Public spending on agriculture and its effects on unemployment in sub-Saharan Africa

by

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DECLARATION

I, Brown Chitekwere, declare that the dissertation, which I hereby submit for the degree MSc Agricultural Economics at the University of Pretoria, is my own work and has not been submitted for a degree at this or any other tertiary institution.

20th April 2021

Signature Date

DEDICATION

I dedicate this dissertation to my late mum, Flossy Chekani who worked very hard to make sure I am who I am today. Mum, this one is for you.

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ABSTRACT

Unemployment has social, health and economic consequences. As such, reducing unemployment to its minimum is a policy goal in every economy. Sub-Saharan Africa has the fastest-growing, young population which is expected to bulge the labour force and increase unemployment in the decade to come. It is, therefore, important for governments to think of ways of creating employment in the region. Expansionary fiscal policies suggest that increased public expenditure helps in creating employment. Agriculture is one of the key contributors to the gross domestic product in the sub-Saharan region. Most countries have committed to increasing public agriculture spending through the Comprehensive African Agriculture Development Programme (CAADP) and its declarations such as Maputo and Malabo where African leaders agreed to allocate at least 10 percent of the total budget to agriculture. Even though most of the countries have not honoured the declarations by allocating less than 10 percent, public spending on agriculture (in absolute numbers) has improved substantially in the region. However, despite the increase in public agricultural spending in the region, the evaluation of the effects of public agricultural spending on unemployment remains scanty.

The study, therefore, analysed the dynamic effects of public agricultural spending on unemployment in sub-Saharan Africa. Since the countries are heterogeneous in terms of their reliance on agriculture, the study also compared the effects of public agricultural spending on

unemployment between agriculture-based and non-agriculture-based countries. The data used were a panel of 19 sub-Saharan African countries for the period from 2001 to 2018 and were obtained from the Comprehensive African Agriculture Development Program (CAADP) - managed Region Strategic Analysis and Knowledge Support System (ReSAKSS) and the World Bank. The dynamic fixed effects and the Generalized Method of Moments (GMM) result indicated that public agriculture spending reduces unemployment in sub-Saharan Africa. The study, however, found that the effect of public agricultural spending on unemployment reduction in sub-Saharan Africa is higher among agriculture-based economies than non-agriculture-based economies.

Following the differences in the effects, the study concludes that regional agricultural agreements might not be optimal in reaching the countries' targets. The regional agricultural agreements such as Maputo and Malabo may give different results based on the countries' inherent agricultural and macro-economic features. As such, the study recommends that countries in sub-Saharan Africa should pledge and set agricultural policies based on their inherent features related to agriculture and the macro-economy.

Keywords: Sub-Saharan Africa, Public agricultural spending, unemployment, GMM, Dynamic fixed effects model, Agriculture based countries.

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ARDL	Autoregressive Distributed Lag
CAADP	Comprehensive Africa Agriculture Development Programme
ECM	Error Correction Model
ECOWAS	Economic Community of West African States
FAO	Food Agriculture Organization
GDP	Gross Domestic Product
GLS	Generalized Least Squares
GMM	Generalized Methods of Moments
OLS	Ordinary Least Squares
OECD	Organization for Economic Co-operation and Development
SSA	Sub-Saharan Africa
USD	United States Dollar

CHAPTER 1: INTRODUCTION

1.1 Background

The relationships between public agricultural expenditure and the economy have already been discussed at length in sub-Saharan Africa (Akroyd and Smith, 2007). Among the most debated issues is the relationship between public agricultural spending and economic growth which has been studied extensively since the signing of the Maputo Declaration in 2003 (Ademola et al., 2013, Ndhleve et al., 2017, Ele et al., 2014). While most studies focus on the relationships between public agricultural spending and economic growth, those between agricultural spending and unemployment are also worthy of considerable attention.

Literature provides several channels through which public agricultural spending creates employment. Firstly, public agricultural spending increases economic growth (Ademola et al., 2013, Ndhleve et al., 2017). As such, there is a likelihood of it increasing employment because increased employment is an outcome of economic growth (Temitope, 2013, Qiong and Junhua, 2015). Again, agricultural spending on infrastructure, research and development, and subsidies increase productivity which may increase purchasing power and aggregate demand, thereby creating employment in the economy (Edeme et al., 2020, Mengoub, 2018, Yeboah and Jayne, 2018). Agricultural spending on agricultural infrastructure such as market structures, irrigation structures, dams attracts private investors that end up creating employment (Edeme et al., 2020). Further to that, spending on extension and agricultural loans may directly employ people in the agricultural sector as a lack of capital and knowledge is considered one of the factors that affect people's participation in the sector (Meyer, 2011, Deekor, 2019).

One of the major macroeconomic goals of any country is to reduce unemployment to its minimum because unemployment has social, health and economic implications (Kreishan, 2011). Socially, unemployment increases the crime rate as most unemployed people indulge themselves in activities such as drug and substance abuse which in turn increases crime (Nagelhout et al., 2017). On the same note, unemployment leads to poverty which then leads to health-related issues such as malnutrition (Wilson and Walker, 1993). When people are poor, they lack resources to purchase

food that may boost their nutrition status. Economically, unemployment reduces potential output and retards economic growth (Sögner and Stiassny, 2000). Sub-Saharan Africa has the fastest-growing and young population that is feared to bulge the labour force, and consequently increase unemployment in the next decade (OECD-FAO, 2016). As such, to avoid the feared increase in unemployment in the sub-Saharan region, there is a need to increase efforts in trying to create employment opportunities in the region.

1.2 Agriculture and agricultural spending in sub-Saharan Africa

SSA is a region that is heavily reliant on agriculture. On average, agriculture's contribution to GDP is about 15 percent with a minimum of three percent and a maximum of 50 percent (OECD-FAO, 2016). This is substantially higher compared to other regions where the average contribution is below five percent. Agriculture also serves as a source of livelihood to many households in the region as it employs more than half of the total labour force (Christiaensen and Brooks, 2018). Figure 1.1 below shows that agriculture contributes more to GDP in the Sub-Saharan region than the rest of the world.

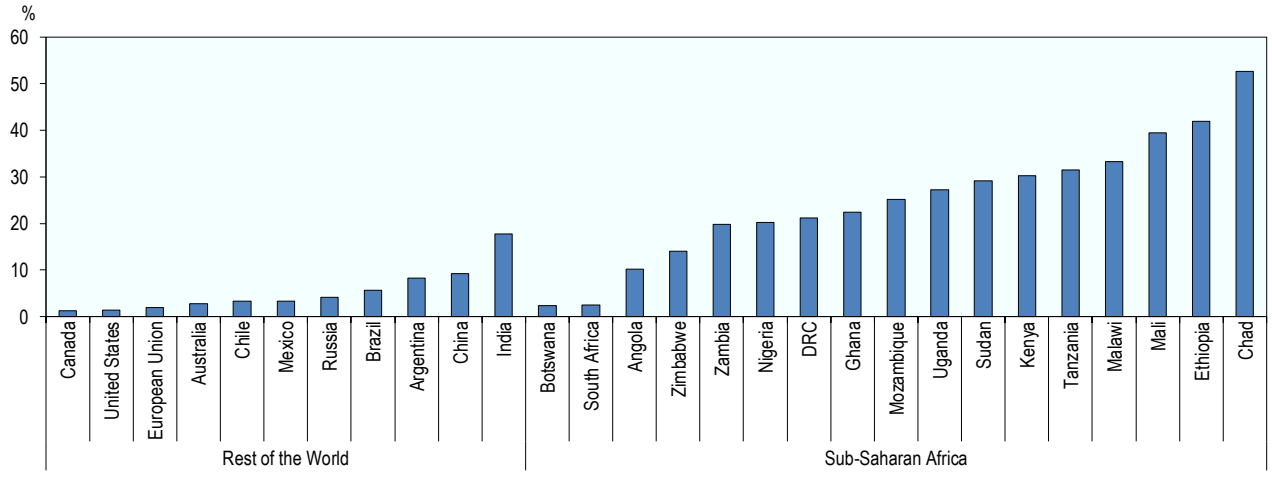

Figure 1.1: Agriculture as a share of GDP

Source: OECD-FAO (2016)

The importance of agriculture to the development of the Sub-Saharan region was acknowledged in 2003 where members of this region signed a declaration on agriculture and food security under the Comprehensive Africa Agriculture Development Programme (CAADP) in Maputo, Mozambique. In the declaration, African countries agreed to allocate 10 percent of their budgets to agriculture to achieve the annual agricultural GDP growth of above six percent (African Union, 2003). The implementation of the commitment has recorded a substantial increase in public expenditure on agriculture in the Sub-Saharan region. FAO (2019) indicated that four countries in SSA namely; Malawi, Ethiopia, Zambia and Togo were in the top ten public agricultural spenders in the world from 2012 – 2016 as shown in Figure 1.2 below.

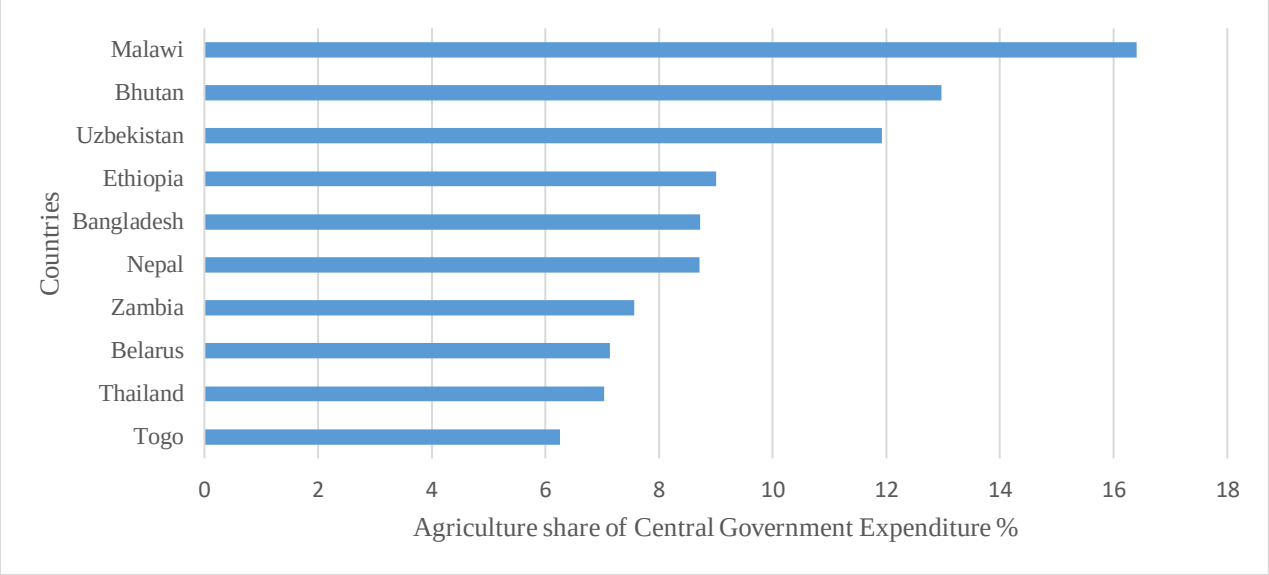

Figure 1.2: The top 10 spenders on Agriculture (2012-2016)

Source: FAO (2019)

The Maputo Declaration was reaffirmed in Malabo, Equatorial Guinee in 2014 where the African leaders went beyond the 2003 targets. The leaders defined a wider and more transformative agenda with clear commitments and employment creation was one of the areas that were emphasized (Badiane and Makombe, 2014). Other areas that were also emphasized include gender, trade, resilience, youth, and nutrition. As such, there is a need to analyze how increased public expenditures on agriculture are helping in realizing these committed areas.

