad and Cavanagh, 1999). However, according to Broad and Cavanagh (1999), the free market policies of the consensus had a negative impact on workers, equity, and the environment. The period 1994 to 1999 experienced a widespread outcry from citizens in developing countries against the economic reforms. Developing countries who adopted these reforms started experiencing huge financial crises. Faced with heavy opposition from economists, policy makers, and politicians, the Washington Consensus started to crumble in the late 1990s (Naim, 2000). African governments started abandoning the structural adjustment programs introduced by the World Bank and IMF and by late 1990s; some African states were already re-establishing their previous position in providing support programs like input subsidies.

In 2000, the UN introduced MDGs following the adoption of the Millennium Declaration. Nations became committed towards a global partnership in an attempt to eliminate extreme poverty and achieve a series of time-bound targets (UN, 2015). The MDGs had a huge influence in the world of development economics as they aimed towards poverty and hunger reduction, higher incomes for people, proper education for children and improved access to clean water (Fehling et al., 2013). In alignment with the MDGs, AU member states adopted the CAADP with the overall objective of reducing poverty and attaining food security. Governments started to become more involved in agricultural markets again as they aimed at achieving the 6% annual agricultural productivity target set by AU. The AU countries also committed themselves to increase their percentage shares of expenditure to agriculture up to 10%.

2.5 Post CAADP 2003

This chapter reviewed growth models that have dominated the field of development economics over the last 60 years. The goal was to understand why other economies have been growing faster than other economies and to examine the role of the government in the economy. The evolution of thought from the classical *Laissez-Faire* to Keynesian economics to Washington Consensus to CAADP commitments was examined. Success stories have been witnessed because of these different schools of thought, with regard to poverty reduction, improved standards of living for citizens, basic education for children, access to clean water and improved life expectancy (Barder, 2012). However, these theories failed to come to an agreement with respect to the government's role in the economy. The Classical economics together with the Washington Consensus being opponents of fiscal policy call for minimum state intervention in the economy. On the other hand, development economists including Keynes (1936) advocate for government intervention in order to achieve full employment and stimulate economic growth.

Even though the issue of government involvement in the economy has been debated over the last decades, reaching an agreement has proved to be futile. Economists continue to criticize the government intervention in the economy, especially through public spending programs. At the macroeconomic level, this intervention is associated with rent seeking and crowding effects of private sector investments. At the microeconomic level, public spending results in net losses to the society, often referred to as deadweight losses (Alston and James, 2002; Summer, 2008; Pindyck and Rubinfeld; 2013). Regardless of these inefficiencies associated, governments continue to intervene in agricultural markets by providing agricultural support programs such as subsidies.

The adoption of the CAADP in 2003 together with other declarations such as the Abuja declaration of 2006 indicates that African governments still believe they have a huge role to play in stimulating growth in both the agricultural sector and their economies (IFPRI, 2013). Many African states re-established their position in providing agricultural support programs, after the inception of CAADP in 2003. In light of this notion that increasing agricultural spending to the sector can enhance economic growth and development, this study aims to contribute to the recent literature by assessing the investment areas which can stimulate more growth in agriculture. Determining the component of public expenditure that is more growth enhancing for the agricultural sector, will help governments to be effective in their budget allocations in the future.

CHAPTER 3 : METHODOLOGY

3.1 Introduction

This chapter gives an outline of the methodology used in this study. The methodology attempts to link the analysis of the data with the thesis statement described in chapter 1. Firstly, the section focusses on the empirical analysis of public expenditure impact on economic welfare and growth. A literature review is performed on previous studies that examined the relationship between economic growth and public expenditure. This is followed by a discussion on the empirical framework and the model specification. Lastly, the chapter discusses the data and reports on the various data sources used in each study area.

3.2 Empirical Analysis of public expenditure impact on Economic Growth: Literature Review.

This section presents an overview of the literature on empirical studies which examined the impact of government spending on economic development. In general, economic development can be measured in a variety of ways. Previous studies have examined the impact of government expenditure on GDP, wages, incomes, consumption, employment status, migration patterns as well as economic welfare (Kanbur et al., 1994; Himmelweit et al., 2001; Gali et al., 2004; Clancy et al., 2014; Suarez-Serrato et al., 2014). Even though different measures have been used before, a number of studies have analyzed the influence of government in an economy by assessing the impact on economic growth.

According to Saad and Kalkechi (2009), people experience a better quality of life when there is increased economic growth. Although it might depend on the policies of a country among other factors, an increase in economic growth is expected to reduce poverty (Bolnick, 2000; Essama-Nssah and Lambert, 2006; Stevans and Sessions, 2008; Hull, 2009; Ijaiya et al., 2011). Poverty and hunger elimination, which are the first two goals of the SDGs, have become fundamental objectives of development in the continent (Bahta et al., 2014; Badiane et al., 2016). This makes an assessment of the determinants of growth an essential contribution to governments and policy makers as they intervene in their economies. Therefore, this study investigates the relationship between the agricultural GDP growth and government spending types for the period 2000 to 2014. The following sub-section 3.2.1 reviews previous literatures that examined the relationship between government expenditure and economic growth.

3.2.1 Public Expenditure and Economic Growth

The 20th century introduced development growth models which aimed at linking public expenditure to long-run economic growth. In the early 1950s, Robert Solow developed neoclassical growth models, which examined how exogenous factors such as technology influenced long run economic growth. Solow's neoclassical growth theory assumed a production function in which economic growth was decomposed into three components including technological advancements, capital accumulation and labor (Solow, 1956). Neoclassical growth theory predicted that the growth of an economy is determined outside the model and is independent of tastes or preferences, policy behavior and other aspects of the production function (Tanzi and Zee, 1997). However, endogenous growth models arose in the 1980s and 1990s in response to the inadequacies of the neoclassical theory and explained how certain variables such as fiscal policy could endogenously influence the long-run economic growth performance of a country (Romer, 1986; Lucas, 1987; Barro, 1981; King and Rebelo, 1990). Contrary to Solow's neoclassical framework which explained how diminishing returns to capital force the economy to come to a steady state where growth only depends on exogenous technical progress; the endogenous growth models explained how growth could be generated endogenously in the absence of exogenous technological progress (McCallum, 1996; Tanzi and Zee, 1997).

Since the 1980s, various studies have used endogenous growth models with different estimation techniques to assess economic growth, yielding conflicting results. One earlier study was by Landau (1983) who examined the cross-country relationship between the share of government consumption expenditure and economic growth. His study performed a cross-sectional analysis in 104 countries for a period of 1961 to 1976. According to Landau (1983), there is no accepted theory on the determinants of economic growth. Using the rate of growth of real per capita GDP as the dependent variable in his regression model, the impact of factors such the share of government consumption expenditure, total investment in education, climate zones and energy consumption per capita was determined. Using the Two-Stage Least Squares (TSLS) to estimate the equation, he found a negative relationship between per capita real GDP and the share of government consumption expenditure. This result is consistent with the views of classical economists who support the free market system and believe government expenditure reduces economic growth. However, the study by Landau (1983) did not disaggregate the total government expenditure into various spending components, which is the main focus of this study.

A seminal work by Kormendi and Meguire (1985) on macroeconomic determinants of growth used post-war data from 47 countries. Their study attempted to determine how various macroeconomic

factors suggested in literature influence economic growth across countries. Using an empirical framework described in equation 3.1 below, Kormendi and Meguire (1985) used mean growth of real aggregate output in a country as their measure of economic growth; Where MDY is the measure of economic growth and X is a vector of explanatory variables.

$$\boldsymbol{MDY_j = \alpha + \beta X_j + \varepsilon_j} \qquad (3.1)$$

The explanatory variables incorporated in their growth model include initial per capita income, the mean population growth, mean money supply growth, the growth ratio of government spending to output, mean growth of exports as a proportion of output as well as the mean growth rate of inflation. Their study found no significant relationship between the share of government consumption spending in GDP and the average growth rates of real GDP. Similar to the study by Landau (1983), Kormendi and Meguire (1985) did not consider examining the impact of different components of public expenditure on growth.

Grier and Tullock (1989) adopted the empirical model developed by Kormendi and Meguire (1985) and carried out an empirical analysis of cross-national economic growth covering 113 countries over the period 1951 to 1980. Their study used post-war pooled cross section/time series data on per capita real GDP, inflation and share of government consumption in GDP. The countries in their study were grouped into OECD and non-OECD countries. Even though Grier and Tullock (1989) used the same concept of government spending as employed by Kormendi and Meguire (1985), their study found contrasting results. Using data averaged over 5-year intervals, Grier and Tullock (1989) found a negative relationship between the growth of real GDP and the growth of government share in GDP for OECD countries. However, no significant results were obtained in non-OECD countries.

Using the real aggregate output of goods and services as the measure of growth, Aschauer (1989) attempted to answer the question; “Is Public Expenditure Productive?”. Unlike Landau (1983) and Kormendi and Meguire (1985) who made use of endogenous growth models in their analysis, Aschauer (1989) assumed a neoclassical production function to assess the role the government plays in stimulating economic growth and productivity improvement. The expenditure data in his study covering from 1945 to 1989 was disaggregated into military and non-military spending. However, after applying both Ordinary Least Squares (OLS) and TSLS estimation, the results indicated no relationship between real aggregate output and both military and non-military expenditures. His results were conflicting with those of Landau (1983) who found a negative relationship between public expenditure and economic growth. This indicates that the results of these growth models are sensitive to the country under study, the period of study as well as the number of variables incorporated in the model.

Barro (1990) was also one of the earlier classical macroeconomists who looked at endogenous models of growth and how they relate public spending to economic growth. According to Barro (1990), economic growth models can generate long-term growth relationships without taking into consideration exogenous factors such as changes in technology as earlier proposed by Solow's neoclassical growth theory. Unlike the previous studies that had examined the impact of public expenditure, Barro (1990), distinguished productive expenditures from unproductive expenditures to understand the incidence of fiscal policy. Using a simple model of endogenous growth, he attempted to show how growth rates could rise due to productive government expenditures at the same time falling due to non-productive expenditures. Real per capita GDP was regressed against a set of explanatory variables using 1960 to 1985 data from 98 countries. The results of their study indicated that non-productive government services have a negative relationship with per capita growth while public investment showed a positive significant impact.

According to Devarajan et al (1996), assessing how the composition of spending affects growth can assist governments in changing the way they prioritize their spending. Based on results of such studies, the governments can reallocate their funds to more growth-enhancing development programs. Therefore, unlike the studies examined above which mainly focused on the impact of total expenditure on growth, Devarajan et al (1996) examined the relationship between the composition of public spending and economic growth using panel data from 43 developing countries over 20 years. A 5-year forward moving average of per capita real GDP was regressed against expenditures on defense, education, health, and transport using OLS. The endogenous growth model developed by Devarajan et al (1996) also divided the government expenditures into two types; productive and unproductive. Their study found capital expenditures to be unproductive while current expenditures were associated with higher economic growth. These results conflict with various economic theories in development economics which consider capital expenditures such as spending on health and education to be productive. According to Devarajan et al (1996), expenditures which are normally considered to be productive could become unproductive if they are used in excess.

Kelly (1997) also recognized the importance of assessing the relationship between the composition of public expenditures and economic growth, which is the main objective of this study. The endogenous growth model employed by Kelly (1997) emphasized on the importance of various components of public expenditure rather than the total aggregate expenditure. Her study estimated GDP growth as a function of various government expenditures such as health, defense, and education for 73 countries in the period 1970 to 1989 using OLS. The regression model incorporated other variables, which have been prominent in the literature of growth modeling such as net trade and private investment. The different types of expenditures influenced economic growth differently with

some of them being insignificant. Nevertheless, her results being consistent with the prediction of Barro (1990), found a positive relationship between private investment and growth.

Building on the conceptual framework by Kormendi and Meguire (1985), Mbaku and Kimenyi (1997) examined the economic and non-economic determinants of economic growth. Using the mean annual rate of growth of output as the dependent variable, Mbaku and Kimenyi (1997) attempted to explore the relationship between political freedom and economic growth in 46 countries. Their study also incorporated the ratio of government spending to output as an explanatory variable in order to contribute towards the debate between various theories in development economics on whether public spending distorts economic activities and reduce economic efficiency. The growth model by Mbaku and Kimenyi (1997) also tested the convergence hypothesis which is one assumption of the neoclassical theory. Their results showed that countries with higher initial per capita income experienced lower future growth because of diminishing returns to investment under any given technology.

A study by Fan and Rao (2003) examined the trends in government expenditures across developing countries. Since African countries are aiming towards meeting the 10% goal set by CAADP, such studies provide insight on how the countries are performing. After examining these trends, Fan and Rao (2003) went further to investigate the determinants underpinning this spending as well as the impacts of such spending on economic growth. Unlike most of the previous literature that only focused on total public spending, Fan and Rao (2003) disaggregated the total public expenditure into spending on agriculture, education, and infrastructure. They developed an analytical framework for determining the impact of these different spending categories on economic growth in Africa, Asia, and Latin America. Different results were obtained in their study across the regions examined. Government spending on agriculture had a positive effect on growth in both Africa and Asia while statistically insignificant in Latin America.

Similarly, a study by Fan and Saurkar (2006) monitored trends in government expenditures for 44 developing countries between 1980 and 2002 and determined the effect of such changes on growth and poverty reduction. Their study applied the same analytical framework as in Fan and Rao (2003), to determine the differential impacts of various government expenditures on growth. The total public expenditure was broken down into various sectors including agriculture, health, education, communication, transportation, defense, and social security. Using a GDP function, the effects of these government expenditures on GDP growth was modeled. Spending on the agricultural sector was further disaggregated into research and non-research spending. The results of their study

indicated that research expenditures had a larger impact on agricultural productivity than non-research expenditures.

Building on the model by Devarajan et al (1996), Shrestha (2009) also examined the composition of Public expenditure, physical infrastructure, and economic growth in Nepal. The study used an endogenous model to analyze the impact of public expenditure on economic growth specifically looking at education, health, and infrastructure. Their study also recognized the work by Barro (1990) and categorized the government expenditure into productive and non-productive spending. The results from the OLS estimation recognized spending on infrastructure as more growth enhancing compared to other types of expenditures.

Udoh (2011) explored the relationship between public expenditure, private investment and growth in the agricultural sector in Nigeria. Making use of data from 1970 to 2008, their growth model incorporated variables such as agricultural output, labor force participation rate, gross fixed capital formation and total foreign direct investment. Similar to studies by Fan and Rao (2003) and Fan and Saurkar (2006), Udoh (2011) used the agricultural output as a dependent variable in his regression model. The VECM model used in his study indicated a positive relationship between public expenditure and output in the short run. However, his results showed an insignificant relationship between the variables in the long-run.

A study by Iganiga and Unemhilin (2011) also looked at the impact of federal government expenditure on agricultural output in Nigeria. In their study, the value of agricultural output was regressed against total agricultural expenditure, total commercial bank credit to the sector and the food import value among other explanatory variables. Their study applied a Cobb-Douglas Growth Model to analyze the data from 1970 to 2008. After applying techniques of co-integration and error correction modeling, their results showed that government capital expenditure positively influence output in the agricultural sector. This conclusion is consistent with the results found by early scholars such as Barro (1990), who regarded capital expenditure as productive.

Most of the studies reviewed above, who examined the impact of spending in the agricultural sector, used the agricultural output as the dependent variable (Fan and Rao, 2003; Fan and Saurkar, 2006; Udoh, 2011, Iganiga and Unemhilin, 2011). However, a research by Armas et al (2012) used agricultural GDP as the dependent variable and attempted to determine the impact of different agricultural spending types on agricultural growth in Indonesia. Their study disaggregated the total agricultural expenditure into spending on irrigation as well as spending on subsidies. An error correction model was then used to assess the impact of spending on these two sub-sectors on agricultural growth from 1976 to 2006. Armas et al (2012) found a positive relationship between

infrastructure spending and economic growth while spending on input subsidies had an opposite effect.