1.3 Research Problem

Curbing unemployment is one of the main goals of macroeconomic policymakers. Sub-Saharan Africa has the largest number of unemployed people in Africa despite the unemployment rate being lower than in North Africa as shown in Table 1.1 below. Again, Table 1.1 illustrates that the number of unemployed people is increasing in sub-Saharan Africa. The region has the youngest and fastest-growing population which is projected to rapidly increase the labour force and the number of jobless people in the region. Christiaensen and Brooks (2018) predict a rise of new labour force entrants from 200 million in 2018 to 265 million by 2030 and 325 million by 2050. The question that beckons is where these new entrants will be employed, and what role can agriculture play in employment creation?

Table 1.1: Unemployment in Africa

	The unemployment rate, 2017-2020 (Percentages)				The unemployment 2017-2020 (Millions)			
	2017	2018	2019	2020	2017	2018	2019	2020
Africa	6.9	6.8	6.8	6.8	32.3	33.0	34.0	34.9
North Africa	11.9	11.8	11.8	11.7	8.7	8.8	9.0	91
Sub-Saharan Africa	5.9	5.9	5.9	5.9	23.6	24.2	25.0	25.9

Source: (International Labour Organization, 2019)

The expansionary fiscal policy is one of the ways that countries can follow to create jobs and combat unemployment as these policies increase aggregate demand which then leads to employment creation (Obayori, 2016). The expansionary fiscal policies involve two tools namely; increased government spending and reduced taxation. This study, however, focuses on government spending as a major fiscal policy tool. Government spending increases productivity (Chatterjee, 1995). Increased productivity in agriculture accumulates extra purchasing power among most families in agricultural dependent economies (Yeboah and Jayne, 2018). This creates multiplier effects on the rest of the economy and creates more jobs even in off-farm sectors

Following the Maputo and Malabo commitments made by the African countries in 2003 and 2014 to allocate 10 percent of their total budget towards agriculture, most countries in the sub-Saharan region have increased their spending on agriculture (Fontan Sers and Mughal, 2019). It is, therefore, important to empirically study the effects that public agricultural spending has had on unemployment across the sub-Saharan region. Christiaensen and Brooks (2018) stated that as countries develop, their economies move away from agriculture to other sectors such as service, construction, and manufacturing. As such, it is vital to evaluate the changes in the effects of public agricultural spending on unemployment over time as it will indicate the relevance of public agricultural spending in reducing unemployment in the future.

OECD-FAO (2016) indicated that the countries in the region are heterogeneous in terms of their reliance on agriculture. Whilst some countries heavily reliant on agriculture for over half of their Gross Domestic Product (GDP), other countries' contribution of agriculture to GDP is not substantial. It is, therefore, important to compare the effects of public agricultural spending on unemployment between countries that rely on agriculture to those countries that do not rely on agriculture. The disaggregation of the countries is important because it shall reduce the aggregation bias which would be rampant if the countries were aggregated.

1.4 Research Objectives

The overall objective is to analyze the effects of public agricultural spending on unemployment in SSA. Specifically, the study has the following objectives;

1. To determine the average effects of public agricultural spending on unemployment reduction in SSA in both short-run and long-run
2. To compare the effects of public agricultural spending on unemployment among countries based on the reliance on agriculture

1.5 Hypotheses

Public agricultural spending is hypothesized to reduce unemployment in both the short-run and the long run. Public agricultural spending which increases productivity would also raise incomes and increase aggregate demand. Increased aggregate demand, therefore, prompts investors from

all circles of the economy to produce more and this creates more labour demand, hence reducing cyclic unemployment. However, spending on research and development may take time to start producing results such as increasing productivity (Jambo, 2017). As such, there is also a likelihood of public agricultural spending creating employment in the long-run.

On a different note, there are existing heterogeneities among countries in terms of the role that agriculture plays in their economies (Van Arendonk, 2015, Christiaensen and Brooks, 2018). As such, the effects of public agricultural spending on unemployment may not be the same across the countries. The effect of public agricultural spending on unemployment is expected to be higher in countries that are highly dependent on agriculture than the other countries. Therefore, the study shall be guided by the hypotheses given in Table 1.2.

Table 1.2: Research objectives, hypothesis and methodological presentation

Research objectives	**Null hypotheses**	**Methodology**
To determine the average effects of public agricultural spending on unemployment reduction in SSA in both short-run and long-run	There are no significant effects of public agriculture spending on unemployment reduction in SSA in the short run and long run	The dynamic panel data models were used to address this objective.
To compare the effects of public agricultural spending on unemployment among countries depending on the reliance on agriculture	There are no significant differences in the effects of public agricultural spending on unemployment between agriculture-based and non-agriculture-based countries	To capture differences in the effects, the study created the dummy variable and multiplied it with public agricultural spending to create an interaction term. The interaction term was regressed in the dynamic panel data models

1.6 Significance of the study

In SSA, the effects of public agriculture spending on unemployment have received limited attention in the literature. Most studies have not analysed the relationship between public agricultural spending and unemployment, but rather the relationship between public agriculture spending and other variables such as output, productivity and economic growth. Again, most studies have looked at the effects of government spending in general or other sectors on unemployment but not the agricultural sector. As such, this provides a need to gauge the explicit empirical link between public agricultural spending and unemployment. Therefore, the empirical results of this study will provide a good source of information to various researchers on this subject. The study will also contribute to the empirical literature on the effects of public agricultural spending and unemployment in SSA.

In addition to the reasons above, understanding the effects of public agriculture spending on unemployment is vital for macroeconomic policymakers. Since, government spending is manageable, knowing the effects can help to know the extent to which the governments can allocate their budget to the agricultural sector to curb unemployment. According to the projections made by Christiaensen and Brooks (2018), the International Labour Organization (2019) and OECD-FAO (2016), unemployment is expected to increase steadily. As such, there is a need to plan and implement strategies for reducing it. Further to that, comparing the effects of public agriculture spending will help to reduce the bias which may result if the countries were aggregated.

1.7 Organization of the study

The study is organized into six chapters; Chapter one gives the general background to the study, research problem, objectives of the study, hypothesis, and the significance of the study. Chapter two focuses on the literature regarding pathways in which public spending creates employment, studies on public agricultural spending and the modelling of the nexus between public agricultural spending which is vital for gauging the gap and providing guidance on the methodology. Chapter three discusses the theories that link public agricultural spending and unemployment and discuss different research methods that have been used in the study. Chapter four presents the results of the empirical analysis of the effects of public agriculture spending on unemployment while

Chapter five presents the results of the comparison of the effects. Chapter six gives a summary, conclusion, recommendation of the study and suggests the areas that future research on the topic should focus on.

1.8 Limitations of the study

The study categorizes the countries into two different categories, and this contributed to reducing the aggregation bias which results from an analysis of countries' aggregated level. However, there may still be heterogeneities within the categories. Due to data limitations, the study has aggregated public agricultural spending which will be very hard for policymakers to know which form of public agricultural spending is more rewarding than the others. Initially, the study intended to consider comparing the effects among countries and disaggregating the forms of public agricultural spending into various forms such as subsidies, research, extension, infrastructure, and price controls but data unavailability posed as a major setback to achieving this objective. Comparing the effects of individual countries and disaggregating the forms of public agricultural spending would be of more policy focus.

CHAPTER 2: LITERATURE REVIEW

In the 2000s, agriculture became a high priority policy agenda among African leaders with a realization for its potential to escalating economic growth and poverty alleviation (Fontan Sers and Mughal, 2019, Mustapha and Enilolobo, 2019). As such, most African leaders committed to allocating 10 percent of their total budget to Agriculture in both the 2003 Maputo declaration and the 2014 Malabo declaration which was a reaffirmation of the Maputo Declaration. Even though most of the countries have not honoured the declarations by allocating less than 10 percent, public spending on agriculture in absolute numbers has improved substantially in SSA and Africa as a whole. Public agricultural spending in Africa grew by 7.7 percent on average during the first five years (2003-2008) of the Maputo Declaration, but the average growth reduced in the preceding years due to the global food price crisis which saw a lot of donors reducing their support in Africa (Fontan Sers and Mughal, 2019). However, the 2008 food price crisis served as a wake-up call for most African countries to start implementing the commitments signed in 2003 (Brooks et al., 2013). This literature reviewed the effects that increased public agricultural expenditure has had across Africa. The review also explored different methods that have been used to analyse the nexus between public spending and unemployment.

2.1 Pathways in which public spending on agriculture create employment

According to theory and literature, there are several pathways in which public agricultural spending can create employment. These pathways are either direct or indirect. Firstly, public spending on agricultural education and extension increases knowledge and employs people in agriculture. Investment in production, value addition and agricultural entrepreneurship education generates knowledge and skills which when applied creates self-employment and job opportunities for others (Deekor, 2019). Further to that, public investment in agricultural loans and subsidies creates both self-employment and job opportunities for other people (Meyer, 2011). Loans and subsidies provide capital to people which is key to creating self-employment and job opportunities for others.

Investment in agricultural infrastructure such as markets, irrigation, storage facilities, processing plants attracts private investors that end up employing people (Edeme et al., 2020). Again,

agricultural-related infrastructure reduces farmers' costs and accelerate output which then creates more employment opportunities in the agricultural sector (Edeme et al., 2020).

Public investment in research and development, subsidies and infrastructure development increases productivity. Increased productivity in agriculture accumulates extra purchasing power among most families in agricultural dependent economies (Yeboah and Jayne, 2018). This creates multiplier effects on the rest of the economy and creates more jobs even in off-farm sectors. Further to that, increased productivity increases the incomes of households which in turn increases aggregate demand. According to the Keynesian theory of unemployment or the theory of effective demand, unemployment is a result of inefficiencies in aggregate demand (Keynes, 1936). As such, using the transitivity rule, we can conclude that agricultural spending which increases productivity, increases aggregate demand and employment

Finally, agricultural spending enhances economic growth (Ademola et al., 2013, Jambo, 2017, Mapfumo et al., 2012, Ndhleve et al., 2017). Economic growth has a bearing on employment in a way that increased economic growth creates employment because there is a direct relationship between economic growth and unemployment as an indicator of economic growth. Covic and Hendriks (2016) stated that improvements in the national economy generate employment in the economy. Therefore, we can be assured of an indirect relationship between agricultural spending, which increases economic growth on employment creation.