Chude and Chude (2013) examined the effects of public expenditure in the education sector on growth in Nigeria using data from 1977 to 2012. Chude and Chude (2013) applied the VECM to determine the relationship between public expenditure and GDP growth. Using the VECM model, both the short-term and long-run effects of education expenditure on economic growth were determined. Expenditure on education had a positive relationship with economic growth in their study. This result is consistent with the views of classical economists such as Adam Smith who considered spending on education to be productive. Chude and Chude (2013) concluded that both exogenous and endogenous factors influence economic growth. This conclusion is in support of both the views of neoclassical theory and the endogenous growth theory.

Sunkanmi and Abayomi (2014) employed the Keynesian macroeconomic framework to examine the relationship between government expenditures and the poverty level in Nigeria. The Keynesian theory suggests that an increase in public expenditure causes the economic growth of a country to rise resulting in poverty reduction. Considering the relationship between economic growth and poverty level, Sunkami and Abayomi (2014) preferred to use the poverty incidence as the dependent variable in their model. Their study disaggregated the public expenditure into spending on rural education, poverty alleviation programs, power generation and rural roads. After applying co-integration analysis and the VECM, the results of their study, being consistent with the views of Keynesian theory, indicated a negative relationship between public expenditure on rural education, poverty reduction programs, and rural roads. However, their results also showed that the population structure, total savings, and foreign aid tend to increase the poverty level in Nigeria.

Chauke et al (2015) carried out a comparative study on the impact of public expenditure on agricultural growth in South Africa and Zimbabwe, using agricultural GDP as the dependent variable. Their study employed co-integration tests together with VECM and the results showed capital expenditures being positively related to agricultural growth in both the short-run and long-run, in both countries. However, their descriptive analysis indicated that governments in both countries spent more funds on current expenditures at the expense of capital expenditures for the observed periods. This practice is regarded as growth retarding by classical economists as well as the early adopters of endogenous growth models such as Barro (1990). Therefore, Chauke et al (2015) recommended governments in both South Africa and Zimbabwe to shift priorities and focus more capital expenditures.

3.2.2 Private Investment, Net Trade and Economic Growth

This study also attempts to understand the significant relationship between private investment and the growth of an economy. Therefore, previous studies which examined how the investment in the private sector boosts a countries' economy are reviewed in this section. Similar to the studies on public expenditure and growth, there is a lot of conflict among the previous literature on private investment and growth. Among the studies that have been reviewed in section 3.2.1 above, Barro (1990), Kelly (1997), and Benin et al (2009) indicated that private investment boosts economic performance. On the other hand, Udoh (2011) found no significant relationship between private investment and economic growth.

Aiming to contribute towards the debate on the roles of private and public investment in the economy, Khan and Reinhart (1989) adopted the neoclassical framework by Solow (1956) and tested the effects of these two types of investments on economic growth in 24 developing countries. In specifying the model, Khan and Reinhart (1989) separated the effects of private investment and public investment on real GDP. Basing on the empirical evidence, their study concluded that private investment has a larger effect on real GDP growth than public sector investment. Contrary to the Keynesian school of thought, Khan and Reinhart (1989) indicated that public sector investment leads to crowding out by utilizing the scarce resources that would otherwise be made available to the private sector.

A study by Phetsavong and Ichihashi (2012) employed an endogenous growth model and expressed the real growth of GDP as a function of public investment, FDI and private domestic investment among other variables. The impact of both public and private sector investment on growth was examined in their study using data in 15 developing Asian countries from 1984 to 2009. The results from the empirical analysis indicated that private investment is essential for economic development. On the other hand, his study found a negative relationship between public domestic investment and economic growth. The empirical evidence from the study by Phetsavong and Ichihashi (2012) supports the views of classical economists who associate public evidence with "crowding out effects" and is in conflict with the Keynesian theory, which calls for an increase in public expenditure by governments.

Considering that net trade is an important component of GDP as indicated by the expenditure approach to GDP calculation, the growth model used in this study also examined the relationship between economic growth and net trade. Net trade or balance of trade measures the difference between the total value of goods and services that the domestic producers sell to foreigners (exports) and the total value of goods and services that the domestic consumers purchase (Muhammad, 2010). A trade surplus occurs when the total value of exports exceeds the total value of imports. On the other

hand, a trade deficit occurs when the total value of imports in a country exceeds the total value of exports. A trade surplus is often associated with a rise in the GDP of a country while a trade deficit results in a decline in GDP (Froyen, 1998; Gordon, 1998).

This sub-section reviews previous literatures that attempted to examine the relationship between trade balance and the growth of a country. The studies obtained different and conflicting results. According to Edwards (1997), the challenges of choosing a suitable indicator of trade policy hinders the empirical literature on the relationship between trade and economic performance. Different indicators of trade policy have been used in previous literature including export growth, trade dependency ratios, trade openness and trade deficits (Bahmani-Oskooee, 1993; Andersen and Babula, 2008; Musila and Yeheyis, 2015; Saaed and Hussain, 2015). A few of the studies have focused on trade balance which is considered an important component of GDP calculation using the expenditure approach.

Balassa (1978) is one of the early scholars who attempted to examine the effects of export-oriented policies on economic growth in 11 developing countries. His study period was from 1960 to 1973 and Gross National Product (GNP) was used as a measure of economic growth. The growth in exports, which is an important component of trade balance, was incorporated in his model as one of the explanatory variables. The regression results in the study by Balassa (1978) associated a one percent increase in export growth with a 0.04% increase in the rate of growth in GNP. According to Balassa (1978), expansion of exports in an economy leads to better allocation of local resources, permit exploitation of economies of scale and generates improved technologies for the local producers as they compete with the foreign markets.

A study by Ahmad et al (2012) also assessed the effects of exports on economic growth in Pakistan for the period between 1971 and 2011. Using OLS, their study tested the relationship between exports and GDP, which was their dependent variable. The results found by Ahmad et al (2012) indicated that an expansion of exports in a country results in an increase in economic growth. Their study provided some insight on the impact of the performance of a country in foreign trade on economic development. However, considering that imports are also an important component of GDP, it would be more effective to use net trade as the explanatory variable rather than focusing on exports only.

A study by Ahmad (2013) investigated the relationship between the trade deficit and economic growth in Pakistan. To measure the trade deficit of the country, their study subtracted the total value of exports from the total value of imports. Time series data over the period from 1971 to 2007 was used in their study. Ahmad (2013) applied an econometric model to test the effects of trade deficit and foreign direct investment (FDI) on economic growth. Similar to the study by Ahmad et al (2012), their study used GDP as the dependent variable in their model. After running co-integration tests and

the VECM, results found by Ahmad (2013) indicated that trade deficit negatively influence growth in the long-run. However, trade deficit had a positive impact on economic growth in the short-run.

The results of both studies by Ahmad et al (2012) and Ahmad (2013) were consistent with the views of the conventional Keynesian macroeconomic theory. An increase in net exports causes the aggregate demand in a country to rise. As a result, producers will expand their output to meet this increased demand, thus, generating more income in the economy and stimulating economic growth. In the contrary, a study done by Silwal (2008) in Nepal indicated no significant relationship between economic growth and trade deficit. However, rather than using GDP as his dependent variable, Silwal (2008) was more interested in the impact of economic growth on the trade deficit.

3.3 Empirical Framework and Model Specification

As noted in chapter 2 of this study, there has been much debate in development economics over the role of the government in economic development. In the last 60 years, the field of development economics witnessed the evolution of growth models. Different schools of thought emerged which tried to explain the concept of government involvement in an economy. These schools of thought include the classical theory, Keynesian theory, neoclassical theory, and endogenous growth theory. Several empirical studies adopted these different schools of thought over the past years, with an attempt to shed more light on this debate of whether public spending stimulates growth in an economy. The previous section reviewed these studies and found conflicting results.

While some of the studies found no significant relationship between public expenditure and growth (Kormendi and Meguire, 1985; Aschauer, 1989; Devarajan, 1996; Udoh, 2011); a vast of the literature reviewed were consistent with the views of Keynesian theory. These studies indicated that increasing expenditures in certain areas of the economy such as infrastructure development and education stimulate the growth of the economy (Kelly, 1997; Fan and Rao, 2003; Chude and Chude, 2013; Sunkanmi and Abayomi, 2014; Armas et al, 2014). Barro (1990) and Shrestha (2009) regarded these types of expenditures that stimulate economic development as productive. On the other hand, several studies found a negative relationship between the growth of a country and public expenditure (Landau, 1983; Grier and Tullock, 1989; Mbaku and Kimenyi, 1997). The results of these studies are consistent with the views of classical economists who support a free market system and believe government expenditure reduces economic growth.

Since the previous studies reflect no agreement on the significant and causality relationship between public spending and growth, there is a need for more empirical research. This study aims to contribute to the current literature by empirically estimating the impact of disaggregated public expenditure on

agricultural growth. following the previous works by Kweka and Morrisey (2000), Gupta et al (2005), Armas et al (2012) and Chauke et al (2015) that used agricultural GDP as a dependent variable, in this study, the impact of public spending on agricultural GDP is analyzed as a means of assessing the effectiveness of government expenditure on achieving the CAADP target of 6% annual agricultural growth. In order to determine the returns to investment on specific types of public expenditures, government spending was disaggregated by infrastructure development, research and development, price supports and input subsidy categories. According to Gemmell et al (2012), paying attention to different categories of expenditure allows one to cater for the trade-offs between the spending types

Following the expenditure approach to GDP calculation as well as previous studies, private investment and net trade were included in the model (Edwards, 1997; Benin et al, 2009; Ahmad, 2013). Consumption is an important component when calculating GDP using the expenditure approach. However, this study did not include consumption as an explanatory variable in the model due to unavailability of adequate data for the period 2000 to 2014. The agricultural growth function in equation 3.2 below displays agricultural GDP as a function of government spending disaggregated by spending categories, private investment, and net trade in agriculture.

$$\boldsymbol{AGDP = f(AR, ISP, IDP, PSP, NT, I)} \qquad (3.2)$$

Where:

AGDP is agricultural gross domestic product measured as agricultural value-added, AR is government spending on agricultural research, IDP is government spending on infrastructure, PSP is government spending on price support programs and ISP is government spending on input subsidy programs, I is private investment and NT is the net trade. Agricultural value added (constant at 2005 US$) was used as a measure of agricultural growth. The agricultural expenditures obtained in local currencies were first converted to US$ using the exchange rates measured in 2005 purchasing power parity (PPP) then deflated to real terms using the GDP deflator. The study used gross fixed capital formation in agriculture (constant 2005- million US$) as a proxy for private investment in agriculture. Data on exports and imports in agriculture (measured in million US$, real terms) obtained from ITC (2015) was used to calculate the net trade variable.

According to Wooldridge (2012), natural logs impose a constant percentage effect of a covariate on the dependent variable. Several studies made use of logs to minimize or eliminate the bias that may arise from using different units between the dependent and independent variables. Fan and Rao (2003) incorporated logs in all the variables before estimating their regression equation. Therefore, this study used natural logs to linearize the growth model, thus explaining the effect of each predictor variable

in terms of percentage change in agricultural GDP. Equation 3.3 below shows a multi-linear equation of the effects of government spending, private investment, and net trade on agricultural GDP growth.

$$\ln(AGDP_t) = \beta_0 + \beta_1 lnAR_t + \beta_2 lnISP_t + \beta_3 lnIDP_t + \beta_4 lnPSP_t + \beta_5 lnNT_t + \beta_6 lnI_t + \beta_7 ln(AGDP_{(t-1)}) + \varepsilon_t \quad (3.3)$$

Where:

$LnAGDP_t$ is the logarithm of agricultural GDP at current period t, β is the regression coefficient, and $lnAR_t$, $lnISP_t$, $lnGI_t$, $lnPSP_t$, $lnNT_t$, lnI_t, are the logarithms of government expenditure on agricultural research, government expenditure on input subsidy, government expenditure on infrastructure, government expenditure on price supports, net trade balance, and private investment, at time t, respectively. $lnAGDP_{(t-1)}$, is the logarithm of agricultural GDP the previous period and ε_t is the stochastic error term.

3.3.1 Methods of Estimation

Most of the studies that have attempted to link public expenditure and growth have come across challenges including the possibility of reverse causality as well as endogeneity of variables (Hoover, 2008, Antonakis et al., 2014; Bellemare et al., 2015). Reverse causality means that even though we expect government spending to influence economic growth, the same growth can also exert a causal effect on spending as well as the other explanatory variables. The essential problem with reverse causality and endogeneity is that they both result in the correlation between the explanatory variables and the error term in the equation. Antonakis et al (2014) regarded endogeneity as the main threat to getting consistent estimates.

The idea of causality began in the 19th century where Mill (1854) introduced the concept of ceteris paribus. A variable X was assumed to have a causal effect on another variable (Y), all other things being held constant (Marshall, 1890). Haavelmo (1944) further explained the causal effect of a variable X on another variable Y in a regression equation. Estimating the regression equation without taking into consideration the possibility of reverse causality and endogeneity will lead to biased estimates and spurious correlation. This means the estimates will not reflect the true population parameters (Florens and Heckman, 2001). Various analytical techniques were developed in the past to overcome the challenges of endogeneity and reverse causality. Some of the techniques proposed in previous years to overcome these two challenges include the differencing approach and the instrumental approach.

Chipaumire et al (2014) estimated the causality relationship between government spending and growth in South Africa using the Granger causality test. According to Devarajan et al (1996), the use of lags eliminates the problem of reverse causality at the same time showing the long-term relationship between the two variables. Therefore, it is necessary to introduce forward lags in such a way that the current expenditure influences the growth variable at a time (t+X years) in the future. The use of forward lags assumes that the government alters its current spending when it is anticipating a change in the agricultural growth in a few years to come (Devarajan et al., 1996). The number of lags used to capture the long-term growth depends upon a particular study. Fan and Saurkar (2006) used 2-year lags in their study whilst the study by Devarajan et al (1996) used 5-year average forward lags.

In times series analysis, the concepts of stationarity and weak dependence play a significant role. When there is stationarity, the mean and variance of the series will remain constant over the time series i.e. there will be no trend. According to Salih (2012), the differencing approach is usually used when the time series is found to be non-stationary i.e. having a unit root. A series is denoted by I(0) if it has no unit root before the process of differencing is applied. If the series is found to be stationary after differencing, then it is denoted by I(1) meaning integrated of order 1 (Wooldridge, 2012; Salih, 2012).

This study employed the Augmented Dickey-Fuller Unit Root test to check for unit roots in variables using the Stata software. The differencing technique was then applied using Stata commands to those series, which were non-stationary to de-trend the data and transform the series to stationary. The study went on to employ the Johansen test of co-integration to understand the long-term relationship between agricultural spending types and agricultural growth. Co-integration exists between variables if they are non-stationary at their level but stationary after differencing (Johansen, 1988). According to Wooldridge (2012) after testing for co-integration among variables, one can either use the vector autoregressive model (VAR) or the vector error correction model (VECM) for estimation.

In the absence of co-integration, the VAR model is a preferable method of estimation. A study done by Chipaumire et al (2014) employed the vector autoregressive model (VAR) to overcome the endogeneity problem. Sims (1980) introduced time series vector autoregressive (VAR) models as a technique to explain the response of variables to different exogenous impulses. A VAR model is a multivariate single-equation in which a dependent variable at the current time is explained by the lagged values of the covariates as well as its own lagged values (Wooldridge, 2012; Canova and Ciccarelli, 2013).