2.2 Effects of public agricultural expenditures

The topic of the effects of public agricultural spending has been studied extensively in SSA since the signing of the Maputo Declaration in 2003 (Akroyd and Smith, 2007). Among mostly researched areas include the effects of public agricultural spending on output, productivity, and economic growth. For example, studies by Mustapha and Enilolobo (2019) and Matthew and Mordecai (2016) examined the effects of public agricultural spending on output. Results indicated that public agricultural spending increased output in the region.

Some studies have gone further to look at the effects of public spending on productivity. Productivity is slightly different from the output because it is a ratio between total output and total

input (Krugman, 1994). As such, productivity measures the efficiency with which inputs are used. Benin (2015) and Wangusi and Muturi (2015) in their studies on SSA and Kenya respectively found that public agricultural spending increases productivity. One would expect such results as output and productivity are closely related.

Improved productivity increases the purchasing power and eventually leads to economic growth. Studies by, Mapfumo et al. (2012), Ademola et al. (2013) and Ele et al. (2014) have proved this relationship in SSA countries as Zimbabwe and Nigeria. All these studies indicated that public spending on agriculture increases the economic growth in these SSA countries proving the connection between increased productivity and economic growth.

Other studies have gone further to investigate the exact relationship between public agriculture spending and outcomes of economic growth such as poverty reduction. Ideally, there is a chain of effects as public agricultural spending increases output and productivity which then increases economic growth as increased productivity would lead to increased aggregate demand. Increased economic growth leads to employment and poverty reduction as there is a direct relationship between public economic growth and employment creation (Qiong and Junhua, 2015). Ndhleve et al. (2017) studied the effects of public agricultural spending on poverty reduction in Eastern Cape, South Africa and proved that there is a direct relationship. The findings however may have skipped the employment creation stage which exists between economic growth and poverty reduction. When there is economic growth, employment levels increase which in turn reduce the poverty levels in an economy.

Edeme et al. (2020) may have gone closer to estimating the relationship between public agricultural spending and unemployment in the study where they analyzed the effects of infrastructure development in agriculture on employment creation in ECOWAS. The results of panel ARDL revealed that agricultural investment in infrastructure creates employment in the region. This study however just focused on infrastructure development leaving out other forms of spending and was limited to the ECOWAS region.

The review of the studies that have been conducted on the effects of public agricultural spending in Africa has shown that public agricultural spending has recorded impressive results in increasing output and productivity and ensuring economic growth in SSA. Increased output and productivity in agriculture creates growth in the rest of the economy and creates employment. However, the literature above presents a gap in the literature on the exact empirical relationship between public agricultural spending and unemployment in SSA.

Unemployment in Africa has somewhat shown an opposite trend to that of public agricultural spending. World Bank (2020a) indicated that there was a sharp reduction in the unemployment rate from 6.7 percent in 2003 to 5.4 percent in 2008. This is the same period that Fontan Sers and Mughal (2019) indicated that there was a sharp increase in public spending on agriculture. After 2008, there was a rise in the unemployment rate which can also be attributed to reduced spending due to the global price crisis of 2008 (World Bank, 2020a). It is to this effect that the study would like to empirically gauge the explicit link between public spending on agriculture and unemployment in SSA.

2.3 Modelling the nexus between public spending and unemployment

This section discusses how studies on the nexus between public spending and unemployment has been modelled. The section focuses on the methods used and the variables use in the models of the nexus between public spending and unemployment. Studies on the nexus between government spending and unemployment have been modelled differently depending on the number of countries or regions used in the study. Most studies that have been conducted at the country-level used time series techniques in the analysis while studies that have been performed on two or more countries have used panel data techniques.

Nwosa (2014) conducted a study on the impact of government spending on unemployment and poverty levels in Nigeria. The study used annual time series data from 1981 to 2011. Ordinary Least Squares (OLS) techniques were employed to study the relationship. The result revealed a positive and significant relationship between government spending and unemployment, but a negative relationship between government spending and poverty rates. Onodugo et al. (2017) went further by splitting the public expenditure into recurrent (payment and expenses used to run the

sector) and capital and included private sector investment. The study also employed OLS model to examined the how government spending affects unemployment. The results showed significant relationships between capital expenditure and unemployment and between private sector investment and unemployment. However, recurrent expenditure could not show any significant relationship with unemployment.

Table 2.1: A summary of the studies that modelled a nexus between government spending and unemployment

Author (Year)	The measure of government spending	Countries and period	Method used	Interest
Nwosa (2014)	Total government spending	Nigeria, 1981-2011	Time-series technique, OLS	Impact of public spending on unemployment
Onodugo et al. (2017)	Recurrent and capital spending	Nigeria, 1980-2013	Time-series technique, OLS	Impact of public spending on unemployment
Habanabakize and Muzindutsi (2015)	Total spending, consumption, investment and export spending	South Africa, the first quarter of 1995 to the fourth quarter of 2014	Time-series technique, VAR Model Multivariate Cointegration	Interaction between public spending and unemployment
Murwirapachena et al. (2013)	Consumption and Investment spending	South Africa, 1980-2010	Time-series technique, VECM	Impact of public spending on unemployment
Seitaridis and Koulakiotis (2013)	Total government spending	Eurozone (15 countries), 2000-2011	Panel Data technique, Panel Granger Causality	The direction of causality between public spending and unemployment

Korkmaz (2015)	Military spending	Mediterranean Countries (10 countries), 2005-2015	Panel data technique, Dynamic Panel Data Model	Effects of military spending on unemployment
Tang et al. (2009)	Military spending	Global (46 countries), 1988-2004	Panel data technique, Panel Granger Causality	The direction of causality between military spending and unemployment
Zhong et al. (2015)	Military spending	G7 countries (7 Countries), 1988-2012	Panel data technique, Panel Granger Causality	The direction of causality between military spending and unemployment
Pirim et al. (2014)	Education and Health Spending	USA states (51 States), 25 years	Panel data technique, Pooled OLS and Fixed effects	Impact of education and health spending on unemployment
Georgiou (2010)	Educational spending	Europe, Japan and USA, 1992-2006	Panel data technique, GLS	Impact of education spending on unemployment
Onuoha and Moses Oyeyemi (2019)	Infrastructure, Health, Defense and Education spending	African (20 countries), 2000-2017	Panel data technique, GMM	Impact of infrastructure, health, defence and education spending on unemployment

Habanabakize and Muzindutsi (2015) analyzed the effects of consumption, export, investment and total government expenditures on the job creation in South Africa using quarterly time-series data from the first quarter of 1995 to the fourth quarter of 2014. The study employed a Vector Autoregressive Model and Multivariate Cointegration approach to determine the effects. The results revealed a long-run relationship between aggregate expenditure and job creation. The study also revealed that government and investment expenditures are key to job creation in South Africa. However, the short-run dynamics showed an insignificant relationship between aggregate expenditure and job creation in South Africa. On a similar note, Murwirapachena et al. (2013) conducted a study in South Africa that focused on the impacts of both government spending and taxes on unemployment. The study used annual time series data for the period 1980 to 2010. The study also employed the VAR model to analyze the data and revealed government consumption expenditure and taxes have a significant positive relationship with unemployment while investment expenditure has a negative bearing on unemployment.

The studies above have assessed the nexus between government expenditure and employment using one cross-sectional unit, the country. This has limited studies to using time series techniques. Seitaridis and Koulakiotis (2013) analyzed the relationship at a regional level where he involved several countries. The study used a panel of 15 member states of the Eurozone for the period 2000 to 2011 to study the relationship between government spending in general and unemployment, specifically, the direction of causality. The study used panel data cointegration and causality test to reveal that there was no cointegration between per capita public spending and unemployment and a one-way direction of causality from unemployment to expenditure.

Fiscal policies provide a preconceived relationship between government spending in general and unemployment. As such, most studies have focused on finding the nexus between public sectorial spending and unemployment. Studies that modelled the nexus between public spending on a sector and unemployment are very relevant to this study as this study seeks to measure the link between public spending on the agricultural sector and unemployment. As such, these studies are going to inform this study of how the relationship between public sectorial spending and unemployment is modelled. Korkmaz (2015) studied the effects of military spending on economic growth and unemployment in the Mediterranean Countries. The study used panel data from 10 countries for

the period 2005 to 2012. Using a dynamic panel data model, the study revealed that military spending affects economic growth negatively and unemployment positively. Tang et al. (2009) and Zhong et al. (2015) used panel Granger Causality test on global data for 46 countries for the period from 1988 to 2004 and data for the G7 countries for the period from 1988 to 2012 respectively to determine the nexus between military spending and unemployment. The study by Tang et al. (2009) revealed a weak causality from unemployment to military spending while the other way depended on how expending was expressed. Military expenditure expressed as a share of GDP showed a likelihood of causing unemployment while military expenditure did not cause unemployment. On the other hand, the study by Zhong et al. (2015) revealed one-way causality for the countries. For other countries, the causality was from military spending and unemployment while for the other, it was vice versa.

Other than the military sector, studies have also modelled the nexus between public spending on other sectors such as health and education and unemployment using several cross-section units. For example, Pirim et al. (2014) studied the long term impact of public education and health spending on unemployment rates in the USA states. The study used a panel of 51 states and for over 25 years. The Pooled OLS regression results revealed that spending on health and education is vital for the unemployment reduction in the USA. Comparably, (Georgiou, 2010) studied the impact of public education spending on unemployment in Europe, Japan and the USA. The study used a panel covering Europe, the USA and Japan for the period 1992 to 2006. The panel GLS model revealed that government spending on education significantly reduces unemployment.

Onuoha and Moses Oyeyemi (2019) looked at how expenditures on health, defence, education and infrastructure impact the unemployment rate in Africa. The study used annual panel series data for 20 African countries for the period 2000 to 2017. Due to the dynamic nature of unemployment, the study used the GMM to estimate the relationship between these forms of expenditures and unemployment. The results of a two-step GMM regression revealed that public spending on infrastructure and education significantly reduces the unemployment rate, while spending on defence and health increases unemployment in the region.

From the literature study above, it has been observed that the studies that used time series analysis had a longer period than the studies that used panel data. All the time series studies in this review had more than 30-time components while most studies that used panel data had less than 30-time components. To increase the number of observations and degrees of freedom, the studies that had few time components included more cross-section units such as countries or states and used panel data techniques instead of time series techniques. Motivated by studies cited above, it is worthwhile to include countries and do panel data analysis when the number of time series components are fewer than 30. This concurs with Tang et al. (2009), Croissant and Millo (2019) who stated that if the sampling period is short, panel data analysis is more efficient than time series analysis.