However, this study applied the error correction technique because of the presence of co-integration between the variables. A study by Chauke et al (2015) is among the studies that used the error correction model to estimate the relationship between government spending and agricultural GDP in South Africa and Zimbabwe. Equation 3.4 below shows a general VECM model with one explanatory variable (Wooldridge, 2012).

$$\Delta \boldsymbol{y_t} = \propto_{\boldsymbol{0}} + \propto_{\boldsymbol{1}} \Delta \boldsymbol{y_{t-1}} + \boldsymbol{\gamma_1 x_t} + \boldsymbol{\delta}(\boldsymbol{y_{t-1}} - \boldsymbol{\beta_1 x_{t-1}}) + \boldsymbol{\varepsilon_t} \qquad (3.4)$$

Where:

- y_t is the dependent variable
- x_t represents the explanatory variable
- $\propto_{\boldsymbol{0}}$ is the constant term
- $\propto_{\boldsymbol{1}}$ describes the relationship between the changes in the current y and changes in the previous y
- γ_1 explains the short run relationship between the changes in x and the changes in y
- $\delta(y_{t-1} - \beta_1 x_{t-1})$ is the error correction term
- δ describes the speed of adjustment back to equilibrium
- β_1 is the co-integrating coefficient
- ε_t is the stochastic error term

Placing the logged variables into the VECM model gives equation 3.5 below:

$$\Delta \mathbf{ln}(\boldsymbol{AGDP_t}) = \propto_{\mathbf{0}} + \boldsymbol{\gamma_1 \Delta lnAR_t} + \boldsymbol{\gamma_2 \Delta lnISP_t} + \boldsymbol{\gamma_3 \Delta lnIDP_t} + \boldsymbol{\gamma_4 \Delta lnPSP_t} + \boldsymbol{\gamma_5 \Delta lnNT_t} + \boldsymbol{\gamma_6 \Delta lnI_t} + \boldsymbol{\alpha_1 \Delta \mathbf{ln} AGDP_{t-1}} + \boldsymbol{\delta}(\boldsymbol{\mu_{t-1}}) + \boldsymbol{\varepsilon_t} \qquad (3.5)$$

Where: Δ is the first difference operator and $\delta(\mu_{t-1})$ is the fitted error correction term

3.4 Data

This study focused on four countries in which data on the composition of agricultural expenditures was found for the period of 2000 to 2014. The countries under study include Zambia, Malawi, South Africa, and Tanzania. The study relied on secondary data for all the variables included in the model. In the empirical analysis, agricultural value added is the dependent variable and serves as a measure of agricultural growth.[6] Value added is the net value of total agricultural output less intermediate inputs in constant 2005 USD. This measure does not account for depreciation of man-made assets or

[6] Agriculture includes forestry, hunting, fishing, as well as cultivation of crops and livestock production.

depletion of natural resources (World Bank, 2015). The data on agricultural value added from 2000 to 2014 was obtained from the World Bank Development Indicators.

The International Trade Centre (ITC) site provided data on exports and imports expressed in terms of value (thousand USD), which were used to generate the net trade variable in agriculture (ITC, 2015). Net trade in agriculture, also referred to as the balance of trade, measures the difference between the total value of exports in the agricultural sector and the total value of imports in agriculture in a country. To adjust for inflation, the net trade values were deflated to real terms using the GDP deflator. Gross Fixed Capital Formation in agriculture (constant 2005 prices-million USD) was used in this study as a proxy for private investment. This variable measures land improvements, machinery and equipment purchases, infrastructure constructions as well as crop and livestock fixed assets and inventory. Data on gross fixed capital formation was obtained from FAO statistics division (FAO, 2015).

The government expenditures collected in local currencies were converted into a value aggregate expressed in terms of international dollars. The aim of these conversions was to make the different monetary variables comparable across the four countries. The study used the exchange rates measured in purchasing power parity (PPP) to convert the local currency expenditures measured in terms of 2005 prices. Data on 2005 purchasing power parity for the four countries was collected from World Bank Indicators (World Bank, 2015). The prices were first deflated from current local currency expenditures to a set of base year prices using the implicit GDP deflator for each country before being divided by the PPP exchange rates. According to the World Bank (2015), each of the four countries had a different base year. Section 3.5 below provides a detailed discussion on the sources and categories of expenditure for each of the four countries.

3.5 Country reports on government spending

Total agricultural spending was broken down into various components depending on the country. This study concentrated on four types of agricultural spending namely, spending on input subsidies, price supports, agricultural research and infrastructure development. The following sub-sections explain in detail the sources of data on agricultural expenditures in each country as well as how the study disaggregated the expenditures.

3.5.1 Zambia

The National Assembly of Zambia and the Ministry of Finance in Zambia (MoF) are the two main sources of data on budgetary expenditures. MoF provides publications related to the fiscal policy of the country. These include medium term expenditure framework (2007-2014), budget yellow books

(2007-2014), and citizens' budgets (2007-2014), which reports and gives a summary of basic budget information such as government revenues and expenditures. The national Assembly of Zambia provided budget speeches from 2000 to 2014.

Various expenditure analysis reports and research papers[7] were used for comparison purposes as well as to supplement the data in cases where the budget statements were not clear on the allocated funds. Some of the reports used include joint presentations on the analysis of the Zambian budgets for various years by institutes such as IAPRI (Indaba Agricultural Policy Research Institute), ACP (Agricultural Commodity Program), and MACO (Ministry of Agriculture and Cooperatives) which are major agricultural research institutions in Zambia.

Generally, the agricultural budget of Zambia consists of personal emoluments (PEs), grants and other payments, poverty reduction programs (PRPs) such as the Fertilizer Support Program (FSP) and Strategic Food Reserve Agency (FRA), agricultural development programs, allocation to the Food Security Pack as well as construction of dams and roads. The FSP and FRA dominate the agricultural budget in Zambia with combined allocations of about 45% of the total budget to agriculture, each year. The two programs also take about 90% of the PRPs budget allocation, on average every year. The government incepted the FSP with an objective of providing fertilizer and improved seeds to small-scale farmers at subsidized prices in order to enhance their productivity. The FRA, on the other hand, manages the food reserve in the sector by purchasing crops mainly maize from the local farmers at subsidized prices.

A very small proportion of the agricultural budget in Zambia goes towards agricultural research. Over the past years, agricultural research and development received approximately 1.5% (on average) share of the agricultural budget. This is contrary to the commitment of the government as stated in the Fifth National Development Plan to allocate a 12.5% share of agricultural expenditure to research and development. The government of Zambia also commits to providing public goods such as infrastructure to the agricultural sector. The National Development Plan considers long-term investments in infrastructure to be a top rank function of the state. Therefore, a significant amount of funds goes towards improving infrastructures such as roads, rural electrification, and irrigation equipment, every year. (Govereh et al, 2009).

[7] A working paper by Govereh et al (2009) titled "Trends and Spatial Distribution of Public Agricultural Spending in Zambia: Implications for Agricultural Productivity Growth" also contributed much on data availability for periods between 2000 and 2008.

Therefore, this study disaggregated the agricultural spending for Zambia into four areas namely input subsidies (ISP), price supports (PSP), agricultural research (AR) and infrastructure development (IDP) considering their importance to the economy. These four main components have been receiving more than half of the budget allocation and have a potential of achieving sustainable agricultural growth. Figure 3.1 below displays data on agricultural spending types and their percentage share allocations in Zambia between 2000 and 2014.

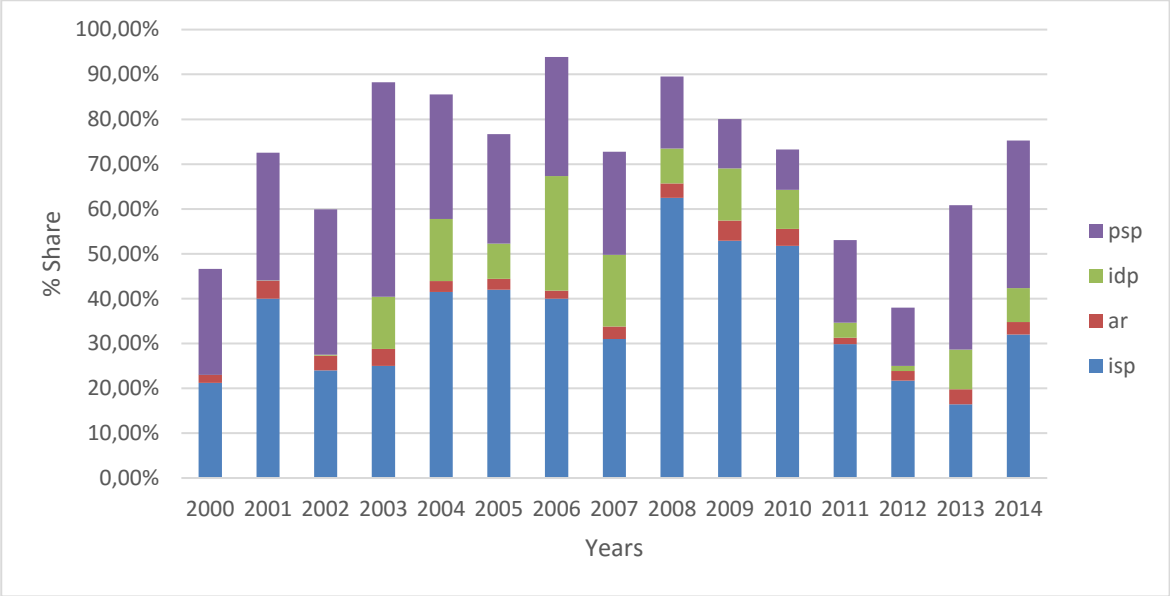

Figure 3.1: Percentage shares of agricultural spending to different areas in Zambia

Source: Calculated using data from Budget Reports (2007-2014), budget speeches (2000-2014) obtained from MoF and National Assembly of Zambia; Govereh et al (2009).

Figure 3.1 above reflects on how the government of Zambia has been prioritizing their budget expenditure to different agricultural sectors. The trends in percentage shares to the four programs showed some fluctuations from 2000 to 2014. The PSPs received much priority during the first three years, having more shares than all the programs including ISPs. However, a downward trend was witnessed from 2004 to 2010 as the government started paying more attention to ISPs. The graph shows ISPs having the highest share of agricultural expenditure since 2004. The government of Zambia has been giving much priority to the fertilizer support program (FSP) showing its commitment towards the Abuja declaration to improve farm productivity through expansion of fertilizer usage.

Even though many studies and economists have pointed out the importance of research and infrastructure improvement, these two sub-sectors received less attention from the government of Zambia (see figure 3.1 above). AR received the least focus for the period of observation, having its

highest share not exceeding 5% of the total agricultural spending. IDP received third priority among the four sub-sectors since 2003. The inception of the Fifth National Development Plan (FNDP) in 2006 brought a few changes in governments priorities as an improvement was witnessed in expenditure to infrastructure development. As shown in figure 3.1 above, in the year 2006, infrastructure improvement received its highest share of approximately 26%. However, this percentage share in infrastructure expenditure decreased to 15% in the year 2007.

3.5.2 Malawi

Data on agricultural expenditures for the period 2000 to 2014 was compiled from budget statements and speeches by the MoF in Malawi. The Southern African Regional Poverty Network (SARPN) provided budget statements for Malawi from 2000 to 2005 (SARPN, 2015). The study also used data from the World Bank public expenditure review (PER) in Malawi for the period 2000 to 2012. A study by Dorward and Chirwa (2011) contributed with data on public expenditures in Malawi for the period 2005 to 2009.

As with Zambia, expenditure was disaggregated into four categories namely input subsidies (ISP), price support programs (PSP), research and extension (ARE) as well as infrastructure development (IDP). These components have received more than half the share of total agricultural expenditures over the period of observation. The Input Subsidy Programs gave much of the boost on agricultural expenditures especially after the inception of the FISP (Farm Input Subsidy Program) in 2005. Significant amounts of funds go to the price support system in Malawi every year. Data on expenditures to the food reserve agency was used in this study to measure the price supports (maize subsidy) by the government of Malawi. The Agricultural Development and Marketing Cooperation (ADMARC) is responsible for the strategic food reserve mainly by purchasing the excess maize from the local producers.

Expenditures on agricultural research are considered to be crucial for growth, especially in the long run. Therefore in line with the objectives of the Economic Recovery Plan (ERP) and MGDS in Malawi, this study considered an analysis on expenditures to research and extension as vital. The introduction of Priority Poverty Expenditures (PPEs) in May 2001 also resulted in more expenditures being allocated to the agricultural sector programs, particularly to infrastructure development. According to Fozzard and Simwaka (2002), the purpose of coming up with the PPEs was to identify key areas of spending which would enable Malawi to meet its poverty reduction targets. The objective was to monitor these key areas and protect them from in-year reallocations, thus making sure that the amounts released would not be less than the budgeted amounts (Fozzard and Simwaka, 2002). The PPEs include expenditures on rural infrastructure development such as water supply, rural feeder

roads, and borehole construction. The 2001/02 budget was the first to introduce the PPEs. After the year 2001/02 budgetary expenditures to the four components of spending considered in this study were occupying above 60% share of the total agricultural budget. Figure 3.2 below shows the percentage share allocations to different components in Malawi between 2000 and 2014.

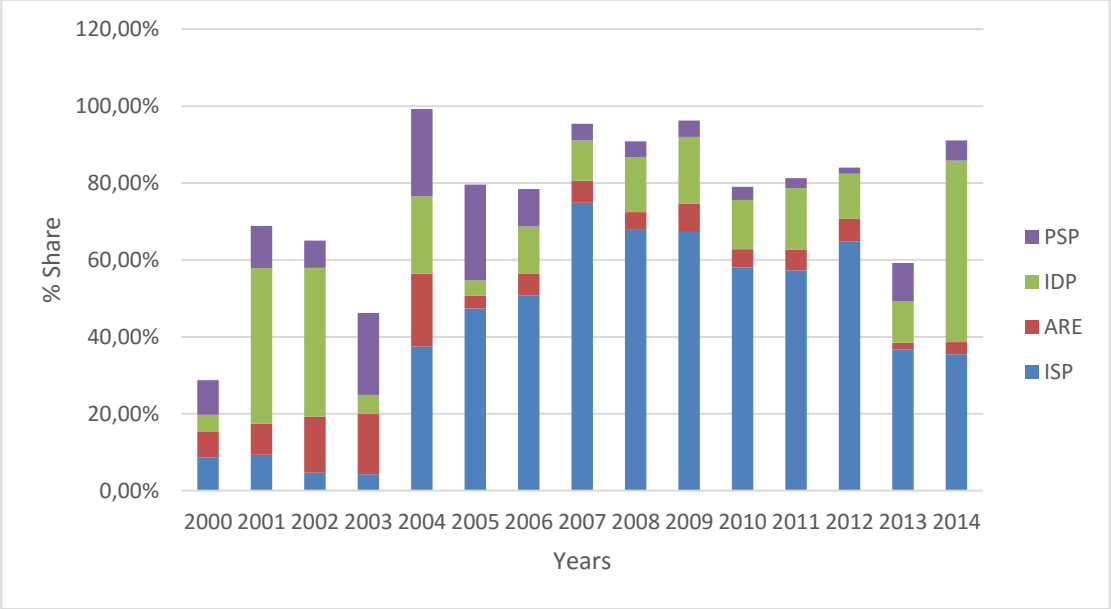

Figure 3.2: Percentage shares of agricultural spending to different areas in Malawi

Source: Calculated using data from budget statements (2006-2014) obtained from MoF in Malawi, budget speeches (2000-2005) obtained from SARPN, Public Expenditure Review (2000-2012) from World Bank (2013), and Dorward and Chirwa (2011).

Government spending to agricultural sub-sectors in Malawi increased since 2000, with fluctuations witnessed in the trends (See figure 3.2 above). Huge improvements in percentage shares were noticed in the agricultural budget from 2004 after the inception of CAADP in 2003. Even though the government of Malawi became heavily involved in funding the agricultural sector from 2004, some agricultural sub-sectors received more priority than others. Similar to Zambia, input subsidies received more attention from the Malawi government than any other sectors as illustrated in figure 3.2. The government of Malawi disbursed more funds to the FISP program with 2007 having the largest share of 74.8%. The huge gap witnessed in the percentage expenditure shares to ISPs from 2006 to 2007 is indicative of the government's commitment to the Abuja declaration of 2006.

As shown in figure 3.2, IDP received more funds than agricultural research and price support programs for the period 2000 to 2014. Unlike the FRA in Zambia, the ADMARC in Malawi responsible for the strategic food reserve has not been receiving much priority. The PSPs received

the least amount of money annually since 2000 while ARE received the third share of agricultural spending among the four sub-sectors.

3.5.3 South Africa

The government of South Africa has been publishing annual reports on budgetary expenditures over the past years mainly through its department of treasury. South Africa also managed to classify its expenditures according to their functions as set out in the Government Finance Statistics Manual. South Africa's budget system presents the different components of expenditures at a more detailed level, differentiating it from the other countries. Data sources on agricultural expenditures for South Africa include annual budget speeches, estimates of expenditure documents, national budget review documents, and budget highlights. The National Treasury department publishes all these documents annually. The study used actual budget outcome figures presented in the budget reports from the 2000/01 financial year to 2014/15.

The main budget in South Africa comprises of receipts on the revenues and expenditures by statutory appropriation or by parliament vote. The national budget structure in South Africa has been changing over the past years due to various macroeconomic factors. For example, after the elections in 2009, the government introduced certain new departments and renamed some of the existing ones. This shift in functions between departments has often resulted in some figures presented being different from their values in previous budget statements. Even though this shift does not influence the total expenditures, the inconsistency in figures to different sub-programs poses a challenge to times series research analysis.

Like the national budget, the agricultural budget structure has also been changing over the past years. The budget statement that presented estimates on agricultural expenditures in the early 2000s is completely different from the recent budget statements. The recent budget structure introduced in 2011 categorizes agricultural expenditures into spending on six major programs. These include administration, agricultural production and food safety, food security and agrarian reform, trade promotion and market access, forestry, as well as fisheries. The agricultural budget further disaggregates these programs into sub-programs in much more detail.

The budget classifies expenditures on agricultural research under the agricultural production and food safety program as well as under the fisheries program. The food security and agrarian reform program is further disaggregated into sub-programs including spending on extension as well as spending on CASP. A significant amount of funds from the agricultural budget goes towards the CASP program, justifying its inclusion in the analysis. Before the inception of CASP in 2004, the government was

disbursing funds to assist farmers especially the historically disadvantaged farmers through the Farmer Support Development Program (FSDP). The government then established CASP as part of the FSDP, which has become the major support program at present. Therefore, for the period 2000 to 2003, the study used expenditures allocated to FSDP in the model as spending to CASP (CASP, 2004).

Therefore, in the case of South Africa, this study focused on four types of agricultural spending considered important for growth in various literatures. These include spending on agricultural research (AR), extension services (AE), infrastructure development (IDP) as well as the Comprehensive Agricultural Support Program (CASP). Figure 3.3 below presents the different areas of public spending in South Africa together with their percentage shares since 2000.

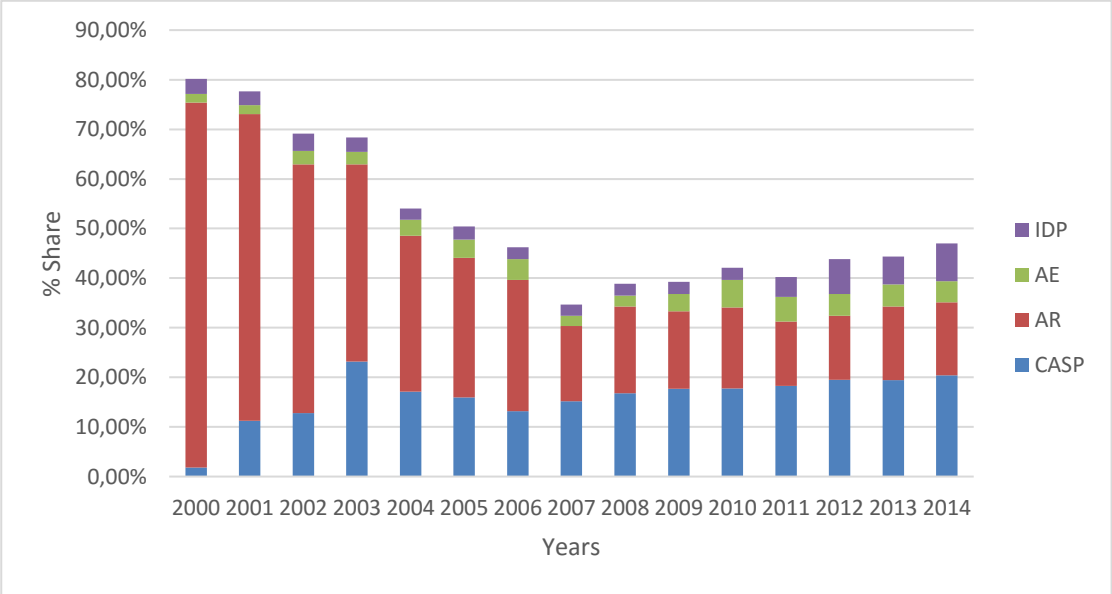

Figure 3.3: Percentage shares of agricultural spending to different areas in South Africa

Source: Calculated using data from National budget reviews (2000-2014), budget speeches and budget highlights (2000-2014) obtained from the Department of National Treasury, South Africa.

South Africa has been the unique country in its commitment towards improving agricultural research and development among the four countries under study. AR was the dominant sub-sector of all the four sub-sectors from 2000 to 2007, as it received the highest shares of agricultural expenditure. However, a steep downward slope is witnessed with percentage shares to AR since 2000. The government shifted its priorities after 2007 and directed most of its funds towards CASP, as it became committed towards assisting the beneficiaries of land reform. Fair amounts of money also went towards IDPs and AE in South Africa. A steady increase is seen with the trends for agricultural extension and infrastructure development expenditures. AE received more priority than IDP during

the early years before 2007 and also in 2010 as it had larger shares of agricultural expenditures. IDP had its highest share of approximately 7.6% in 2014 while AE received its highest expenditure share of 4.5% in 2013 (see figure 3.3 above).

3.5.4 Tanzania

The data sources for Tanzania include budget speeches (period 2001-2014), citizens' budget (2011-2014), budget digest (2004-2010) and medium-term budget framework (2009-2014) obtained from MoF in Tanzania. The World Bank public expenditure reviews also provided data on expenditures in Tanzania from 2000 to 2014 (World Bank, 2009; World Bank, 2011; World Bank, 2014).

The budget structure in Tanzania consists of the recurrent expenditures and the development expenditure component. The recurrent component is dominated by the expenditures to personal emoluments (PEs). The budget to PEs in Tanzania is composed of salaries, allowances, pensions, and other direct employee benefits. On the other hand, the development component of the budget consists of the investment expenditures to the sector. These include expenditures on agricultural services such as research and extension, infrastructure (irrigation), capacity building and marketing, evaluation, and coordination as well as subsidies and national strategic reserve. Even though government expenditure in Tanzania goes to different sub-programs, this study only focused on three components for which data was available. These include spending on input subsidies (ISP), research and extension (ARE) as well as infrastructure development (IDP). The percentage shares of agricultural spending to these areas are presented in figure 3.4 below.

The trends in percentage shares to the different sectors have been unsteady and fluctuating from year to year since 2000. The government of Tanzania has been spending more money on improving its infrastructure from 2000 to 2010. This is surprisingly different with Zambia and Malawi who prioritized input subsidies for the same period of observation. However, recently the government of Tanzania shifted its attention from infrastructure to input subsidies. Figure 3.4 below shows more funds going towards input subsidies since 2011. ARE received the least priority among the three sub-sectors for the period 2000 to 2014. ARE shows a steady trend, increasing from 2.57% in 2000 to a maximum of 10.3% share in 2007 then dropping to 0.5% in 2014. The percentage share of input subsidy programs showed an upward and downward trend, dropping from 17.36% in 2000 to 5.62% in 2005 then rising to a maximum share of 31.6% in 2011.

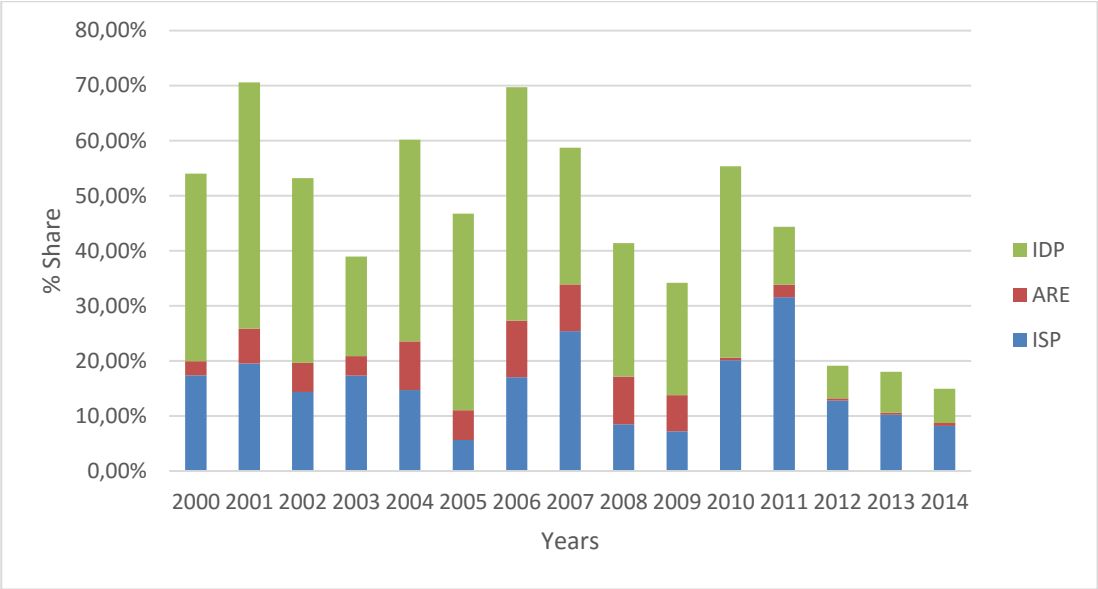

Figure 3.4: Percentage shares of agricultural spending to different areas in Tanzania

Source: Calculated using data from budget speeches (2001-2014), citizens' budget (2011-2014), budget digest (2004-2010), Medium Term Budget Framework (2009-2014) obtained from MoF in Tanzania and Public Expenditure Reviews (2000-2013) by World Bank (2014).

CHAPTER 4 : RESULTS AND DISCUSSIONS

4.1 Introduction

The study compiled data on agricultural expenditures, agricultural GDP, private investment and net trade balance across four African countries from 2000 to 2014. This chapter provides the presentation as well as interpretation of the study results. Section 4.2 gives a descriptive analysis of the trends in agricultural GDP, private investment and net trade. Section 4.4 explains the empirical results of regression analysis, including stationarity tests results, co-integration test results and VECM results. Lastly, a summary of the chapter is given in section 4.5.

4.2 Descriptive Results

4.2.1 Changes in agricultural GDP from 2000 to 2014

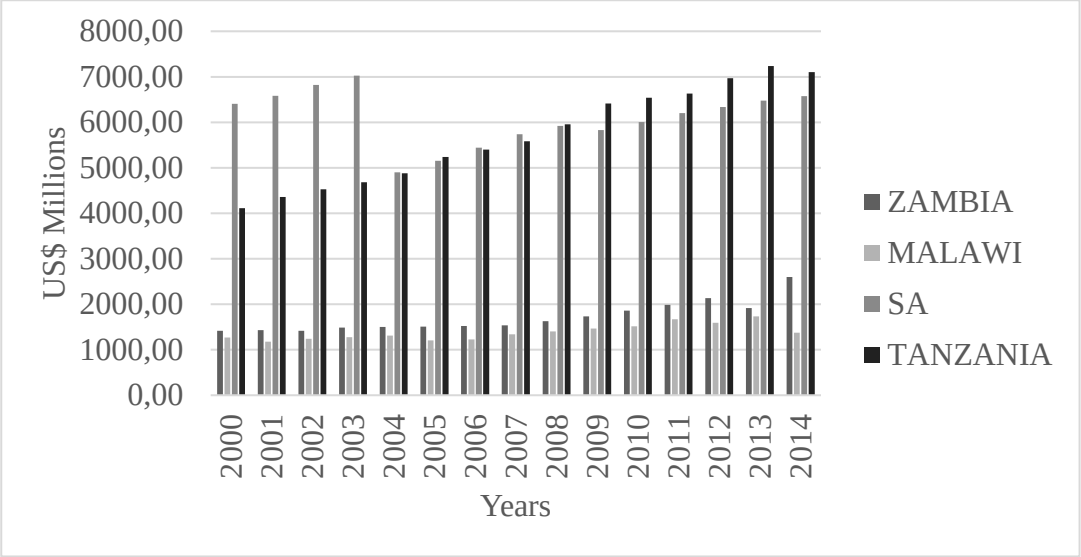

Figure 4.1: Changes in agricultural GDP across the four countries since 2000

Source: World Bank Indicators (2015)

Figure 4.1 above illustrates a graphical exposition of agricultural GDP used in the study as a measure of agricultural growth. South Africa having the highest growth among the four countries, showed an increase in agricultural GDP before sloping down in 2003 from US$ 7000 million to US$ 5000 million in 2004. Tanzania was second in terms of agricultural growth during the early years, displaying a gradual increase in agricultural GDP since 2000. However, as South Africa showed a slow decline in its agricultural growth after the 2008 recession, Tanzania gained the top position having the largest growth in the agricultural sector among the four countries. Zambia and Malawi

being in the third and fourth position in terms of their agricultural GDP, respectively, both showed a steady increase since 2000. (For data on agricultural GDP, see Appendix F).

4.2.2 Changes in Agricultural Investment from 2000 to 2014

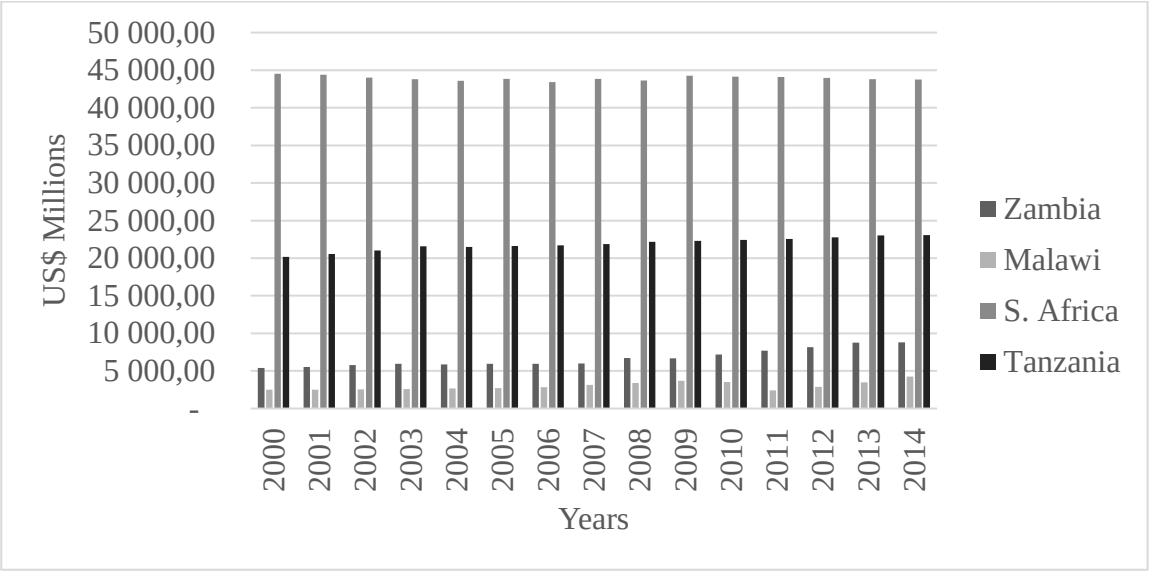

Figure 4.2: Changes in private investment across the four countries since 2000

Source: World Bank Indicators (2015)

Government involvement has been associated with crowding out private investment; however, it is equally fair to understand both the trends in private investment in these countries and how that private investment influences growth. Figure 4.2 display the trends in private investment for the four different countries. Data shows that private investment being more important in South Africa than in the other three countries. South Africa had an average of about US$ 43 000 million for the period 2000 to 2014, compared to US$ 23 000 million in Tanzania which was in the second position in private investment. All the countries showed steady trends in private investment without much fluctuations from year to year. There is still need for improvement in Malawi when it comes to investment by private companies in the agriculture sector. The graph shows Malawi having a maximum of about US$ 4000 million dollars invested in agriculture, which is lower when compared to South Africa, Tanzania, and Zambia. (See Appendix G for data on private investment).