Empirical studies presented above have also shown that there are a variety of panel data methods that can be used to reveal the nexus between public spending and unemployment depending on the nature of the study. Most studies have used the panel data version of the Granger causality test to determine the direction of causality while pooled OLS, GLS and dynamic panel data models such as GMM have been used to measure either impacts or effects. The dynamic panel data models capture the dynamic effects because they include the lagged dependent variable as an explanatory variable (Croissant and Millo, 2019). This study, therefore, uses the dynamic panel data models to capture the dynamics of the dependent variable, unemployment rates.

2.4 Summary

The chapter reviewed the literature on the effects of public spending and unemployment and on the methods of modelling the nexus between public spending and unemployment. The literature on the effects of public agricultural spending has demonstrated that most studies have focused on the effects of public agricultural spending on variables such as output, productivity and economic growth. The literature, however, shows that there is an empirical gap on the effects of public agricultural spending on unemployment even though the trends somehow show that there is a correlation between the two.

Again, the chapter presented different methods of modelling the effects of public agriculture spending and unemployment. The studies that are conducted at the country level use time series

while studies that involve two or more countries use panel data. Depending on the type of relation the study wants to gauge, panel data has several techniques that are used. Studies that aim at looking at the direction of causality use granger causality while studies that aim at quantifying the effects employ either static or dynamic models. However, dynamic panel data models are most preferred as unemployment is dynamic. Therefore, this study adopts dynamic panel data models.

CHAPTER 3: METHODS AND PROCEDURES

Having justified the existing gap in the literature on the effects of public agriculture spending on unemployment in sub-Saharan Africa in the previous chapter, this chapter provides an outline of the methods and procedures used to address the gap. The methods and procedures are based on what literature has used to address a similar gap as presented in the previous chapter. Therefore, the chapter links the research problem presented in the introduction section with the data analysis. Firstly, the chapter discusses the theories that link government spending and unemployment and then the section discusses the modelling techniques that the study is going to use and finally, the section provides the sources of data for the study.

3.1 Theoretical Framework

Several theories exist that relate public spending to unemployment. These theories include the theory of effective demand and the theory of the real business cycle. These theories are crucial for this study because they provide a link between public agricultural spending and unemployment.

3.1.1 The Business Cycle Theory

The theory of the real business cycle states that the growth of productivity of inputs is what causes employment and unemployment (Chatterjee, 1995). The theory of the business cycle is based on a Cobb-Douglas production function as shown in equation 2 below.

$$Q = AL^{a}K^{b} \quad (1)$$

Where:

Q is the output, A, total factor productivity (TFP), is the ratio between output and inputs, L is labour, K is Capital, and superscripts a and b are shares of labour and capital respectively.

According to the theory, if the growth of output is less than the growth of inputs, then the total factor productivity (TFP) is not growing (Chatterjee, 1995). When TFP is not growing it leads to the inefficiencies of both the firm and the economy. The inefficiency of firms and the economy means that the reallocation of inputs cannot be achieved. As such, the inputs will not be used

profitably. Therefore, the lack of growth of TFP means that other variables such as expenditure, investments, GDP, and hours worked will also stop growing which then results in unemployment.

Mouhammed (2011) states that the lack of growth of TFP is due to; lack of improvements in technology and skills, a lack of inventions of new products and high costs of imports. However, improving factor productivity can increase TFP. Factor productivity can increase by developments in science and engineering, research and developments and good management techniques. Mouhammed (2011) summarizes that improvements in technology and productivity reduces unemployment. In most economies, the government has a mandate to invest in the improvement of science and technology, and research and development. Therefore, from this theory, we can conclude that if government spending in agriculture is tackling areas such as science and technology and research and development, unemployment is likely to reduce as these investments would lead to the growth of TFP.

3.1.2 The theory of effective demand

The theory of effective demand states that unemployment results from deficiencies in the aggregated demand and it is based on the idea of a British Economist J.M. Keynes (Mouhammed, 2011). Keynes (1936) stated that aggregate demand is the determinant of the labour-market equilibrium. Labour-market equilibrium is reached at a point when the aggregate demand intersects with the aggregate supply (Debreu, 1956). Aggregate demand is the number of goods and services that all people are willing and able to buy at various prices in an economy (Aschauer, 1985). According to Keynes, when the aggregate demand for goods and services increases, firms and employers are encouraged to produce more which eventually leads to higher demand for labour.

If the labour-market equilibrium is reached when the aggregate demand is increasing, the equilibrium point demand is called the effective demand (Keynes, 1936). The point is slightly lower than the full employment point because there is still frictional unemployment that exists. However, the equilibrium point reached when the aggregate demand is reducing is called the ineffective demand point. As such, the ineffective demand point is the point of involuntary or cyclic unemployment. Based on that, the theory suggests that the level of unemployment in the

short run is caused by the reduction or deficiencies in the aggregate demand. Keynes proved the idea from the behaviour of the capitalists of continued hiring of more workers and increasing output when the profits and the economy are performing well. However, the capitalists would reduce the number of workers when the economy is not performing well.

Post-Keynesian economics concur with Keynes by arguing that ineffective aggregate demand, instability of exchange rates and international mobility of finances are the specific causes of cyclic unemployment (Davidson, 1998). Other Keynesian economists also clarify that contractionary fiscal policies are a root cause of unemployment because they create deficiencies in aggregate demand (Mouhammed, 2011). This is because aggregate demand has a direct relationship with government spending according to the Keynesian Model given below:

$$Y = f(G, C, I \text{ and } NE) \quad (2)$$

Where:
Y is output or aggregate demand. G is government expenditure, all government consumption and investment expenditures. C is the aggregate private consumption in the economy. 'I' is all private investments made in the economy. NE is net exports. Thus, aggregate exports minus imports.

Public agricultural spending which increases productivity would also increase aggregate demand. According to Yeboah and Jayne (2018), in the SSA context where most families are agricultural households, increased agricultural productivity increases incomes which leads to an increase in economic growth and aggregate demand for all goods and services across the economy. According to the theory, increased aggregate demand, therefore, prompts investors from all circles of the economy to produce more and this creates more labour demand, hence reducing cyclic unemployment.

3.2 Data and Data Sources

The research study relied on secondary data from various sources for use in estimating the regression equation. The data were for the period 2001 to 2018. Data on total public agricultural expending and GDP per capita were obtained from the CAADP-managed Region Strategic

Analysis and Knowledge Support System (ReSAKSS) website. The data on public agricultural expenditures were in absolute United States Dollar values constant in 2010 prices. Data on unemployment, the share of agriculture contribution to GDP and labour force were obtained from the world bank website. Unemployment was captured as the unemployment rates which are derivations from total unemployment and total labour force. Table 3.1 indicates the variable, the measurement and their sources.

Table 3.1: A summary of the variables used in the study

Variable	**Definition**	**Source**
Unemployment (percentagetwo	The percentage of unemployed people out of the total labour force	Worldbank
Public Agricultural spending (Billion USD)	All costs incurred by the government in the agricultural sector expressed in USD to manage inflation and volatility factors	ReSAKSS
GDP per capita (USD)	A proxy for economic growth	ReSAKSS
Share of agriculture to GGP	Percentage contribution of the agricultural sector to GDP	World Bank
Share of agriculture to the labour force	Percentage contribution of agriculture to the labour force	World Bank

Source: Author's summary

The study, however, did not consider all the countries in Sub-Saharan Africa due to data unavailability. The study included 19 Sub-Saharan countries and each of the four regions of sub-Saharan Africa (North, Central, West and East) was represented by a minimum of two countries based on the number of countries in that region and the availability of data on either public agricultural spending or unemployment rates from 2001 to 2018. The other countries did not have balanced data for both unemployment and public agricultural spending from 2001 to 2018. The countries that were selected for this study include; Angola, Malawi, Botswana, South Africa, Zambia, Mozambique, Cameroon, Madagascar, the Republic of Congo, Ghana, Nigeria, Mali,

Gambia, Guinee Bissau, Kenya, Tanzania, Senegal, Uganda, and Ethiopia. Table 3.2 below summaries the countries that have been chosen for this study.

Table 3.2: SSA countries used in the study

East Africa	Central Africa	West Africa	Southern Africa
• Kenya • Ethiopia • Tanzania • Uganda • Madagascar	• Cameroon • Republic of Congo	• Ghana • Mali • Nigeria • Gambia The • Guinea Bissau • Senegal	• Malawi • South Africa • Zambia • Mozambique • Botswana • Angola

Source: Author's data

3.3 Modelling the dynamic effects of public spending on unemployment

Macroeconomic decisions take time to be implemented because they undergo extensive scrutiny before they get approved (McEachern, 2011). Decisions made today may take time to be implemented. As such, to model macroeconomic decisions, there is a need to consider the dynamics of the process. The dynamics can be captured by the notion of dynamic panel data modelling. The dynamic panel data models are panel data models that include the lagged dependent variable as an explanatory variable (Croissant and Millo, 2019). The lagged dependent variable is included to capture the dynamics of the process which may be crucial for obtaining consistent estimates when modelling variables that are serially correlated (Bond, 2002). The dynamic panel data model is shown in equation 3 below.

$$Y_{i,t} = \alpha Y_{i,t-1} + X'_{it}\beta + \cap_i + \varepsilon_{it} \quad ; |\alpha| < 1 \tag{3}$$

Where:

$Y_{i,t}$ is the dependent variable, $Y_{i,t-1}$ is a lagged dependent variable, X'_{it} is a vector of regressors, $\cap_i$ is a country-specific effect and εit is the disturbance error term.

According to Korkmaz (2015), Judson and Owen (1999), the fixed effects model is a common choice among most macro-economists. Fixed-effect models control for endogeneity caused by omitted country-specific characteristics that are correlated with the other regressors. Again, the fixed-effect model is appropriate when the choice of countries is not random. The countries chosen in this study were based on data availability and not randomly hence there is a likelihood of the presence of endogeneity.

The model in this study was specified as follows:

$$Unemp_{i,t} = \alpha Unemp_{,t-1} + agriex'_{it}\beta 1 + gdpca_{it}\beta 2 + \cap_i + \varepsilon_{it} \quad ; |\alpha| < 1 \qquad (4)$$

Where :

"Unemp" is the unemployment rate, "agriex" is the public agricultural spending, "gdpca" is GDP per capita, $\cap_i$ is the country-specific effect and ε is the error term.

The variables were chosen based on the theories of the real business cycle and effective demand presented in the theoretical framework. Public agricultural spending was used as the main explanatory variable while GDP per capita was used as a control variable. This is because the study specifically wanted to find the effects of public agricultural spending on unemployment while recognizing the role of economic growth in reducing unemployment in sub-Saharan Africa.

Estimating the dynamic effects of public agricultural spending on unemployment using equation 4 above could give rise to several econometric problems. Firstly, the time-invariant country effects could be correlated with the independent variables. Secondly, there was a likelihood of a reversed causality running from unemployment to public agricultural spending, which could lead to inconsistent estimates. Again, the lagged dependent unemployment (Unemp, $_{t-1}$) was endogenous as it was correlated with the country-specific effects, $\cap_i$. Therefore, using Generalised Least Squares (GLS) or Ordinary Least Squares (OLS) could lead to biased and inconsistent estimates as it could violate the OLS and GLS assumption of strict exogeneity. Other than the problems above, the inclusion of the lagged unemployment rate as an explanatory variable might have led to autocorrelation.