4.2.3 Changes in Net Trade Balance from 2000 to 2014

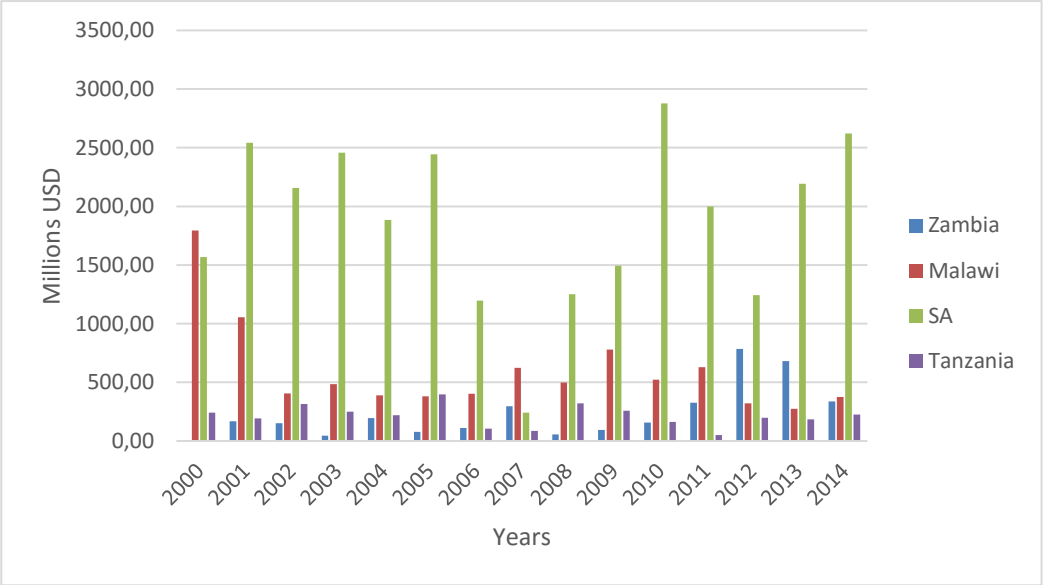

Figure 4.3: Changes in Net Trade across the four countries since 2000

Source: ITC (2015), calculations based on UN COMTRADE statistics.

The relationship between net trade and growth has been a subject of much debate and controversy over the past years. Some studies suggested a positive relationship between the two macroeconomic variables (Ahmad et al., 2012; Ahmad 2013). The study examined the trends in net trade balance in agriculture for the four countries since 2000 and tried to assess its impact on growth. The aim is to contribute to the available literature regarding the contribution of net exports towards economic development based on the regression results.

Figure 4.3 above reflects changes in net trade across the four countries measured as the difference between the total value of exports and the total value of imports. The total agricultural products excluded fisheries and forestry products. The trends reflect much fluctuations in the balance of trade in these four countries from 2000 to 2014. The graph shows the South African economy have more net trade balance since 2000 than the rest of the countries under study. A steep increase was seen by South Africa as it rose from a value of approximately 1560 million USD in 2000 to a value of approximately 2400 million USD in 2005. A steady downward slope was then witnessed after 2005. Figure 4.3 above indicates Malawi having a better balance of trade on agricultural products in its economy than both Zambia and Tanzania. The lower trade balances witnessed in Zambia and Tanzania especially in the early 2000s indicate much trade restrictions in these countries. These restrictions result in inefficient production by discouraging farmers from making long-term investments. Restrictions on trade such as banning the exportation of maize deter the private sector

from investing in the agricultural sector through input supply marketing of crops (See Appendix H for data on Net trade).

4.3 The Mismatch between Allocated and Actual Expenditures

Zambia

It is to the knowledge of this study that in most years, the government of Zambia has been releasing more funds to the agricultural programs than the amounts allocated in their budgets especially during the period 2004 to 2014. This mismatch between the budget allocated amounts and the actual amounts released makes it difficult to plan and predict future policies for the country. Figure 4.4 below depicts the mismatch that exists between the amounts released and the budgeted amounts in Zambia.

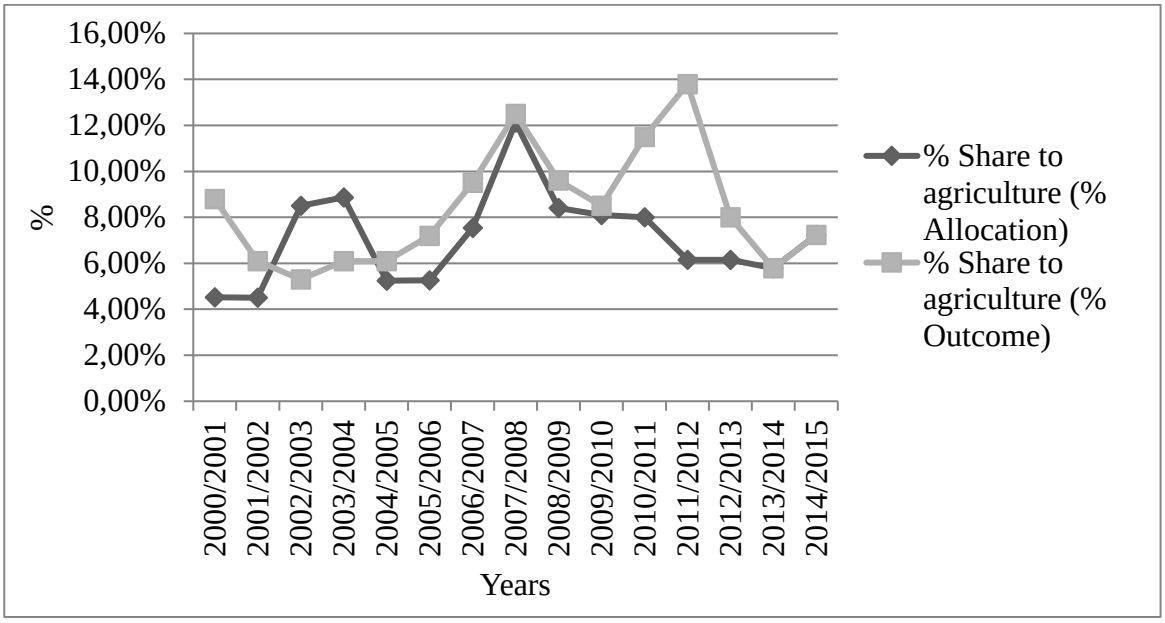

Figure 4.4: The mismatch between allocated and actual expenditure in Zambia

Source: Calculated using data from Budget Reports (2007-2014), budget speeches (2000-2014) obtained from MoF and National Assembly of Zambia; Govereh et al., (2009).

Malawi

The mismatch between actual expenditures and estimated expenditures also exist within the Malawi budget system. In some years the actual expenditures were found to be more than the approved expenditures and yet in certain years the actual expenditures were contained with the approved budget expenditures. Figure 4.5 below illuminates this match by comparing the trends in both approved and actual spending from 2000/01 to 2014/15. During the period 2000 to 2004, the government of Malawi was spending less than the amount allocated in the budget. However, after 2004 the graph shows actual amounts released being more than the budget estimates.

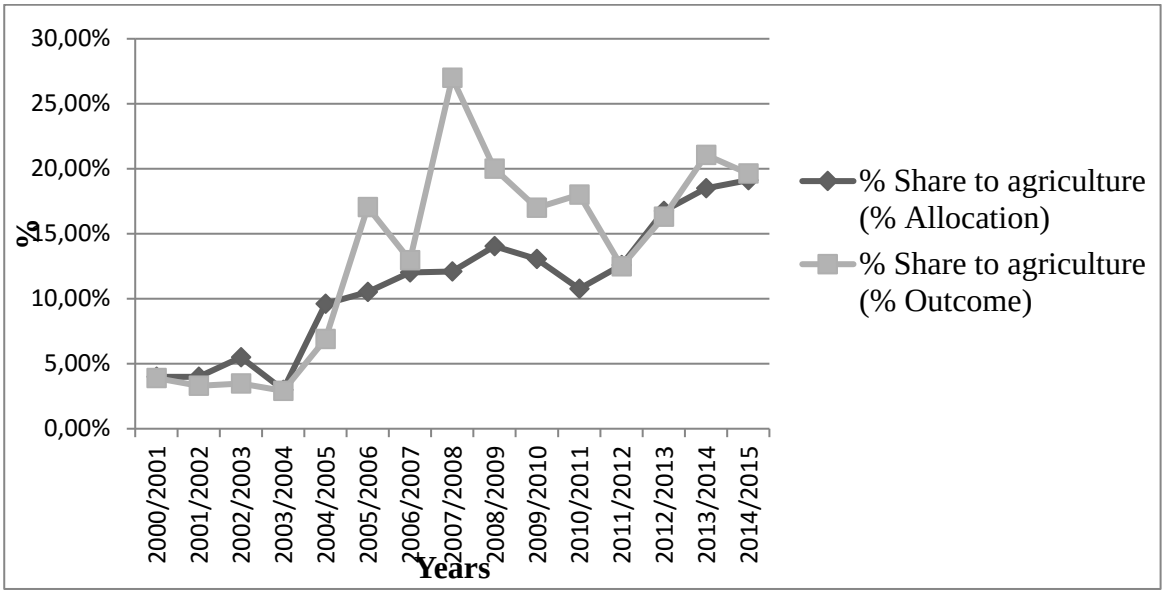

Figure 4.5: The mismatch between allocated and actual expenditure in Malawi

Source: Calculated using data from budget statements (2006-2014) obtained from MoF in Malawi, budget speeches (2000-2005) obtained from SARPN, Public Expenditure Review (2000-2012) from World Bank (2013), and Dorward and Chirwa (2011).

South Africa

As shown in fig 4.6 below, South African government has been spending more money on the agricultural sector than the allocated amount in the budget. A significant improvement is seen in recent years indicated by the small gap between the approved budgets expenditures and actual expenditures since 2010.

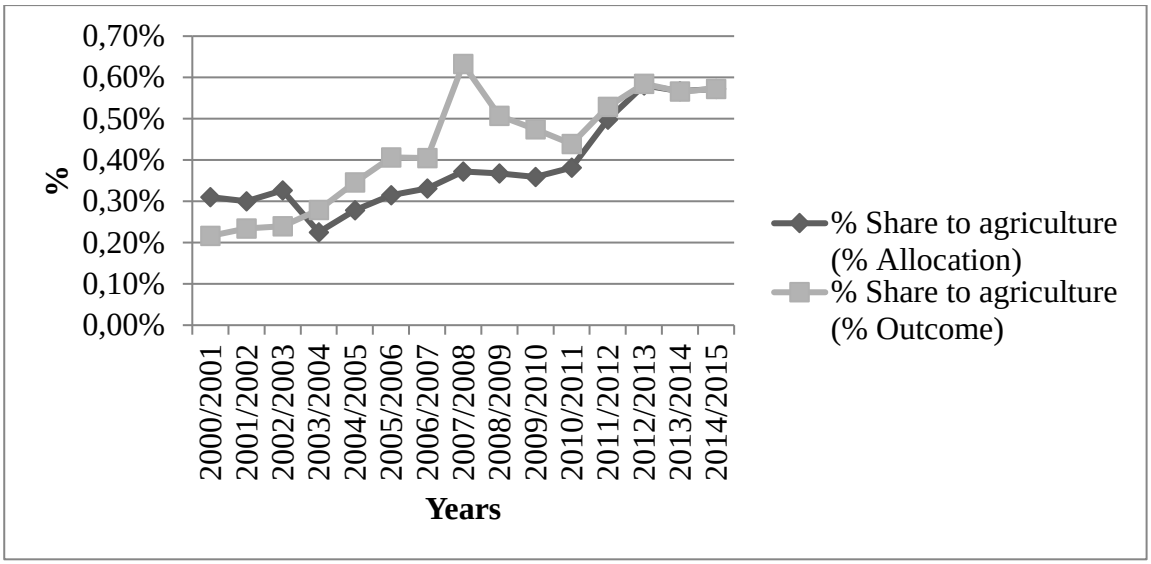

Figure 4.6: The mismatch between allocated and actual expenditure in South Africa

Source: Calculated using data from National budget reviews (2000-2014), budget speeches and budget highlights (2000-2014) obtained from the Department of National Treasury, South Africa

Tanzania

Similar to many other countries, the Tanzanian budget system is also associated with significant deviations between the approved budget expenditures and the actual expenditures released. Unlike the case of Zambia, in which the actual expenditures were more than the proposed expenditures, the government of Tanzania has been spending less than the approved budget expenditures over the past years (See figure 4.7 below). This difference can be attributed to unrealistic budget allocations by the government. Budget revisions have also been common in Tanzania over the past years whereby the government reallocates funds within sectors. The original budget might not have focused on the major priorities, hence a need for reallocation to ensure the priority sectors receive adequate funds.

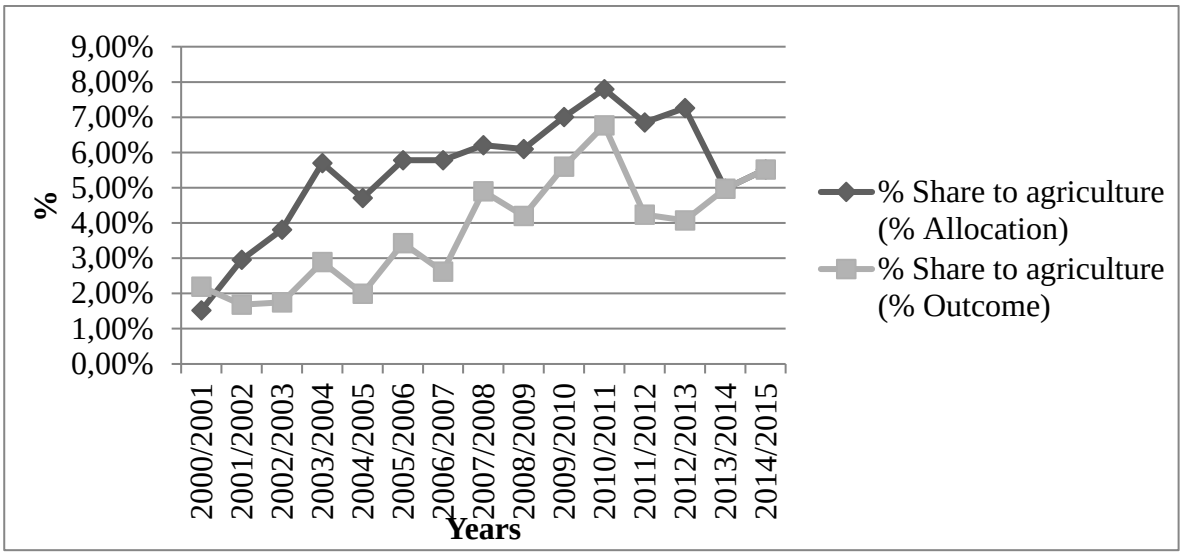

Figure 4.7: The mismatch between allocated and actual expenditure in Tanzania

Source: Calculated using data from budget speeches (2001-2014), citizens' budget (2011-2014), budget digest (2004-2010), Medium Term Budget Framework (2009-2014) obtained from MoF in Tanzania and Public Expenditure Reviews (2000-2013) by World Bank (2014).

4.4 Empirical Results

4.4.1 Introduction

Previous studies provide inconsistent results on the significant relationship between government expenditure and economic growth. The conclusion in most of the previous studies was that total government spending negatively influences economic growth, Landau (1983), Grier and Tullock (1989), Romer (1990), Kelly (1997), Connolly and Li (2016). Some studies found a positive relationship, Alexiou (2007), Komain and Brahmasrene (2007), Tijani et al (2015), while a few managed to conclude an insignificant relationship between expenditures and growth, Aschauer

(1989), Nelson and Singh (1994), Ibok and Bassey (2014). This study aimed to contribute to the current literature by assessing the relationship between disaggregated government expenditures to agriculture and agricultural growth. As mentioned earlier in the methodology section, the study employed agricultural GDP as a proxy for agricultural growth.

Many studies examined the aggregate influence of public expenditures on growth but failed to explore the effects of different components of government spending. Using total government expenditures may not be the best test of measuring the incidence of government interference. This is because governments allocate the total expenditures to different areas. Some components of the total spending are likely to be more beneficial to growth compared to others (Kelly, 1997). Therefore, this study highlighted the different contributions of different types of expenditures on growth instead of focusing on the total aggregate expenditures.

4.4.2 Augmented Dickey-Fuller Unit-Roots Test (Stationarity Test) Results

As noted earlier in section 3.5 above, before estimating the regression equation, it is vital to understand the data first. The study carried out Unit Root testing using the ADF test for each of the four countries in STATA before proceeding to the Johansen test of co-integration. All the variables had unit roots at level with the exception of agricultural research expenditure in South Africa and net trade in both Zambia and Tanzania. Therefore, the study employed first differencing to make the variables stationary.

4.4.2.1 Stationarity test results in Zambia

In the case of Zambia, all the variables were found with unit roots at level except for net trade balance variable (see table 4.1 below). However, the augmented Dickey-Fuller test indicated stationarity in the variables after first differencing. As shown by the p-values in table 4.1 below, the null hypothesis was rejected at 1% significant level for all the variables after differencing.

Table 4.1: Stationarity Test Results for Zambia

VARIABLE	P-VALUE AT I(0)	CONCLUSION	P-VALUE At I(1)	CONCLUSION
GDP	0.9978	Non-Stationary	0.0000***[8]	Stationary
ISP (Input Subsidies)	0.3910	Non-Stationary	0.0000***	Stationary
AR (Agricultural Research)	0.8882	Non-Stationary	0.0000***	Stationary
IDP (Infrastructure Dev)	0.3618	Non-Stationary	0.0021***	Stationary
PSP (Price Support)	0.6793	Non-Stationary	0.0000***	Stationary
NT (Net Trade)	0.0011	Stationary	-	-
INVEST (Investment)	0.9933	Non-Stationary	0.0047***	Stationary

Source: Authors' Own Computation using STATA

4.4.2.2 Stationarity test results in Malawi

In Malawi, all the variables contained unit roots at level. However, all the variables considered in the model were stationary after differencing. While all the other variables were stationary at 1% significant level, input subsidies and private investment were found to be stationary at 10% level (See table 4.2 below).

Table 4.2: Stationarity Test Results for Malawi

VARIABLE	P-VALUE AT I(0)	CONCLUSION	P-VALUE At I(1)	CONCLUSION
GDP	0.7407	Non-Stationary	0.0022***	Stationary
ISP (Input Subsidies)	0.4860	Non-Stationary	0.0517*	Stationary
ARE (Ag Research & Ext)	0.1145	Non-Stationary	0.0000***	Stationary
IDP (Infrastructure Dev)	0.8783	Non-Stationary	0.0000***	Stationary
PSP (Price Support)	0.2302	Non-Stationary	0.0032***	Stationary
NT (Net Trade)	0.1193	Non-Stationary	0.0020***	Stationary
INVEST (Investment)	0.5235	Non-Stationary	0.0638*	Stationary

Source: Authors' Own Computation using STATA

[8] ***, ** and * denotes significance at 1%, 5% and 10% level, respectively.

4.4.2.3 Stationarity test results in South Africa

As shown in table 4.3 below, the null hypothesis of a unit root at all common significance was rejected with the exception of the agricultural research variable. Agricultural research has a p-value of 0.0007 indicating stationarity at 1% significant level. The null hypothesis could not be rejected after first differencing, thus concluding stationarity in the variables. Table 4.3 shows agricultural extension being stationary at 10% significant level while all the other variables were stationary at 1% level.

Table 4.3: Stationarity Test Results for South Africa

VARIABLE	P-VALUE AT I(0)	CONCLUSION	P-VALUE At I(1)	CONCLUSION
GDP	0.2919	Non-Stationary	0.0032***	Stationary
CASP	0.3189	Non-Stationary	0.0000***	Stationary
AR (Agricultural Research)	0.0007***	Stationary	-	-
IDP (Infrastructure Dev)	0.9761	Non-Stationary	0.0009***	Stationary
AE (Agricultural Ext)	0.3385	Non-Stationary	0.0602*	Stationary
NT (Net Trade)	0.1707	Non-Stationary	0.0005***	Stationary
INVEST (Investment)	0.1319	Non-Stationary	0.0000***	Stationary

Source: Authors' Own Computation using STATA

4.4.2.4 Stationarity test results in Tanzania

With the exception of net trade, the null hypothesis that the variables exhibit a unit root was rejected at all significant levels as depicted by the p-values in table 4.4 below. The Net Trade variable was stationary at level having a p-value of 0.0321. The study concluded that all variables were stationary after first differencing. However, while all the variables showed stationarity at 1% level after first differencing, GDP was stationary at 5% significant level (see table 4.4).

Table 4.4: Stationarity Test Results for Tanzania

VARIABLE	P-VALUE AT I(0)	CONCLUSION	P-VALUE At I(1)	CONCLUSION
GDP	0.6128	Non-Stationary	0.0286**	Stationary
ISP (Input Subsidies)	0.4094	Non-Stationary	0.0011***	Stationary
ARE (Ag Research & Ext)	0.6855	Non-Stationary	0.0000***	Stationary
IDP (Infrastructure Dev)	0.1250	Non-Stationary	0.0000***	Stationary
NT (Net Trade)	0.0321**	Stationary	-	-
INVEST (Investment)	0.3834	Non-Stationary	0.0523*	Stationary

Source: Authors' Own Computation using STATA

4.4.3 Co-Integration Test Results

After the stationarity test, the study implemented the Johansen Co-integration test in STATA to examine the long run relationship between government types and growth for the four countries under study. Co-integration exists if a linear combination of two or more time series, which are integrated of order one results in I(0). The condition to run the Johansen test of Co-integration is that the variables must be non-stationary at level but stationary after differencing. The Johansen test consists of the maximum rank, the eigenvalue and the trace statistic. The maximum rank determines the number of co-integrating vectors or equations when estimating a regression with more than two explanatory variables. At a maximum rank of zero, there is no co-integration. The trace statistic determines if a co-integrating equation exists at each maximum rank. A co-integration equation exists at a point where the trace statistic is less than the 5% critical value.

4.4.3.1 Johansen Co-integration test results in Zambia

Table 4.5 presents the co-integration test results for Zambia. The results show that at the maximum rank of two, the trace statistic is lower than the 5% critical level. Therefore, the null hypothesis of no co-integration is rejected indicating the presence of co-integration among the variables.

Table 4.5: Co-integration Test Results for Zambia

Johansen tests for co-integration

Trend: rconstant — Number of obs = 13

Sample: 2002 - 2014 — Lags = 1

maximum rank	parms	LL	eigenvalue	trace statistic	5% critical value
0	0	-73.136194	.	139.6577	102.14
1	12	-43.042327	0.99024	79.4700	76.07
2	22	-28.891658	0.88662	51.1686*[9]	53.12
3	30	-17.676445	0.82190	27.7382	34.91
4	36	-8.3419061	0.76214	10.0691	19.96
5	40	-4.1546719	0.47491	1.6947	9.42
6	42	-3.3073379	0.12222		

Source: Calculations from own study

[9] The Asterisk * shows the point where co-integration exists between the variables i.e. where the trace statistic is less than the 5% critical value.

4.4.3.2 Johansen Co-integration test results in Malawi

The results presented in table 4.6 show that there are three co-integration equations in the Johansen test for Malawi. Similar to Zambia, the null hypothesis is also rejected indicating the existence of a long-run relationship between the variables.

Table 4.6: Co-integration Test Results for Malawi

Johansen tests for co-integration

Trend: rconstant Number of obs = 13

Sample: 2002 - 2014 Lags = 1

Maximum Rank	parms	LL	eigenvalue	trace statistic	5% critical value
0	0	-71.205649	.	154.0430	102.14
1	12	-40.791808	0.99071	93.2153	76.07
2	22	-24.367796	0.92008	60.3673	53.12
3	30	-8.9251398	0.90706	29.4820*	34.91
4	36	-1.8165713	0.66500	15.2649	19.96
5	40	4.5562406	0.62485	2.5192	9.42
6	42	5.8158576	0.17617		

Source: Calculations from own study

4.4.3.3 Johansen Co-integration test results in South Africa

As depicted in table 4.7 below, there exist three co-integration equations in the Johansen test for South Africa. The asterisk shows the trace statistic to be lower than the critical value at the maximum rank of three. Therefore, the study concludes that the variables are co-integrated and have a long run relationship.

Table 4.7: Co-integration Test Results for South Africa

Johansen tests for co-integration

Trend: rconstant Number of obs = 13

Sample: 2002 - 2014 Lags = 1

Maximum Rank	parms	LL	eigenvalue	trace statistic	5% critical value
0	0	-29.569472	.	97.5101	76.07
1	10	-11.189724	0.94085	60.7506	53.12
2	18	2.0693604	0.86995	34.2324*	34.91
3	24	9.3794458	0.67523	19.6122	19.96
4	28	14.820764	0.56705	8.7296	9.42
5	30	19.185557	0.48906		

Source: Calculations from Study

4.4.3.4 Johansen Co-integration test results in Tanzania

The co-integration test results for Tanzania also indicate the variables to be moving together in the long-run. Table 4.8 proves there are three co-integration equations as shown by the asterisk at the maximum rank of one. Therefore, the study proceeds to VECM due to the presence of co-integration among the variables.

Table 4.8: Co-integration Test Results for Tanzania

Johansen tests for co-integration

Trend: rconstant Number of obs = 13

Sample: 2002 - 2014 Lags = 1

Maximum Rank	parms	LL	eigenvalue	trace statistic	5% critical value
0	0	-8.3197295	.	193.8771	102.14
1	12	51.64578	0.94087	73.9460*	76.07
2	22	67.614654	0.90467	42.0083	53.12
3	30	76.754561	0.86006	23.7285	34.91
4	36	83.364495	0.79187	10.5086	19.96
5	40	87.458902	0.65701	2.3198	9.42
6	42	77.009469	0.03935		

Source: Calculations from Study

4.4.4 Vector Error Correction Model Results

Because of the presence of co-integration among the variables, the study estimated the Vector Error Correction model. The VECM applied in this study gives results for both the short run period and the long run period. After the model was run in STATA, all the variables were insignificant in the short run. This suggests that expenditures to these programs have no immediate effect but it can take some time to notice their impact on growth. However, agricultural growth responded to the explanatory variables differently across the countries in the long. Section 4.4.4 explains the long run impact of the spending types on growth in the four countries.

4.4.4.1 Results for Zambia

Table 4.9: Long run impact of agricultural spending types on agricultural growth in Zambia

beta	Coeff.	Std. Err.	T-statistic	Prob
lnAR	-0.0436328	0.01003	-4.35	0.000***[10]
lnIDP	0.0405539	0.0070934	5.72	0.000***
lnISP	-0.0609056	0.0295316	2.06	0.039***
lnPSP	-0.1071801	0.0246306	-4.35	0.000***
lnNT	0.0841236	0.023814	3.53	0.000***
_cons	-0.4636804	0.1219487	-3.80	0.000***

R-squared = 0.4470 chi2 (30) = 4126.94 Prob> chi2 = 0.0000

Durbin-Watson statistical value = 1.371814 U(-1) = -0.8705325[11]

Source: Calculations from own study

Contrary to a study by Fan and Rao (2003) who indicated agricultural research to have a positive influence on growth, this study found a negative relationship between the two variables. The coefficient on research (lnAR) was -0.0436328, indicating that a one percent increase in agricultural research results in a 0.04% decrease in growth, ceteris paribus. Even though literature suggests that making use of new technology can enhance the farm productivity, it is also an issue when it comes to

[10] ***, ** and * denotes significant levels of 1%, 5% and 10%, respectively.

[11] U(-1) denotes the error correction term which measures the speed of adjustment towards equilibrium state.

adopting that new technology, especially by smallholder rural farmers. Many of them tend to be afraid to invest in new equipment as well as new seeds, and therefore dwell on traditional methods, which are less productive. According to Hazell and Haddad (2001), timely adoption of new technologies brought by research reduces per unit cost of production at the same time enhancing more profitability for the early adopters. Therefore, the negative sign on the research might be due to the slow response or resistance by these farmers in accepting the new technology and new research methods proposed by extension services causing long run the growth in agriculture to decline.

Various studies have also pointed out that investing in infrastructure development such as roads, electricity and irrigation can enhance growth in the long-run (Turnovsky and Fisher, 1995; Calderon and Serven, 2004). Access to better roads can improve local farmers' access to markets and making use of irrigation reduces the risk of depending on rain-fed agriculture. Therefore, improving infrastructure can result in increased agricultural growth. Table 4.9 shows the infrastructure-spending variable (lnIDP) with a coefficient of 0.0405539 meaning a 1% increase in infrastructure spending can result in a 0.04% increase in growth, ceteris paribus.

Economists have associated spending on ISPs and PSPs with growth reduction in the agricultural sector. These two types of spending result in crowding out of private investment and are associated with rent seeking. The results in table 4.9 above indicates that there is a negative relationship between agricultural growth and ISPs as well as PSPs which is consistent with the results of Fan et al (2008). According to Fan et al (2008), investments in other areas such as research, education, and rural roads enhance more growth than input subsidy programs. Study results suggest that a 1% increase in spending in ISPs and PSPs is associated with a 0.06% and 0.11% decrease in agricultural growth respectively, ceteris paribus

The study found a positive relationship between net trade and economic growth. As shown by the coefficient of 0.0841236 in table 4.9, a one percent increase in net trade results in a 0.08% rise in agricultural GDP, ceteris paribus. This result is consistent with both the Keynesian theory views and the work of Ahmad (2013) who found a negative relationship between trade deficit and economic growth. An increase in the trade balance of a country can boost production by domestic producers, thus, enhancing economic development.

In the case of Zambia, private investment had no significant impact on long-run growth. The study applied the Durbin-Watson test to examine the autocorrelation of errors in the regression equation. The Durbin-Watson statistic takes a range of 0 to 4. Values toward zero indicate negative autocorrelation while values approaching four indicate positive autocorrelation (Durbin and Watson, 1950). Table 4.9 shows the Durbin-Watson Statistical value of *1.371814* which is in the zone of

indecision with regard to the absence of autocorrelation in Zambia. The error correction term, which measures the speed of adjustment towards equilibrium, was -0.8705325 (table 4.9). This indicates that the system corrects its previous disequilibrium at the speed of 87%.

4.4.4.2 Results for Malawi

Table 4.10 below shows the results of the VECM model for Malawi. Malawi shows different results to Zambia with regard to the relationship between agricultural expenditure on research and growth. In table 4.10, the coefficient on agricultural research and extension (m_areL) is 13.53013. This means a 1% increase in expenditure to research and extension in Malawi is associated with a 13.53% increase in agricultural growth, ceteris paribus. The results found in this study support various studies that found spending on agricultural research positively related to agricultural growth. According to Stads and Beintema (2015), investing in agricultural research on new machinery and new improved seeds can have a positive influence on agricultural growth. The local farmers can improve their productivity if they adopt the use of the new technology thus enhancing agricultural growth in the future.

Table 4.10: Long run impact of agricultural spending types in agricultural growth in Malawi

beta	Coeff.	Std. Err.	T-statistic	Prob
lnARE	13.53013	1.067561	12.67	0.000***
lnISP	-5.956627	0.3683292	-16.17	0.000***
lnIDP	4.173023	0.360661	11.57	0.000***
lnPSP	4.329918	0.3983421	10.77	0.000***
lnI	-28.67216	1.818189	-15.77	0.000***
_cons	0.0934758	0.1592946	0.59	0.557

R-squared = 0.5297 chi2 (25) 400.94 prob> chi2 = 0.0000

Durbin-Watson statistical value = 2.212307 U(-1) = -0.0110744

Source: Calculations from own study

In table 4.10, there is a positive relationship between agricultural growth and PSPs, while ISPs show a negative influence on agricultural growth. A 1% increase in PSP spending results in a 4.33% increase in growth while a 1% increase in ISP spending is associated with a 5.96% decrease in growth, ceteris paribus. This shows that for Malawi economy, spending on price supports is more growth-

enhancing than spending on subsidy programs. Even though price supports are associated with crowding out of investment, in the case of Malawi they tend to enhance growth. When the government continues to purchase subsidized crops, the local farmers will increase their production. In addition, they will diversify and invest their profits in other non-agricultural activities. Therefore, the farmers become less dependent on the government in the future thus improving the agricultural growth.