Several methods could be used to control for potential endogeneity in this case. The first method is by using the within estimator which would wipe all the time-invariant country-specific effects. However, this creates Nickel Bias in the context where the N is larger than the T as the demeaning process creates a correlation between the regressors and the error term (Nickell, 1981). The first difference transformation is also used to remove the time-invariant country effects as shown in equation 5 below.

$$\Delta Unemp_{i,t} = \alpha \Delta Unemp,_{t-1} + \Delta agriex'_{it}\beta 1 + \Delta gdpca_{it}\beta 2 + \Delta \varepsilon_{it} \quad ; |\alpha| < 1 \qquad (5)$$

However, estimating equation 5 could still suffer from endogeneity because the dynamic nature of equation 4 makes ΔUnemp,t-1 be correlated with Δεit. Anderson and Hsiao (1982) went further by proposing the use of instrumental variables (IVs) to solve the problem of endogeneity. The method suggested that the instrumental variables may be constructed for the lagged unemployment from the second and third lags of unemployment either by differences or lagged levels. For example, $\Delta Unemp,_{t-2}$ or $Unemp,_{t-2}$ may be used as instruments for endogenous $\Delta Unemp,_{t-1}$.

Arellano and Bond (1991) proposed the use of Generalized Methods of Moments (GMM) to address endogeneity. The GMM estimators are obtained using the moments condition generated by the lagged dependent variable with the error term (Brañas-Garza et al., 2011). The GMM estimators obtained using this method are called Difference GMM estimators or Arellano-Bond Estimators. Similar to the IV estimator proposed by (Anderson and Hsiao, 1982), the technique also makes use of values of the dependent variable lagged two periods as instruments for the lagged dependent variable. Just like all instrumental variable estimators, the GMM estimator is unbiased but is more efficient than methods such methods as Instrumental Variables, Ordinary Least Squares, and Within Group because it exploits all possible instruments and exhibits the smallest bias and variance (Arellano and Bond, 1991). Apart from solving endogeneity, the GMM method is also designed to solve autocorrelation as the lagged dependent variable is instrumented with its past values. Again, the GMM method is well suited when T is smaller than N. As such, the study used the GMM method to estimate the dynamic relationship between unemployment and public agricultural spending.

The consistency of GMM estimates, however, is dependent on the validity of the instruments used in the model (Sequeira and Maçãs Nunes, 2008). To check the validity of the instrument used, we perform two specification tests. The first test is called the Hansen test of over-identifying restrictions, which tests the overall validity of the instruments. The Hansen Test test the null hypothesis of the inclusion of valid instruments against an alternative hypothesis (H1) of the inclusion of invalid instruments. The second test checks for the second-order autocorrelation test for the error term. The second-order correlation test tests the null hypothesis (H0) of the presence of second-order correlation against the alternative hypothesis of no second-order serial correlation. Both Hansen and Second-Order correlation tests are used to determine the validity of instruments used in the model.

Bearing in mind that GMM results are computed in the short-run, the study went further to calculate the long-run estimates of GMM. The long-run estimates are calculated by dividing coefficients of the short-run elasticities by one minus the coefficient of the lagged dependent variable (Onuoha and Moses Oyeyemi, 2019). Thus, the long-run effects of the k^{th} parameter are given by the formula:

$$\text{Long-run effects} = \beta_k / (1 - \alpha) \quad (6)$$

Where;

β_k is the coefficient of the k^{th} parameter and α is the coefficient of the lagged dependent variable

3.4 Comparing the effects among countries of public agricultural spending on unemployment

To compare the effects, the study first classified the countries into two categories based on the standard criteria given by World Bank (2014). The countries were categorised into two categories based on how much agriculture contributes to the labour force and GDP. Having categorised the countries into two categories, the study created a dummy variable (dep) and multiplied it with public agricultural spending to form an interaction term. The interaction term was included in both the dynamic fixed-effect model and the GMM to capture the differences in the effects as shown in equation 7 below.

$$Unemp_{i,t} = \alpha Unemp_{,t-1} + agriex'_{it}\beta 1 + gdpca_{it}\beta 2 + agriex*dep\ \beta 3 + \cap_i + \varepsilon_i \ ; |\alpha| < 1 \quad (7)$$

Where:

"Unemp" is the unemployment rate, "agriex" is the public agricultural spending, "gdpca" is GDP per capita, $\cap_i$ is the country-specific effect and ε is the error term and agriex*dep is the interaction term between agricultural spending and the dummy variable created.

3.5 Summary

Theories of unemployment have stated that fiscal policy though government spending creates jobs and reduces unemployment. This chapter, therefore, discussed the theory of the real business cycle and the theory of effective demand to justify how public agriculture spending would increase unemployment. The chapter highlights that public agricultural spending would increase productivity which then increases aggregate demand for goods and services in an economy. Increased aggregate demand is vital for employment creation as it encourages firms to produce more and increase their labour demands.

The chapter also discussed the analytical methods used in the study to gauge the existing relationship between public agricultural spending and unemployment. Due to the dynamic nature of unemployment, the study discussed a dynamic panel data model which was adopted to study the effects of public agricultural spending on unemployment. The chapter revealed that GMM was the right method of analysis to study the dynamic relationship between public agricultural spending and unemployment as the method controls for econometrics problems associated with dynamic panel data models such as heteroskedasticity, second-order serial correlation and endogeneity. The chapter again discussed the two main data sources; the World-Bank and ReSAKSS websites.

CHAPTER 4: EFFECTS OF PUBLIC AGRICULTURAL SPENDING ON UNEMPLOYMENT

This chapter discusses the empirical findings on the effects of public agricultural spending on unemployment in sub-Saharan Africa. The study used Stata 15 to conduct the analysis. The level variables such as GDP per capita and public agricultural spending were transformed into log forms to reduce the extrema in the data and reduce the effects of outliers. The chapter first discusses the univariate properties of the data and the trends of public agricultural spending and unemployment before discussing and comparing the effects of public agricultural spending on unemployment in SSA.

4.1 Descriptive statistics

The panel data set contained 19 sub-Saharan countries, which represented cross-sectional units with a period of 18 years, from 2001 to 2018. The number of observations, therefore, was N × T, which yielded 342 observations indicating a balanced panel. All the variables used in the model had a total of 342 observations except the lag of unemployment which has 323 observations because it was a transformation of the unemployment rate. All the variables used in the model were transformed into log forms except unemployment and lag of unemployment because they are already in percentages.

The study computed the standard deviation and the skewness to appreciate the distributions of the data. Standard deviation measures the dispersion around the mean and is widely used to compare distributions (Altman and Bland, 2005). The larger the standard deviation, the higher the dispersion and the smaller the standard deviation, the lesser the dispersion. The statistics show that the unemployment rate was relatively a highly dispersed panel with a standard deviation of 6.703587 as compared to the log of public spending and log of GDP per capita panels that had standard deviations of 1.602765 and 0.9100388 respectively.

Table 4.1: Descriptive statistics of the variables used in the fixed effects model and the GMM

	Unemployment	**Lag of Unemployment**	**Log of public Agric spending**	**Log of GDP per capita**
Unit	percent	percent	Billion USD	USD
Observations	342	323	342	342
Mean	8.300272	8.361985	5.076998	6.991237
Median	6.622	6.629	5.344817	6.846337
Standard deviation	6.703587	6.733774	1.602765	0.9100388
Minimum	0.599	0.599	-0.2438788	5.273
Maximum	33.473	33.473	7.831114	8.991064
Skewness	1.523696	1.505621	-1.059635	0.629357

Skewness, on the other hand, is also used to compare distribution in terms of their symmetry to the mean. Symmetric distributions have a skewness value of zero. The data show that all the variables included in the study are asymmetric. However, the log of GDP per capita showed that the variable was close to being symmetric with a skewness value of about 0.6 as compared to unemployment and log of public agriculture spending that has skewness values of 1.523696 and -1.059635 respectively.

From the data description presented above, the variables included in this study were not normally distributed. However, this has not affected the results of the dynamic panel data model because it is not a requirement of this model for data to be normally distributed (Croissant and Millo, 2019). There next sections, therefore, discuss the trends of the variables and the results of the empirical analysis.

4.2 Growth of public spending and Change in Unemployment rates from 2001 to 2018

Before empirically studying the relationship between public agricultural spending and unemployment, the study computed the average growth rates and average unemployment for all the countries to determine if the two variables move in the same direction. Figure 4.2.1 shows that

from 2001 to 2018, most countries have increased their spending on agriculture which can be attributed to countries' commitment to agriculture through the signing of the Malabo and Maputo declarations in 2003 and 2014 respectively. This concurs with Fontan Sers and Mughal (2019) who also indicated that public spending on agriculture has increased in absolute numbers after the signing of the Malabo and Maputo Declaration. However, Figure 4.2.1 indicates heterogeneities in the growth of public agricultural spending with some countries having a low average growth in agricultural spending while some showing a substantially higher average growth in public agricultural spending.

Figure 4.1 shows that among the selected countries, Botswana had the lowest and negative average growth in agricultural spending while Nigeria had positive but substantially lower growth in public agricultural spending. According to OECD-FAO (2016), Botswana's economy is least dependant on agriculture in Africa. As such, it is expected to see it having a negative and lowest growth in agricultural spending.

It is also expected for countries such as Guinee Bissau, Gambia and Mozambique to have higher average growth in public agricultural spending because the contribution of agriculture to the economy of these countries is very substantial that it contributes more than 20 percent to the GDP (Tomšík et al., 2015). The country which has spent contrary to the expectation is Nigeria because the average growth in expenditure on agriculture is low as compared to the contribution that agriculture makes to its economy. However, the low growth in expenditure in Nigeria explains why the sector has been termed as a neglected sector in the country (Oladipo et al., 2019).