Surprisingly, the study found a negative relationship between private investment and agricultural growth. This is in contrary to a vast of studies that have associated private spending with a positive influence on growth (Khan and Reinhart, 1989). In this study, a one percent increase in private investment results in a 28.7% decline in agricultural growth, all else being constant. The study found no significant relationship between the net trade balance of the economy and long run agricultural growth. Similar to Zambia, infrastructure spending in Malawi has a positive influence on agricultural growth. Table 4.10 depicts a coefficient of 4.173023 on the infrastructure variable (lnIDP). This means a one percent increase in infrastructure spending is associated with a 4.17% increase in agricultural growth, ceteris paribus.

The Durbin-Watson statistical value was 2.21 (see table 4.10) indicating the absence of autocorrelation in the residuals. Table 4.10 above reports a significant and error correction term of -0.011, suggesting that the speed of adjustment towards the long-run equilibrium state is 1.1%.

4.4.4.3 Results for South Africa

Table 4.11: Long run impact of agricultural spending on agricultural growth in SA

beta	Coeff.	Std. Err.	T-statistic	Prob
lnCASP	0.2947622	0.0237711	15.77	0.000***
lnIDP	-0.2627922	0.0122587	-46.18	0.000***
lnAE	0.097157	0.0153459	22.68	0.000***
lnAR	1.026163	0.1107268	5.51	0.000***
lnI	-1.229426	0.7071569	-1.74	0.082*
_cons	-5.702338			

R-squared = 0.6729 chi2 (248.96) prob>chi2 = 0.0000

Durbin-Watson statistical value = 1.650401 U(-1)= -5.224493

Source: Calculations from own study

The VECM model used to analyze data on South Africa found the net trade variable to be insignificant. Similar to Malawi, the study results indicated a negative relationship between growth and private investment (lnI). Increasing private investment by a one percent results in a decline in agricultural growth by 1.2%, ceteris paribus. This is opposite to various studies that have suggested a positive relationship between private investment and growth. A study by Benin et al (2009) on public spending and agricultural growth in Ghana found private farm investment to influence agricultural productivity positively.

Surprisingly spending on infrastructure in South African has a negative relationship with agricultural growth as shown in table 4.11 above. A one percent increase in infrastructure spending results in a decline in growth by 0.29%. According to Devarajan et al (1996:322), if there is a negative relationship between a component of spending and economic growth, it does not necessarily mean that the expenditure is unproductive. This might mean that the growth is taking time to respond to the changes in infrastructure spending. Grier and Tullock (1989) also suggested that the convergence phenomenon exists where wealthier countries are associated with a lower future growth rate because of diminishing returns to investment, in our case, investment on infrastructure development in South Africa. Mourmouras and Lee, (1999) also mentioned that increasing spending on infrastructure can enhance growth up to a certain optimum point until the reverse effects start to be witnessed in the long run.

The study found a positive relationship between spending on CASP and agricultural growth (table 4.11). CASP provides various support services to smallholder farmers and the beneficiaries of land reform. These services ensure that the farmers have access to inputs, infrastructure as well as to markets necessary to increase their productivity hence improve agricultural growth. A 1% increase in spending on CASP is associated with a 0.29% increase in agricultural growth, ceteris paribus. Similar to the results found in Malawi, spending on agricultural research in South Africa positively enhances growth. An increase in research expenditure by 1% results in an increase in growth by 1.02%.

Agricultural extension is a vital instrument to enhance agricultural productivity for the farmers. According to Bravo-Ureta et al (2007), education and extension services are critical especially for the smallholder farmers if they are to make efficient use of the given latest technologies. As expected, the results report a positive relationship between spending on extension (lnAE) and agricultural growth. A one percent increase in agricultural extension in South Africa is accompanied by a 0.1% increase in agricultural growth, all other factors being constant. The results of this study are consistent

with the results of Dercon et al., (2009) and Elias et al., (2013) who both associated investment in agricultural extension services with a significant positive influence on productivity and growth in agriculture.

There was no autocorrelation in the residuals as indicated by the Durbin-Watson statistical value of 1.65. Table 4.11 above reports an error correction term of -5.224493 in South Africa. The system corrects its previous disequilibrium at the speed of 522%, which is faster than all the other countries examined in this study.

4.4.4.4 Results for Tanzania

Table 4.12: Long run impact of agricultural spending on agricultural growth in Tanzania.

beta	Coeff.	Std. Err.	T-statistic	Prob
lnISP	-0.0750953	0.0017467	-42.99	0.000***
lnARE	0.006048	0.0003668	16.49	0.000***
lnIDP	-0.11696	0.0006637	-17.62	0.000***
lnI	0.2901464	0.092806	3.13	0.002***
lnNT	0.0149096	0.0021434	6.96	0.000***
_cons	-0.1128724	0.0105581	-10.69	0.000

R-squared = 0.2694 chi2 (25) = 89609.89 (Prob > chi2 = 0.0000)

Durbin-Watson statistical value = 1.7414761 U(-1) = -0.4511371

Source: Calculations from own study

The VECM results on Tanzania showed a positive relationship between trade balance and agricultural growth as seen in the case of Zambia. This outcome is consistent with the results of a study by Balassa (1978). The coefficient of 0.0149096 on the net trade balance variable (lnNT) in table 4.12 means that for every one percent increase in net trade, agricultural growth increases by 0.01% on average, ceteris paribus. While various studies found similar results, a study by Silwal (2008) found contradictory results whereby trade balance had no significant relationship with economic growth. As depicted by table 4.12, the sign on input subsidy variable (lnISP) was negative as expected. Classical economists associate spending on input subsidy programs with a decrease in agricultural

growth in the long-run. In Tanzania, a one percent increase in expenditure to subsidy programs results in a decrease in agricultural growth by 0.08% on average, ceteris paribus.

Similar to the case of South Africa, spending on infrastructure development in Tanzania decreases long run growth in agriculture. A one percent increase in expenditure on infrastructures is associated with a 0.12% decline in agricultural growth (see table 4.12 above). This result might be due to excess spending by the government on infrastructure development at the expense of other productive expenditures, resulting in diminishing returns. According to Devarajan et al (1996), expenditures which are normally considered to be productive could become unproductive if they are used in excess. The study results in Tanzania also indicated a significant positive relationship between agricultural growth and both agricultural research and private investment. The Durbin-Watson statistical value was 1.74 and being closer to two, this indicates the absence of autocorrelation. Table 4.12 above illustrates the error correction term, which is significant and having a negative value. The system adjusts to the long run equilibrium state at the speed of 45.1%.

4.5 Summary and Conclusion

This chapter examined the results of the analysis done in this study. Firstly, the descriptive results were given in which the trends in GDP, private investment and trade balance since 2000 were explained. This chapter also analyzed the difference that exists between the actual amounts released by the governments and the budgeted estimates. This mismatch existed in all the four countries proving evidence that governments often divert their funds or reallocate the money to other sectors. Finally, the error correction model was used to analyze the effects of each agricultural spending type on growth. The different results witnessed across these countries indicates that relationship between agricultural spending and growth is sensitive to the region of study as well as the environment conditions. Table 4.13 below shows a summary of the significant slope coefficients for each country under this study.

Table 4.13: A Summary of Empirical results

Country	Variable	Coefficient
Zambia	Agricultural research Programs	-0.0436328
	Infrastructure Development Programs	0.0405539
	Input Subsidy Programs	-0.0609056
	Price Support Programs	-0.1071801
	Net Trade	0.0841236
Malawi	Agricultural research and Extension	13.53013
	Infrastructure Development Programs	4.173023
	Input Subsidy Programs	-5.956627
	Price Support Programs	4.329918
	Private Investment	-28.67216
South Africa	CASP	0.2947622
	Infrastructure Development Programs	-0.2627922
	Agricultural Extension	0.097157
	Agricultural Research	1.026163
	Private Investment	-1.229426
Tanzania	Agricultural research and Extension	0.006048
	Infrastructure Development Programs	-0.11696
	Input Subsidy Programs	-0.0750953
	Private Investment	0.2901464
	Net Trade	0.0149096

Source: Own Study Results

CHAPTER 5 : SUMMARY, CONCLUSION AND POLICY IMPLICATIONS

The first objective of the study was to examine the trends in agricultural expenditures using time series data from 2000 to 2014. This involved determining if the countries were meeting the 10% mark set by CAADP in 2003 as indicated by their different shares of expenditure to the agricultural sector. As seen in Section 1.3 of the study, only Malawi managed to surpass the 10% share among the four countries. This success was attributed to its strong input subsidy program, which gave a boost to its economy in early 2000. The Malawi Miracle of 2005, which transformed the country into a major exporter, resulted in the government being even more involved in the agricultural sector through spending excessive amounts, especially on the subsidies. The success by Malawi motivated other countries including Zambia and Tanzania, which began increasing their expenditures to the agricultural sector.

The government of Zambia increased its percentage share of expenditures to agriculture since 2000 indicating its commitment towards meeting the CAADP goals. The year 2011 saw Zambia exceeding the 10% mark, with a maximum percentage share of 14%. On the other hand, Tanzania and South Africa reflected unsatisfactory results as their percentage shares were far below the 10% target. This poses questions on their commitment towards achieving the goals of the CAADP process. Given the importance of agriculture investment to the economies of developing countries, the study recommends an improvement by these countries in terms of their spending commitments to the sector. According to Fan and Rao (2003), with the recent increase in world food prices that severely threatens both the rural and urban consumers, it is imperative that African governments enhance their spending on agriculture. This will ensure increased agricultural productivity at the same time ensuring a long-term supply of affordable food to the poor communities.

Under the first objective, the study also examined the trends in agricultural expenditures to different sub-sectors from 2000 to 2014. One of the important questions the study aimed to answer was; how do these governments allocate their total agricultural spending? It is important to understand how these governments prioritize their total agricultural spending. As seen in section 3.5 on country reports and data description, these countries prioritize their expenditures differently depending on the needs of their economies. Results indicated that ISPs received more attention than any other sector in Zambia and Malawi for the period 2000 to 2014. Unlike these two countries, the government of Tanzania has been on the same side with the economists who associate infrastructure investment with more growth to the economy than subsidies. The trends in Tanzania showed infrastructure development receiving more funds than input subsidies and research since 2000.

Even though Zambia and Malawi both paid more attention to ISPs, results also showed that the two countries had different interests when it comes to other sub-sectors. Zambia has been disbursing more funds to the FRA that is responsible for the purchase of maize from farmers. However, Malawi has not been giving much concern on ADMARC that plays a similar role. The PSP in Zambia received the second priority in terms of spending while having the least priority in Malawi. The disaggregation of spending in South Africa was a bit different from the other countries. The study examined the trends in spending towards CASP, which has been receiving a significant amount of funds from the budget. The government of South Africa has been giving more priority on agricultural research in earlier years until recently in 2009 when it shifted its attention to focus more on CASP. Infrastructure development and extension programs in South Africa received the least priority in their expenditures for the study period.

The second objective of the study was to analyze the mismatch that exists between actual expenditures and allocated expenditures in these four countries. The study found deviations between the actual amounts and the allocated amounts in all the four countries. This is because in most cases these countries do not focus on the priority sectors in their budget process. Therefore, when releasing the funds, they tend to deviate from the budget allocated amounts to ensure adequate investment in the major priority sectors. The results in chapter 4 of this study showed both Zambia and Malawi spending more than the budget estimates. On the other hand, the government of South Africa only started spending more than the amounts allocated in the budgets after 2003.

The study also regarded unrealistic budget estimates, as one of the reasons behind the mismatch in values. Unrealistic budget amounts have been common among African countries including Tanzania. As seen in section 4.3 of the study, the government of Tanzania has been spending less money than the budgeted amounts from 2000 to 2014 because of unrealistic budget estimates. This mismatch between the budget allocated amounts and the actual amounts released makes it difficult to plan and predict future policies for African countries. Therefore, the study recommends proper planning for the part of governments before carrying out the budget process to ensure proper targeting of the major priority areas that requires more funding.

The third objective, which was the main aim of the study, was to compare the impact of different types of agricultural expenditures on agricultural growth in Zambia, Malawi, South Africa and Tanzania. As the countries are aiming towards meeting the 10% mark set by CAADP in 2003, there is a need for proper and efficient targeting to ensure more growth-enhancing sub-sectors receive more funds. Before analysis, the study first tested for stationarity in variables using the ADF unit root test. After differencing the non-stationary variables, the study went on to test for co-integration. Because

of the presence of co-integration, the study regarded the error correction model as the suitable estimation technique because it adjusts to both short-run changes in variables and deviations from long-run equilibrium. The study found different results for each country hence different recommendations were given.

In Malawi, the study found agricultural growth to increase by 13% for every one percent change in agricultural research, which was comparable to 4.33%, and 4.17% increases in growth associated with one percentage change in PSPs and IDPs, respectively. This indicated that agricultural research in Malawi is more growth-enhancing than any other component of spending. However, the study found some conflict between the regression results and the trends in the composition of agricultural expenditures since 2000. Even though agricultural research enhances more growth, the trends illustrated in figure 3.2 showed the sub-sector receiving only third priority in terms of its share of agricultural expenditure among the four sub-sectors.

On the other hand, the analysis found a negative relationship between ISPs and long run growth in agriculture but from the trends in figure 3.2, subsidy programs received more priority from the government of Malawi. This conflict between the regression results and government targeting indicates a misallocation of funds by the government. The study recommends the government of Malawi to shift its funds from programs such as ISPs towards more growth enhancing sectors such as agricultural research.

Contrary to Malawi, agricultural research in Zambia had a negative relationship with agricultural growth. This result suggests the sensitivity of the relationship between growth and public expenditure types to the region under study. Both ISPs and PSPs had a negative influence on agricultural growth confirming the conclusions of various studies and theories such as classical economics, which associated these two types of government intervention with a decline in economic growth. Surprisingly, from the trends shown in figure 3.1 in chapter 3 of the study, the government of Zambia has been disbursing more funds towards these two sub-sectors than any other sub-sector. Similar to Malawi, there seem to be some misallocation of funds in Zambia in favor of sub-sectors associated with a decline in growth.

Moreover, study results indicated a positive relationship between infrastructure development and agricultural growth. Therefore, the study recommends the government of Zambia to change its spending priorities. Higher agricultural growth can be achieved in Zambia if more growth-enhancing areas such infrastructure development receives higher priority while less money is spent on FSPs and PSPs. With respect to agricultural research, the study further recommends more education to the farmers so they can adopt new technologies brought by research. It is also import to make sure that

research methods introduced are relevant and appropriate to the country's conditions in which they are being introduced.

The regression results for South Africa indicated that a one percent increase in agricultural research expenditure is associated with a 1.03% increase in agricultural growth while a one percent increase in CASP spending results in a 0.29% increase in growth. This means spending on agricultural research is more growth-enhancing than spending on the CASP program. Unlike Zambia and Malawi, the study results from the regression in South Africa complimented with how the government has been prioritizing its spending for the period 2000 to 2014. During the early years, agricultural research was dominating having the largest share of spending among all the other areas of spending. However, the government shifted its priorities and paid more attention on CASP since 2009. This post-settlement support to the targeted beneficiaries of land reform through CASP is expected to bring various benefits. These include improved equality in land ownership, promotion of farm efficiency, improved wealth creation in the rural areas and increased sustainable employment.

Private investment in South Africa had a positive impact on agricultural growth in this study, while other countries showed insignificant results. The results found in South Africa confirms the literature, which has pointed out the importance of both private and public investment to the growth of the economy. In order to achieve the inclusive growth in the sector, there is a need for effective policies and adequate regulations that will ensure a positive environment for both private and public investment. Even though private investment had a positive effect on agricultural GDP, the study results considered other investment areas to be more growth-enhancing, except for spending on infrastructure that had negative results. A one percent increase in private investment only resulted in a 0.08% rise in agricultural growth, which was less than the 0.1% growth impact that resulted from extension expenditure in South Africa.