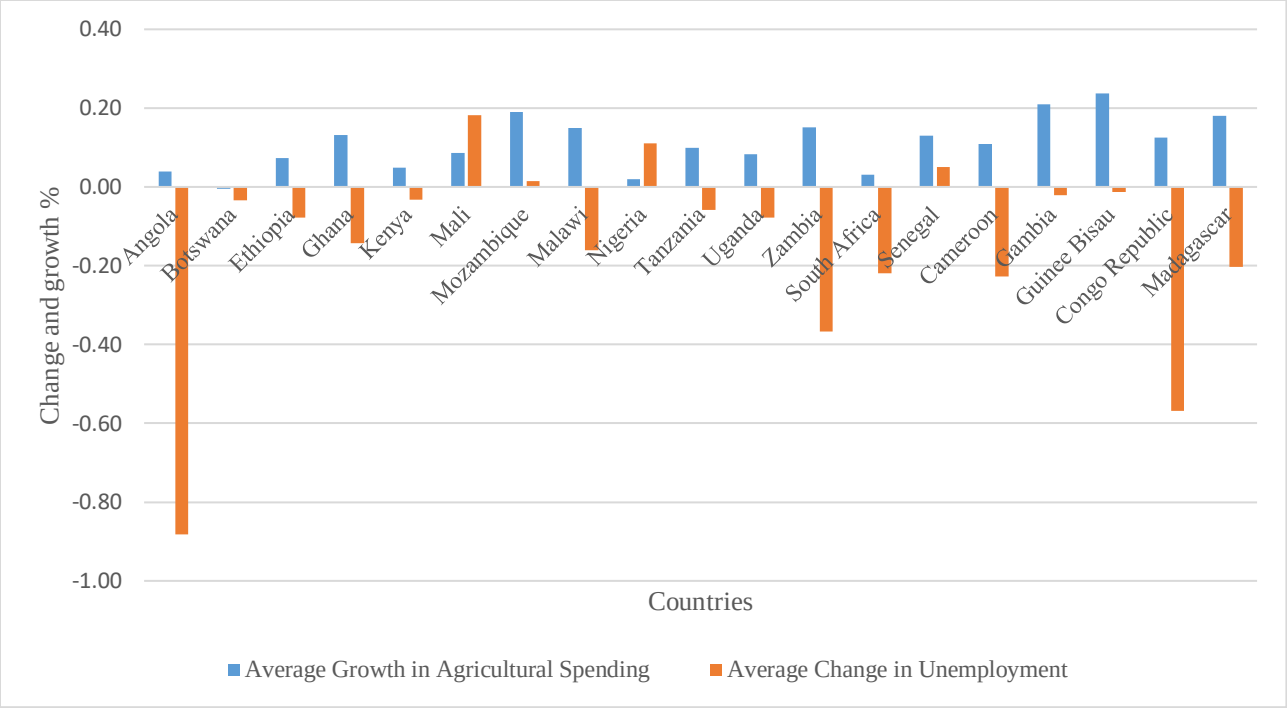

Figure 4.1: Average growth in public agriculture spending and change in unemployment (2001-2018)

Source: RESSAKS (2020) and World Bank (2020a)

The figure also shows that unemployment has reduced in most countries in the region. The figure shows that few countries such as Mali, Nigeria and Senegal had a rise in unemployment rates while the rest of the countries had a drop in the rates of unemployment. The highest drop in unemployment was recorded in the Congo Republic and Angola. Countries such as Zambia, Cameroon, Madagascar, Senegal, Ghana and Malawi also recorded a substantial decrease in unemployment over the period. The figure provides a picture that there is a correlation between increased public agricultural spending and unemployment as most countries that increased public spending have also experienced a reduction in unemployment. The next section, therefore, provides an empirical estimation of the relationship between public agricultural spending and unemployment.

4.3 The effects of public agricultural spending on unemployment

To determine the effects of public agricultural spending on unemployment, the study first used the dynamic fixed-effect model. The fixed-effect model was preferred ahead of the random effect

model because of two reasons. First, if the individual effects represented omitted variables, it was highly likely that these country-specific characteristics would have been correlated with the other regressors hence can cause endogeneity. Again, the selection of countries was not random as it was done based on data availability. As such, the fixed-effect model was the right model to control for the presence of endogeneity ahead of the random-effects model.

Table 4.2: Dynamic fixed effects model results

Variable	**Coefficient**	**p-Value**
l.unemp	0.881607	0.000***
logAgriex	-0.230717	0.026**
logGDPca	-0.29367	0.406
Constant	4.074332	0.092*
Diagnostics		
Number of observations	323	
Number of groups	17	
Overall R-squared	0.9771	

*Notes: * denotes 1 percent significance, ** denotes 5 percent significance, *** denotes 10 percent significance*

Source: Author's computations

Table 4.2 presents the results of the dynamic fixed-effect model. The results showed the goodness of fit of 0.9771 implying that about 97 percent of the variations in the unemployment rates can be explained by the independent variables included in the model. Again, the study tested for multicollinearity in the model. The variance inflation factor (VIF) test was conducted and mean VIF was 1.97. The VIF for public agricultural spending was 1.14 while the VIF for GDP per capita was 2.49. This means that the model did not suffer from perfect multicollinearity. Perfect multicollinearity exists when the VIF is greater than 10 (Wooldridge, 2016). The dynamic nature of unemployment was considered by including lagged unemployment as a regressor. The results show that the lag of unemployment is positive and significant which implies that unemployment depends on its past realizations. Each additional year increases unemployment holding all other factors constant.

The log of public agriculture spending was negative and significant at a five percent level of significance while the control variable log of GDP per capita was negative but not significant at a 10 percent level of significance. The negative and significant coefficient of the log of public agricultural spending means that public agriculture spending reduces unemployment in the region. Specifically, the coefficient means that a one percent increase in public agriculture spending reduced unemployment by 0.23 percent in SSA, ceteris paribus. The results on the log of agricultural spending were the expected result as public agricultural spending is expected to increase productivity and aggregate demand which would prompt investors and firms to increase production thereby increasing employment opportunities in the economy.

The results presented in Table 4.2 may still be inconsistent because the fixed-effects model may have failed to counter the autocorrelation and endogeneity caused by the reversed causality and the inclusion of endogenous variables in the model. To deal with suspicious endogeneity and autocorrelation in the dynamic fixed-effect model, the study used the GMM method as proposed by Arellano and Bond (1991). The method uses the moment conditions to control for endogeneity. The consistency of the GMM estimator relies on the validity of the instrument. The first rule of thumb for avoiding instrument over-identification when estimating GMM is that the number of instruments should not surpass the number of cross-section units in the model (Labra and Torrecillas, 2018). Other than that, there is a need to perform a formal specification test to check the validity of instruments. Table 4.3 below presents the results of the GMM.

Table 4.3: The GMM results of public agricultural spending on unemployment

Variable	**Model 1**	**Model 2**
L.unemp	0.7318813 (0.000)***	0.7423002 (0.000)***
logAgriexp	-0.5124727 (0.044)**	-0.4988314 (0.058)*
logGDPca	-2.947731 (0.020)**	-2.639833 (0.045)**
Diagnostics		

Number of observations	304	304
AR(2)	0.125	0.144
Hansen	0.261	0.261
Number of Groups	19	19
Number of Instruments	18	18

*Notes: * denotes 1 percent significance, ** denotes 5 percent significance, *** denotes 10 percent significance, Model 1 is the one-step difference GMM and Model 2 is the two-step difference GMM*

Source: Author's analysis

Table 4.2 indicates that the number of instruments for GMM is 18 which is less than the number of cross-section units, which in this case are countries, 19. From the results, it can reasonably be assumed that there is no serious problem of instrument overidentification because the number of instruments is not more than the number of cross-section units. Regarding the formal test for instruments overidentification, the Hansen test was performed to check the validity of the instruments. The null hypothesis of the test is that the instruments are valid while the alternative hypothesis is that the instruments are not valid. As shown in Table 4.3.2, the results of the Hansen tests were not significantly different from zero at 10 percent level of statistical significance, indicating that the validity of instruments used in the model cannot be rejected and concludes that there was no serious problem of invalid instruments used in the model.

The study again performed an autocorrelation test to test for the presence of second-order correlation in the model. The study used the Arellano-Bond test for correlation to test for the presence of autocorrelation with the null hypothesis of no correlation. The AR (2) test results presented in Table 4.3 indicate that there was no second-order serial correlation as the p-value was not significant at the 10 percent level of statistical significance. Therefore, the study failed to reject the null hypothesis and concluded that there was no significant problem of second-order serial correlation in the model.

According to Brañas-Garza et al. (2011), difference GMM may also not provide good estimators in the presence of heteroskedasticity. As such, Windmeijer (2005) proposed the use of two-step GMM estimators to control for the problem as these estimators are robust even under

heteroskedastic conditions. As such, the study estimated both one-step and two-step difference GMM. From the results presented in table 4.3, it was observed that the lag of unemployment was positive and significant which means that indeed unemployment is dynamic. That is, unemployment depends on its past realizations. The results, as expected, gave negative and significant coefficients on both the log of public agricultural spending and the control variable, log of GDP per capita. However, the significant levels were different for one-step difference GMM and two step-difference GMM. Due to the robustness of the two-step difference GMM, the study adopted the results of the two-step difference GMM.

GMM estimates are short-run estimates. The coefficient, -0.50, on the log of public agricultural spending, means that a one percent increase in public agricultural spending in SSA, unemployment reduces by 0.50 percent in the short run, ceteris paribus. These results were as expected because most households in SSA are farming households and increased public spending would have a greater effect on reducing employment (Christiaensen and Brooks, 2018). Again the results concur with the studies by Edeme et al. (2020), Deekor (2019) and Meyer (2011) that stated that spending on agriculture particularly in infrastructure, agricultural education and extension and agricultural loans and subsidies create employment.

Further to that, the results extended the findings of the studies by Ademola et al. (2013), Mapfumo et al. (2012), Ndhleve et al. (2017) and Wangusi and Muturi (2015), public spending on agriculture increases both productivity and economic growth in Africa. Increased productivity and economic growth translate to increased purchasing power among farming households which increases aggregate demand for goods and services from agricultural and other sectors in the economy. The increase in demand for goods and services in an economy prompts investors to produce more and this eventually creates demand for more labour thereby creating employment in the economy (Keynes, 1936).

Bearing in mind that GMM results are computed in the short-run, the study went further to calculate the long-run estimates of GMM. The long-run GMM coefficients for the log of agricultural spending and the control variable, GDP per capita are given in Table 4.4 below which contacts the results of long-run GMM.

Table 4.4: The long-run GMM results of public agricultural spending on unemployment

Variable	Coefficient	p-Value
logAgriex	-1.935707	0.021**
logGDPca	-10.24383	0.010*

*Notes: * denotes 1 percent significance, ** denotes 5 percent significance, *** denotes 10 percent significance*

Source: Author's analysis

Table 4.4 indicates that agricultural spending has a long-run significant power in reducing unemployment. That is, a one percent increase in public agricultural spending reduces unemployment by about 1.9 percent in the long run, ceteris paribus. The long-run results also indicate that the control variable, GDP per capita is vital for reducing unemployment in the region. That is, a one percent increase in economic growth reduces unemployment by about 10 percent, holding all other factors constant.

The effect, in the long-run, was higher than in the short-run because other forms of spending such as research and development may take time to start producing results (Jambo, 2017). As such, we expected a higher effect in the long run as all the forms of spending shall be producing results. That is, in the long-run, all the forms of public agricultural expenditures would be producing results.

4.4 Summary

The chapter discussed the empirical results of the effects of public agricultural spending on unemployment in sub-Saharan Africa. The chapter first described the data using descriptive statistics. From the description, the data were found not to be normally distributed, but this did not affect the model estimated, the dynamic panel data model. The study then estimated a dynamic fixed-effect model which showed that public agricultural spending reduces unemployment in the region.

However, according to the literature, the dynamic fixed effect model comes along with several econometric problems such as endogeneity, heteroskedasticity and second-order serial correlation. The study went further to control statistical problems that may arise because of using the dynamic fixed-effect model. The study used a two-step difference GMM method which controls for endogeneity, autocorrelation and heteroskedasticity to determine the effects of public spending on unemployment in sub-Saharan Africa. Both short-run and long-run results support the theories of effective demand and real business cycle and conclude that public agricultural spending has a bearing on reducing unemployment in the region

CHAPTER 5: COMPARISON OF THE EFFECTS OF PUBLIC AGRICULTURE SPENDING ON UNEMPLOYMENT IN SSA

This chapter is an extension of the results found in Chapter 4 where public agricultural spending was found to affect unemployment reduction in sub-Saharan Africa. The chapter addresses the second objective of the study was aimed at comparing the effects of public agricultural spending on unemployment across the countries. To compare the effects, the countries were categorized into two categories based on how much they rely on agriculture. Firstly, the chapter discusses how countries were classified and then estimated regression models with an interaction term between public agricultural spending and a dummy on the dependence on agriculture using Stata 15. The interaction was included to capture the differences in the effects (Wooldridge, 2016).

5.1 Classification of the countries

The World Bank (2014) classifies countries based on how much agriculture contributes to the labour force and the GDP. A country is classified as agriculture-based when agriculture contributes at least 25 percent to GDP and 50 percent to the labour force. The other categories include: pre-transitioning, transitioning, urbanizing and developed. Countries in which agriculture still contributes over 50 percent but the contribution to GDP is between 10 percent to 25 percent are called pre-transitioning countries. However, the classification by Byerlee et al. (2008) did not recognise the pre-transitioning category. As such, the pre-transitioning category was still considered agriculture-based.

Countries that have agriculture contributing between 25-50 percent to the labour force and 10-25 percent to GDP are called transitioning countries. Countries are considered urbanizing when the contribution of agriculture to the labour force is between 10 percent to 25 percent and the contribution to GDP is between 10 percent to 25 percent. The last category is called the developed and it includes countries that have both contributions of agriculture to the labour force and GDP is below 10 percent.

The country segmentation demonstrates a pattern that as countries move from being agriculture-based country, the contribution of agriculture to GDP drops and there is a reduction in agricultural employment. The decline of agriculture's contribution to the labour force and GDP is attributed to the shift in the concentration of activities from on-farm to off-farm activities such as processing, manufacturing and agribusiness (Van Arendonk, 2015). Processing, manufacturing, and agribusiness end up contributing a lot to GDP and the labour force as compared to the primary sector, agriculture.

As the concentration of activities shifts from on-farm to off-farm, even the expenditure focus changes. Technological innovations and institutional innovations are structural changes that happen within the agricultural sector to overcome the decline. These structural changes include the commercialization of agriculture which goes along with technological innovations such as hybrid seeds, chemicals and mechanization (Van Arendonk, 2015). As such, the focus of public agricultural spending changes from building capital to improving productivity such as infrastructure development, research and development.

Figure 5.1. shows that out of 19 countries selected for this study, 7 countries met all the criteria to be agriculture-based countries and these are Ethiopia, Guinee Bissau, Madagascar, Malawi, Mali, Uganda and Tanzania. Countries such as Zambia, Mozambique and Cameroon meet all the requirements to be in the pre-transitioning category. However, some countries such as Ghana, Kenya and Gambia had an agriculture contribution to GDP of over 25 percent but the contribution to the labour force was lower than 50 percent. As such, they were also dropped to the pre-transitioning category.

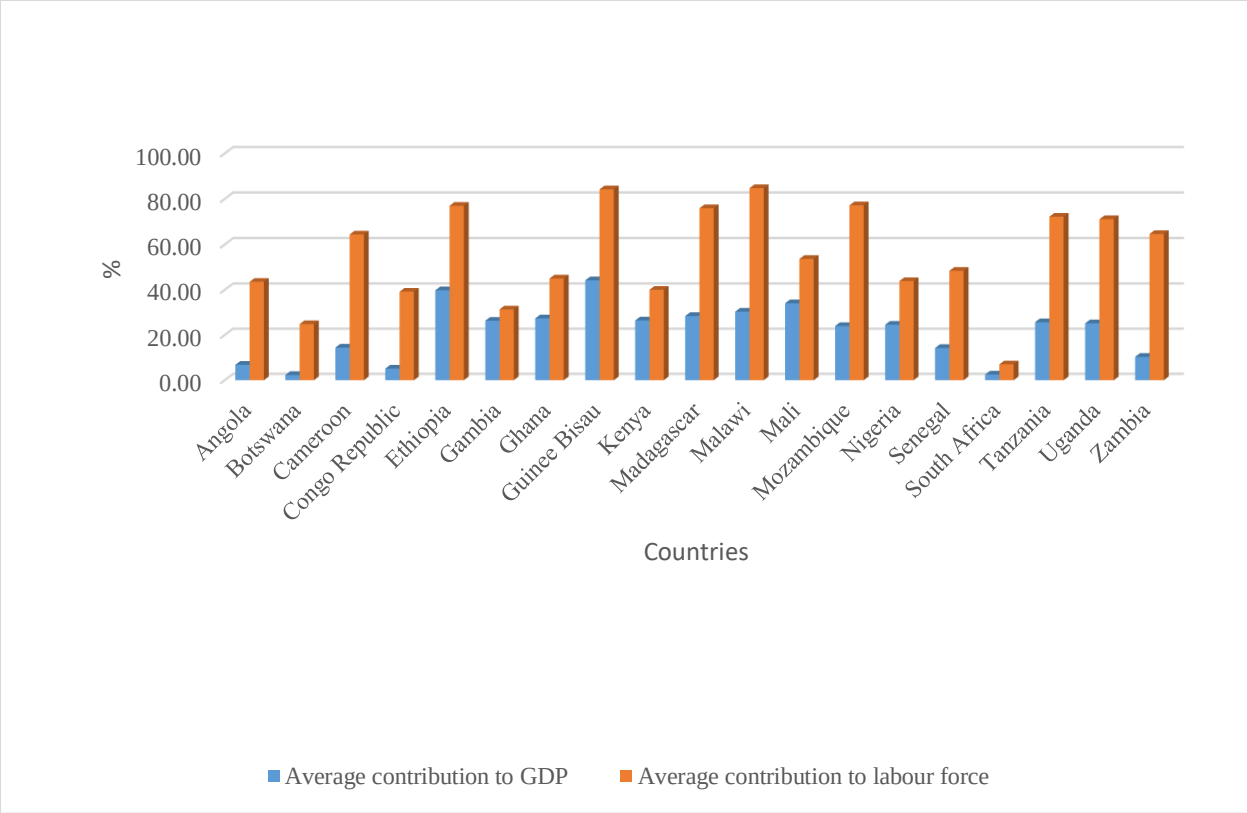

Figure 5.1: Average contribution of agriculture to GDP and labour force (2001-2018)

Source: World Bank (2020b)

Transitioning category, in this case, includes countries such as Nigeria and Senegal where agriculture contributes between 25-50 percent to the labour force and 10-25 percent to the GDP. The Congo Republic, Botswana and Angola had an agriculture contribution to the labour force of over 25 percent but lower than 50 percent. However, the contribution of agriculture to the GDP was less than 10 percent. As such these countries were also dropped into the transitioning category. The data shows that no country falls under the urbanizing category, but South Africa falls in the developed country as both the agriculture contribution to GDP and labour force were below 10 percent. Table 5.1 below allocates the countries used in this study into their respective categories.

The study, therefore, focused on two categories; agriculture-based and non-agriculture based. This was because the inclusion of all the groups led to estimation problems such as second-order serial correlation and multicollinearity. The agriculture-based category also included all pre-transitioning as this category had one indicator that pointed at agriculture-based economies. Again,

Byerlee et al. (2008) considered pre-transitioning countries as agriculture-based countries. Non-agriculture-based countries included all countries in the transitioning, urbanizing and developed countries.

Table 5.1: Classification of countries

Agri based	Non-Agri based
• Malawi • Ethiopia • Tanzania • Uganda • Madagascar • Mali • Guinea Bissau • Zambia • Mozambique • Cameroon • Ghana • Kenya • The Gambia	• Nigeria • Angola • Congo Republic • Botswana • Senegal • South Africa

Note: Classification based on the average contribution of agriculture to the labour force and GDP (2001-2018)

Source: Author's data

5.2 Comparison of the effects of public agricultural spending on unemployment among countries

The study made a comparison between agriculture-based countries and non-agriculture-based countries to deduce if there are significant differences in the effects of public agricultural spending and unemployment between the two categories. The comparison was aimed at reducing the aggregation bias that may arise because of aggregating the heterogeneous countries. To compare the effects, the study created a dummy variable (Dep) for the agricultural countries. An interaction term was then formed by multiplying the dummy variable by the log of agricultural spending. Interaction terms are used to compare the effects of a variable across various categories (Wooldridge, 2016). The study, therefore, used the interaction between the dummy and the log of public agricultural spending to compare the effects of public agricultural spending on unemployment between the agricultural countries and non-agricultural countries.The interaction

term (logAgriex*Dep) was then regressed with other variables log of public spending, the log of GDP per capita, lag of unemployment to determine the differences in the effects of public agriculture spending and unemployment between these two categories.

The study, again, preferred fixed effects model ahead of random effects because of its ability to control the omitted country specific variables such as labour environment that when left out could increase the likelihood of omitted variable bias and endogeneity in the model. As already indicated, the fixed effects model demeans and wipes out all the time-invariant country specific variables hence controlling bias and endogeneity.

The model showed an overall R-squared of 0.8865 translating that approximately 89 percent of the deviations in employment can be explained by the covariates included in the model. The study also tested for multicollinearity in the model. The variance inflation factor (VIF) test showed that the VIF for public agricultural spending was 1.18 while the VIF for GDP per capita was 2.81. The VIF for the interaction term was 1.28. The mean VIF was 1.89 indicating that the model did not suffer from perfect multicollinearity.

Table 5.2: The Dynamic fixed-effect model results

Variable	**Coefficients**	**P-values**
l.unemp	0.8667705	(0.000 ***
logAgriex	-1.016038	(0.000)***
logGDPca	-.4386938	(0.200)
logAgriex*dep	1.026526	(0.000)**
Constant	5.845913	(0.014)**
Diagnostics		
Number of observations	323	
Number of groups	19	
Overall R-squared	0.8865	

*Notes: * denotes 10percent significance, ** denotes 5percent significance, *** denotes 1percent significance*

Source: Author's analysis

The results are shown in Table 5.2 The coefficients of both the log of agricultural spending and the interaction term were significant at a 5 percent level of significance. The negative coefficient of the log of agricultural spending means that public agriculture spending reduces unemployment while the positive sign on the interaction term means that the effects of public agriculture spending on unemployment are greater in agriculture-based countries than in non-agriculture-based countries. Specifically, the coefficient of the interaction term shows that the effect of public agricultural spending on unemployment is 1.03 percent higher in agricultural countries than non-agricultural countries holding all other factors constant.