The study found a positive relationship between agricultural growth in Tanzania and agricultural research expenditures, private investment and trade balance. However, the results also indicated that private investment is more growth-enhancing than both the net trade of the economy and agricultural research expenditures. A one percent increase in private investment results in a rise in agricultural growth by 0.29%, which is above the 0.006%% and 0.01% growth impact caused by agricultural research expenditure and trade balance, respectively. Even though the increase in net exports in Tanzanian stimulates economic development, figure 4.3 in chapter 4 above displayed lower values of net trade between 2000 and 2014. These results indicate much trade restrictions on exports in the country. The government of Tanzania has banned the exportation of various commodities such as maize on several occasions since the 1980s (Makombe and Kropp, 2016). Therefore, the study

recommends the government of Tanzania to increase its trade balance by removing bans on exportation to achieve higher growth in the future.

Further recommendations from this study are provided below:

The study recognized unavailability of accurate data as one of the reasons behind the conflicting results among the various studies involving the incidence of government spending. Lack of reliable and accurate data can be a serious hindrance to implementation projects that can end both poverty and hunger in the continent. Therefore, the study further recommended an improvement on data availability for the part of governments and Ministries of finance. An improvement in fiscal transparency will ensure more efficient targeting and provision of financial resources in the future.

The study considered only four countries for analysis due to the availability of data in these countries. The findings in this study revealed that the agricultural spending types influence growth differently from country to country. Therefore, it would be inaccurate to apply the recommendations given for the countries in this study to another country. It is recommended that future studies include even more countries in their analysis. Cross-country analysis will make easier for governments to prioritize their spending to relevant sectors of the economy thus improving growth and tackling poverty in the continent.

Time series analysis is sensitive to the number of years used in the model and results that are more effective can be achieved if more years are considered in the model. Once again, data availability limited the number of years considered in this study to period 2000 to 2014. However, governments are now improving their fiscal transparency and providing more data on actual amounts of money released. Therefore, it will be more effective for future studies to consider more years in their analysis.

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APPENDICES

Appendix A: **Government expenditures in the four countries in Local currencies.**

Appendix A1: **Government expenditure in Zambia (ZMK Millions) from 2000 to 2014.**

Year	Agriculture Expenditure	National Expenditure	Agriculture Expenditure	National Expenditure
	Budgeted Estimates		Actual Amounts Released	
2000/2001	141.14	3,122.00	211.80	2,406.82
2001/2002	189.617	4,212.00	409.00	6,704.92
2002/2003	440.18	5,172.00	301.50	5,688.68
2003/2004	561.89	6,338.00	542.00	8,885.25
2004/2005	367.53	6,999.00	563.30	9,234.43
2005/2006	465.00	8,845.70	677.40	9,408.30
2006/2007	650.00	8,618.10	826.20	8,696.84
2007/2008	1,300.00	10,720.10	1,064.80	8,518.40
2008/2009	900.00	10,702.60	800.50	8,338.54
2009/2010	1,190.00	14,690.10	1,096.30	12,897.65
2010/2011	1,200.00	15,000.30	1,139.00	9,904.35
2011/2012	1,231.60	20,041.20	3,000.00	21,740.00
2012/2013	1,698.00	27,636.07	2,300.00	28,750.00
2013/2014*[12]	1,865.40	32,200.00	1,865.40	32,200.00
2014/2015*	3,080.00	42,600.00	3,080.00	42,600.00

Source: Budget Reports (2007-2014), budget speeches (2000-2014) obtained from MoF and National Assembly of Zambia; Govereh et al (2009).

[12] Actual expenditures released by the government were used in the study. The asterisk (*) represent years in which budget estimates were used.

Appendix A2: **Government expenditures in Malawi (MK Millions) from 2000 to 2014.**

Year	Agriculture Expenditure	National Expenditure	Agriculture Expenditure	National Expenditure
	Budgeted Estimates		Actual Amounts Released	
2000/2001	1,513.00	37,828.00	1,449.80	37,226.40
2001/2002	1,835.00	45,875.00	1,398.00	42,490.30
2002/2003	2,489.00	45,262.00	2,130.00	61,260.30
2003/2004	1,700.00	56,800.00	2,345.20	80,536.30
2004/2005	8,230.00	85,600.00	6,666.00	96,625.00
2005/2006	12,559.00	119,500.00	22,505.00	132,000.00
2006/2007	16,817.00	139,900.00	21,126.50	163,009.00
2007/2008	21,000.00	173,595.00	48,681.00	180,300.00
2008/2009	32,200.00	229,241.00	53,676.00	268,380.00
2009/2010	33,540.00	257,100.00	46,658.00	274,460.00
2010/2011	32,000.00	297,000.00	55,440.00	308,000.00
2011/2012	38,300.00	304,000.00	46,067.50	368,540.00
2012/2013	68,000.00	406,080.00	85,839.06	526,620.00
2013/2014	118,000.00	638,200.00	138,200.00	656,213.00
2014/2015	142,000.00	742,700.00	157,069.33	799,742.00

Source: Budget statements (2006-2014) obtained from MoF in Malawi, budget speeches (2000-2005) obtained from SARPN, Public Expenditure Review (2000-2012) from World Bank (2013), and Dorward and Chirwa (2011).

Appendix A3: **Government expenditures in South Africa (ZAR Millions) from 2000 to 2014.**

Year	Agriculture Expenditure	National Expenditure	Agriculture Expenditure	National Expenditure
	Budgeted Estimates		Actual Amounts Released	
2000/2001	723.60	233,452.20	741.30	342,832.50
2001/2002	775.20	258,317.70	899.50	384,003.20
2002/2003	940.70	287,909.10	957.30	398,841.40
2003/2004	1,110.20	492,960.60	1,261.20	451,382.30
2004/2005	1,533.30	550,033.70	1,755.20	506,970.60
2005/2006	1,974.70	627,092.10	2,319.00	571,051.50
2006/2007	2,302.10	694,404.30	2,625.10	649,063.30
2007/2008	2,742.90	736,638.40	4,718.90	746,111.70
2008/2009	3,118.60	849,172.20	4,462.90	879,805.20
2009/2010	3,669.60	1,023,082.20	4,935.50	1,040,360.60
2010/2011	4,206.00	1,102,058.70	4,955.70	1,128,800.90
2011/2012	6,206.80	1,246,851.90	6,586.80	1,245,735.90
2012/2013	7,865.30	1,353,852.90	7,875.60	1,346,424.20
2013/2014	8,325.50	1,469,226.60	8,259.90	1,458,330.80
2014/2015	9,081.50	1,586,985.50	8,991.10	1,571,581.60

Source: National budget reviews (2000-2014), budget speeches and budget highlights (2000-2014) obtained from the Department of National Treasury, South Africa.

Appendix A4: **Government expenditures in Tanzania (Tshs Millions) from 2000 to 2014.**

Year	Agriculture Expenditure	National Expenditure	Agriculture Expenditure	National Expenditure
	Budgeted Estimates		Actual Amounts Released	
2000/2001	19,100.00	1,257,600.00	28,800.00	1,315,000.00
2001/2002	52,100.00	1,764,740.00	25,600.00	1,522,000.00
2002/2003	84,500.00	2,219,200.00	34,800.00	1,990,000.00
2003/2004	148,600.00	2,607,200.00	73,000.00	2,528,000.00
2004/2005	157,700.00	3,347,500.00	64,500.00	3,240,000.00
2005/2006	233,300.00	4,035,100.00	133,500.00	3,895,000.00
2006/2007	276,600.00	4,788,500.00	123,100.00	4,702,000.00
2007/2008	372,400.00	6,000,000.00	293,902.00	5,998,000.00
2008/2009	440,100.00	7,216,100.00	290,136.00	6,908,000.00
2009/2010	666,900.00	9,516,700.00	465,416.00	8,311,000.00
2010/2011	903,800.00	11,590,400.00	638,900.00	9,439,000.00
2011/2012	926,200.00	13,525,300.00	455,900.00	10,767,000.00
2012/2013	1,103,600.00	15,192,000.00	560,100.00	13,740,000.00
2013/2014*[13]	908,100.00	18,249,000.00	908,100.00	18,249,000.00
2014/2015*	1,084,700.00	19,649,490.00	1,084,700.00	19,649,490.00

Source: budget speeches (2001-2014), citizens' budget (2011-2014), budget digest (2004-2010), Medium Term Budget Framework (2009-2014) obtained from MoF in Tanzania and Public Expenditure Reviews (2000-2013) by World Bank (2014).

[13] * Shows the years in which budget estimates were used in the analysis.

Appendix B: **Percentage Shares expenditure to Agriculture across the four countries**

Year	**Percentage Allocations**				**Percentage Outcomes**			
	Zambia	Malawi	SA	Tanzania	Zambia	Malawi	SA	Tanzania
2000/2001	4.52%	4.00%	0.31%	1.52%	8.80%	3.89%	0.22%	2.19%
2001/2002	4.50%	4.00%	0.30%	2.95%	6.10%	3.29%	0.23%	1.68%
2002/2003	8.51%	5.50%	0.33%	3.81%	5.30%	3.48%	0.24%	1.75%
2003/2004	8.87%	2.99%	0.23%	5.70%	6.10%	2.91%	0.28%	2.89%
2004/2005	5.25%	9.61%	0.28%	4.71%	6.10%	6.90%	0.35%	1.99%
2005/2006	5.26%	10.51%	0.31%	5.78%	7.20%	17.05%	0.41%	3.43%
2006/2007	7.54%	12.02%	0.33%	5.78%	9.50%	12.96%	0.40%	2.62%
2007/2008	12.13%	12.10%	0.37%	6.21%	12.50%	27.00%	0.63%	4.90%
2008/2009	8.41%	14.05%	0.37%	6.10%	9.60%	20.00%	0.51%	4.20%
2009/2010	8.10%	13.05%	0.36%	7.01%	8.50%	17.00%	0.47%	5.60%
2010/2011	8.00%	10.77%	0.38%	7.80%	11.50%	18.00%	0.44%	6.77%
2011/2012	6.15%	12.60%	0.50%	6.85%	13.80%	12.50%	0.53%	4.23%
2012/2013	6.14%	16.75%	0.58%	7.26%	8.00%	16.30%	0.58%	4.08%
2013/2014	5.79%	18.49%	0.57%	4.98%	5.79% *	21.06%	0.57%	4.98% *
2014/2015	7.23%	19.12%	0.57%	5.52%	7.23% *	19.64%	0.57%	5.52% *

Source: Calculated using data from different Ministries of Finance in the four countries.

Appendix C: **Agricultural expenditures across the four countries in international dollars.**

Year	Zambia Agricultural Expenditure	Malawi Agricultural Expenditure	SA Agricultural Expenditure	Tanzania Agricultural Expenditure
	2005 International Dollars, Millions			
2000	349.71	194.15	449.26	124.23
2001	538.82	149.03	506.44	104.86
2002	332.69	140.02	480.35	133.09
2003	508.52	140.71	598.19	257.44
2004	441.47	346.56	781.48	212.54
2005	455.11	1,054.32	979.15	347.86
2006	484.61	777.40	1,042.96	275.40
2007	552.85	1,628.60	1,722.41	620.67
2008	375.66	1,652.67	1,496.78	528.49
2009	487.37	1,325.59	1,539.73	775.89
2010	444.36	1,466.79	1,453.71	974.95
2011	1,048.90	1,173.00	1,811.67	623.69
2012	771.25	1,856.97	2,052.98	691.91
2013	592.09	2,347.64	2,031.56	1,041.85
2014	900.54	2,206.02	2,090.10	1,188.89

Source: Calculated using Budget Reports from Ministries of Finance in the four countries.

Appendix D: **2005 Purchasing Power Parity Exchange Rates**

Country	PPP Exchange rates
Zambia	2,563.23
Malawi	35.20
Tanzania	473.52
South Africa	3.41
Kenya	19.03

Source: World Bank Indicators (2015)

Appendix E: **Implicit GDP Deflators across the four countries (%)**

Year	Zambia	Malawi	SA GDP	Tanzania
2000	23.63	21.22	48.40	48.96
2001	29.61	26.65	52.10	51.56
2002	35.36	43.22	58.46	55.22
2003	41.58	47.35	61.85	59.88
2004	49.78	54.65	65.88	64.09
2005	58.07	60.64	69.47	81.05
2006	66.51	77.21	73.83	94.40
2007	75.14	84.92	80.37	100.00
2008	83.14	92.27	87.46	115.94
2009	87.76	100.00	94.03	126.68
2010	100.00	107.38	100.00	138.39
2011	111.58	111.58	106.65	154.37
2012	116.34	131.33	112.53	170.95
2013	122.91	167.25	119.27	184.07
2014	133.43	202.28	126.19	192.67

Source: World Bank Indicators (2015)

Appendix F: **Agricultural GDP across the four countries.**

Year	ZAMBIA	MALAWI	SA	TANZANIA
2000	1419,77	1267,73	6407,55	4114,11
2001	1428,58	1175,99	6582,84	4360,86
2002	1414,47	1238,98	6824,28	4527,21
2003	1487,00	1276,10	7025,52	4682,88
2004	1499,20	1309,86	4897,02	4881,14
2005	1507,50	1206,44	5155,44	5240,88
2006	1525,09	1224,87	5444,32	5401,09
2007	1538,57	1342,46	5736,16	5580,47
2008	1625,98	1399,86	5919,20	5952,37
2009	1730,09	1467,53	5828,16	6411,05
2010	1861,93	1516,13	6005,32	6541,48
2011	1989,21	1667,72	6198,24	6630,38
2012	2134,76	1589,63	6335,84	6966,03
2013	1914,54	1733,04	6476,00	7234,01
2014	2597,93	1374,08	6573,60	7104,12

Source: World Bank Indicators (2015) [14]

[14] Value Added (US$ Millions Constant 2005 prices) was used as a measure of agricultural GDP growth.

Appendix G: **Private Investment across the four countries**[15]

Years	Zambia	Malawi	S. Africa	Tanzania
2000	5 410,56	2 515,41	44 542,19	20 180,85
2001	5 503,24	2 521,15	44 397,36	20 570,45
2002	5 794,47	2 534,22	44 019,08	21 007,97
2003	5 948,61	2 567,71	43 785,21	21 574,92
2004	5 853,10	2 669,59	43 575,58	21 480,76
2005	5 940,06	2 726,61	43 837,10	21 624,37
2006	5 937,50	2 856,94	43 404,09	21 717,87
2007	5 986,63	3 125,05	43 831,85	21 893,76
2008	6 708,62	3 390,68	43 612,69	22 156,49
2009	6 673,67	3 677,19	44 266,88	22 307,15
2010	7 170,85	3 508,04	44 156,21	22 409,76
2011	7 708,67	2 410,02	44 093,07	22 575,59
2012	8 171,19	2 865,52	43 985,92	22 774,26
2013	8 757,29	3 481,61	43 800,74	23 024,78
2014	8 820,69	4 247,56	43 765,70	23 080,04

Source: (FAO, 2015)

[15] Gross Fixed Capital Formation (constant 2005 prices - Million US$) was used as a proxy for private investment.

Appendix H: **Net Trade Balance (millions USD-real terms) in the four countries.**

Zambia	Malawi	SA	Tanzania
6,10	1793,73	1569,06	241,41
169,36	1055,22	2540,96	191,48
153,25	404,72	2157,03	316,11
44,76	485,28	2456,93	249,17
195,86	390,45	1883,77	219,84
78,95	382,09	2444,52	397,12
112,07	403,44	1196,68	106,65
295,73	624,10	241,09	86,22
56,55	499,73	1252,17	321,96
95,17	779,16	1494,48	257,31
158,03	522,64	2877,93	161,83
325,84	629,71	2000,47	51,82
785,43	322,02	1243,29	197,60
682,20	276,05	2191,90	183,52
337,80	375,52	2620,70	226,83

Source: Calculated using export and import values from International Trade Centre (ITC, 2015).