The coefficient of the log of public agricultural spending indicates the effects in the base category, non-agriculture-based while the absolute sum of the coefficients of the log of public agricultural spending and the interaction term shows the effects in the agriculture-based category. Assuming the unemployment rate is 10 percent in both agriculture-based and non-agriculture-based countries, one percent increase in public agriculture spending would reduce unemployment to 8.95 percent in the base category, non-agricultural based countries while the same percentage increase would reduce unemployment to 7.90% in the agriculture-based countries, holding all other factors constant.

Table 5.3: The GMM results with an interaction term

Variable	**Model 3**	**Model 4**
L.unemp	0.6968912 (0.000)***	0.6999618 (0.000)***
logAgriexp	-1.765857 (0.011)**	-1.757077 (0.012)*
logGDPca	-3.010223 (0.025)**	-2.966809 (0.035)**
logAgriex*Dep	1.725505 (0.011)**	1.724691 (0.012)**
Diagnostics		
Number of observations	304	304
AR(2)	0.123	0.146

Hansen	0.247	0.247
Number of Groups	19	19
Number of Instruments	19	19

*Notes: * denotes 10 percent significance, ** denotes 5 percent significance, *** denotes 1percent significance, Model 3 is the one-step difference GMM and Model 4 is the two-step difference GMM*

Source: Author's analysis

However, due to the econometric problems such as endogeneity, autocorrelation and heteroskedasticity that are associated with the dynamic fixed effect model as discussed in chapters 3 and 4, the study went on to estimate the GMM. The results of the GMM are shown in Table 5.3. The number of instruments is not more than the number of groups indicating that there may not be a problem of instrument overidentification. The Hansen test, a formal test for instrument overidentification, was insignificant at a 10 percent level of significance indicating that there was no problem of instrument identification. Again, the model did not suffer from second-order serial correlation as the AR(2) is not significant at the 10 percent level of statistical significance.

Both the coefficients of the log of public agriculture spending and the interaction term were significant at a 5 percent level of significance, in both one-step and two-step GMM. Like in the dynamic fixed effect model above, the negative coefficient on the log of public agricultural spending means that public agricultural spending reduces unemployment in the region while the positive sign on the interaction term means that the effect of public agricultural spending on unemployment is indeed higher in agriculture-based countries than in non-agriculture-based countries. However, due to the robustness of the two-step GMM, the study also adopted the results of the two-step GMM ahead of the one-step GMM.

The coefficient of the interaction term, 1.72, means that the effect of public agricultural spending is 1.72 percent higher in agriculture-based countries than in non-agriculture-based countries, ceteris paribus. Assuming the unemployment rate is 10 percent in both categories, a one percent increase in public agricultural spending would cause unemployment to reduce to 8.24 percent in the base category, non-agriculture-based countries, while the same percentage increase in

agriculture-based countries would reduce the unemployment rate to 6.52 percent, all other things being equal.

From the results, it is evident that country features such as the contribution of agriculture to GDP and the labour force are key factors behind the success of public agricultural spending on unemployment. If the contribution of agriculture to GDP is high, increased agriculture spending which increases economic growth will consequently increase employment because economic growth has a positive effect on employment creation (Prachowny, 1993). Again, the higher the contribution of agriculture to the labour force, the higher the effectiveness of public agriculture spending. According to the theory of real business cycle discussed in the theoretical framework, government spending increases productivity and it is the increased productivity that contributes to the creation of employment opportunities (Mouhammed, 2011). This is because as labour productivity improves, the labour demand increases as it becomes more rewarding when you add an extra unit of labour (Tang et al., 2009).

The result also attested to the assertion that as a country develops, the relevance of agriculture to economic development reduces (Van Arendonk, 2015, Christiaensen and Brooks, 2018). That is, as a country develops, the contribution of agriculture to GDP and employment creation reduces. As such, the effect of public agricultural spending on creating unemployment in non-agriculture-based countries may not be higher than in agriculture-based economies where the relevance of agriculture is still higher. As countries develop, most people are employed in service and manufacturing industries as such public agricultural spending may not have higher impacts unlike in countries where agriculture is the hub of the economy (Brooks et al., 2013).

The forms of spending may also explain the higher effect of public agricultural spending in agriculture-based economies than in non-agricultural based economies. In most agriculture-based economies, the government spending focuses more on both providing agricultural capital in form of loans, subsidies and extension, and increasing productivity which ends up creating more employment opportunities among people unlike in other categories where the focus is narrowed to increasing productivity and end up investing in research and development and mechanization which does not create more jobs as compared to combining it with capital-oriented expenditures.

5.3 Summary

The chapter compared the effects of public agricultural spending and unemployment in sub-Saharan Africa. The countries were divided into two categories based on agriculture's contribution to GDP and labour force. Countries in which agriculture contributes either more than 25 percent to GDP or at least 50 percent to the labour force, were termed agricultural countries and were compared with the later. The results showed that the effect of public agricultural spending on unemployment is higher in agricultural countries than in non-agricultural countries. The study highlighted that the higher number of people employed in agriculture and the higher contribution of agriculture to the economy are the key factors behind the higher effectiveness of public agricultural spending in reducing unemployment. Again, the study highlighted the diversification of the focus of public agricultural spending to be among the factors behind the higher returns of public agricultural spending in reducing unemployment in agriculture-based countries. Unlike non-agricultural countries that focus only on productivity-enhancing expenditures such as infrastructure development and research and development, agriculture-based countries also focus on capital building expenditures such as loans and subsidies.

CHAPTER 6: SUMMARY, CONCLUSION, AND RECOMMENDATIONS

Chapter 6 presents the summary of findings, conclusions, and recommendations of this study. The summary gives a brief overview of the research problem, objectives, methodology, and findings, the conclusion captures the overall outcome of the study regarding the findings of the hypotheses and objectives. The recommendations give some remedies and directions to be implemented by specific bodies such as governments and regional integrations. The chapter also provides directions for future research based on the limitations that have been discussed in Chapter 1.

6.1 Summary

Since the signing of the Maputo Declaration in 2003, most countries have increased their spending on agriculture. That has given a genesis of empirical studies on the relationship between public agricultural spending on various macroeconomic variables such as economic growth, poverty reduction, output and productivity. However, there was still a gap in empirical literature regarding the effects that public agricultural spending has on unemployment reduction in sub-Saharan Africa. Therefore, this study sought to examine the empirical relationship between public agricultural spending and unemployment in the region. The study is relevant since public spending on agricultural loans and subsidies provide capital, spending on agricultural extension and education provides skills and knowledge while spending on infrastructures such as value addition plants, irrigation, and agricultural buildings attract private investors thereby creating different job opportunities. Spending on research and development is very key to increasing productivity which is essential for increasing incomes and aggregate demand in the economy.

The study, specifically, analysed the short-term and long-term impact of public agricultural spending on unemployment and compared the effects of public agricultural spending on unemployment among countries. To study the short term and long-term effects, the study used the dynamic fixed-effect model and the GMM estimation technique. The study used GDP per capita, a proxy for economic growth as a control variable. To compare the effects, the study created an interaction term between the dummy of dependence on agriculture and public agriculture spending which was regressed in both the dynamic fixed-effect model and the GMM models.

The results from both the dynamic fixed effects model indicated that public agricultural spending has a role in reducing unemployment in sub-Saharan Africa. However, the study went further to estimating the GMM bearing in mind that there might be problems of autocorrelation and endogeneity in the dynamic fixed-effects model which may arise due to reversed causality between public agricultural spending and unemployment and the inclusion of the lagged dependent variable as a regressor. The GMM controls for endogeneity, autocorrelation, and heteroskedasticity. The study also estimated the long-run estimates from the two-step GMM considering that GMM estimates are short-run estimates. The study found that public agricultural spending reduces unemployment in sub-Saharan Africa both in the short and long-run.

To compare the effects the study classified the countries into two categories; agriculture-based and non-agriculture based. The classification was based on World Bank classification which considers the contribution of agriculture to GDP and labour force. For a country to be considered agriculture-based, either the contribution of agriculture to the labour force must be at least 50 percent or the contribution to GDP must be at least 25 percent. The study created a dummy variable and interacted it with public agricultural spending. The interaction term was regressed in both the dynamic fixed effects model and the GMM. The results from both techniques found out that the effect of public agricultural spending on unemployment is greater in agriculture-based countries than in non-agricultural countries.

6.2 Conclusions

The study has empirically examined the effects of public agricultural spending on unemployment in sub-Saharan Africa and compared the effects between agriculture-based countries and non-agriculture-based countries. The study found out the following two revelations;

1. Both the short-run and long-run results found statistically significant negative effects of public agricultural spending on unemployment in sub-Sahara Africa. That is, the study found out that public agricultural spending reduces unemployment both in the short and long run in sub-Saharan Africa
2. Finally, the interaction term between the dummy for agriculture-based countries and public agricultural spending was positive and statistically significant indicating the effects of public spending on unemployment reduction is higher among agriculture-based

countries than non-agriculture-based countries. That is, the effect of public agriculture spending on creating employment reduces as the relevance of agriculture to the country's development reduces.

The results, therefore, lead to a conclusion that regional agricultural policies, agreements and interventions such as the Malabo and Maputo agreements may not yield the same result across all countries in sub-Saharan Africa due to heterogeneities in features related to agriculture and the macro-economy that exist among the countries

6.3 Recommendation

Despite the general result showing that public agricultural spending reduces unemployment in sub-Saharan Africa, it would be illogical to recommend that countries should embark on expansionary fiscal policies in the region, particularly by increasing public agricultural spending. The recommendation would be illogical because the study has also found out that the effects are different based on the different features that exist across countries. That is, the study has found that the effects of increased public spending in reducing unemployment are higher in agriculture-based countries than in non-agriculture-based countries. As such, recommending a policy for the entire region may be deceptive. Therefore, the study recommends that countries in sub-Saharan Africa should pledge and set agricultural policies based on their inherent features related to agriculture and the macro-economy.

6.4 Suggestion for future research

The study suggests that future research on this topic should consider disaggregating public agricultural spending into different forms such as subsidy, research, and development, infrastructure, education, and extension which this study failed to do due to data limitations. The disaggregation of expenditures will obtain results that would be relevant for policymakers to identify specific intervention areas of public agricultural spending which are more responsive in the reduction of unemployment in SSA.

The study also recommends that future research on this subject should use data with longer time dimensions. The longer time dimensions help to perform robust analysis which can capture effects

for individual countries. Capturing effects for individual countries is important since countries have different inherent agricultural and macro-economic features that affect the performance of the public agricultural spending differently.

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