The Impact of Foreign Aid on Economic Development and the Role of the Institutional Quality

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ABSTRACT

This study, will attempt to empirically analyse the achievements or failures of foreign aid on economic growth from different perspectives, such as the role of institutional quality, investment volatility and foreign agricultural aid on food security, in the different economies of Sub-Saharan Africa over a given period of time.

In the second chapter of this study, the interconnectivity of growth, aid and institutions in Sub-Saharan Africa were analysed, based on annual data for a panel of 39 nations from 1996 to 2017. The hypothesis that the growth impact of aid and institutions could be interactive was examined. The hypothesis was tested using panel data series for official development assistance, aggregate and individual measures of institutional quality and economic growth, while controlling for sub-regional differences in Southern Africa, Eastern Africa, Western Africa and Central Africa. The results indicate that aid has a direct positive and an indirect negative growth impact through its interaction with domestic institutions. The synergistic growth impact of aid and institutions is found to be substitutive rather than complementary. Good quality institutions are positively correlated with growth, and the institutions that reduce rent-seeking and protect property rights are the types of institutions with the biggest growth effects.

In addition, Foreign agricultural aid has been put forward as a viable complement to domestic resource mobilization in filling the resource gap. The third chapter thus empirically examines the impact of foreign agricultural aid on food security in Sub-Saharan Africa over the period 2002-2017. Based on the methodology stated in this

chapter, the following conclusions have been reached: (i) Foreign aid to agriculture can indeed help to fill the resource gap (ii) The nature of causal relations between per-capita calorie intake and foreign agricultural aid shows that foreign agricultural aid is an important predictor of food security. (iii) Foreign agricultural aid directed towards increasing agricultural productivity helps to cope with a rising population. (iv) Feedback suggests the existence of a vicious cycle in which SSA countries with weaker institutions receive more agricultural aid which further weakens the quality of institutions in these countries.

Finally, in the fourth chapter of this study, it is known that sustained investment is required for economic growth. Investment, however, often experiences severe volatility in poor countries, making spending plans difficult to formulate and diminishing growth potentials. Foreign aid serves as an important source of complementary financing for sustained investment. This paper therefore studies the effect of aid inflows on total investment volatility in 19 heavily-indebted, poor Sub-Saharan African countries over the period 1980 to 2017. Employing the cross-sectionally augmented distributed lag (CS-DL) estimation technique for long-run coefficients in dynamic heterogeneous panels with cross-sectional dependence, along with bootstrap panel causality testing, we show that aid has an inverse relationship with volatility. The fourth chapter thus conclude that aid can be viewed as a dampening factor for investment volatility in poor countries.

Keywords: Economic Growth, Official Development Assistance, Institutions, Sub-Saharan Africa, Panel GMM, Food security, Foreign aid, Investment volatility, Cross-sectional dependence, Slope heterogeneity, CS-DL, Bootstrap panel Granger causality

ÖZ

Bu çalışmada, dış yardım uygulamalarının ekonomik büyüme üzerindeki başarısında veya başarısızlığında, kurumsal kalitenin rolü, yatırım dalgalanmaları ve ayrıca gıda güvenliğindeki dış kaynaklı tarımsal yardım gibi farklı perspektiflerde ele alarak, farklı ekonomilerde değerlendirildi. Deneysel olarak belirli bir zaman diliminde Sahra Altı Afrika ülkeleri örneklenerek analiz çerçevesi oluşturuldu.

Dolayısıyla bu çalışmanın ilk bölümünde, Sahra Altı Afrika Ülkeleri'ndeki büyüme, yardım ve kurumların birbirleri ile etkileşimi, 1996'dan 2017'ye kadar 39 ülkeden oluşan bir panel çerçevesinde yıllık verilere dayanılarak analiz edildi. Dış yardımlar ve kurumların büyüme üstünde etkisinin olabileceği hipotezi interaktif olarak incelendi. Hipotez, Güney Afrika, Doğu Afrika, Batı Afrika ve Orta Afrika'daki bölgesel farklılıklar kontrol edilirken, resmi kalkınma yardımı, kurumsal kalitenin toplu ve spesifik ölçümleri ve ekonomik büyüme için panel veri serileri kullanılarak test edildi. Sonuçlar, yardımın yerel kurumlarla etkileşimi yoluyla doğrudan olumlu ve dolaylı olarak olumsuz bir büyüme etkisine sahip olduğunu göstermektedir. Dış yardım ve kurumların sinerjik büyüme etkisinin tamamlayıcı olmaktan çok ikame edici olduğu bulunmuştur. Kaliteli kurumlar ekonomik büyüme ile pozitif yönde ilişkilidir ve rant arayışını azaltan ve mülkiyet haklarını koruyan kurumlar, büyüme etkilerinin en büyük olduğu kurum türleridir.

Öte yandan yabancı tarımsal yardım, kaynak açığının doldurulmasında yerel kaynak seferberliğinin uygulanabilir bir tamamlayıcısı olarak öne sürülmüştür. Bu bölüm, böylelikle 2002-2017 döneminde Sahra Altı Afrika'da yabancı tarımsal yardımın gıda

güvenliği üzerindeki etkisini ampirik olarak incelemektedir. Çalışma metodolojisine dayanarak aşağıdaki sonuçlara ulaşılmıştır; (i) Tarıma yönelik dış yardım, gerçekten de GGD ülkelerinin kaynak açığını kapatmaya ve uzun vadede kişi başına kalori alımını önemli ölçüde artırmaya yardımcı olabilir. (ii) Kişi başına kalori alımı ile yabancı tarımsal yardım arasındaki nedensel ilişki, yabancı tarımsal yardımın gıda güvenliğinin önemli bir göstergesi olduğunu göstermektedir. (iii) Nüfus büyüklüğü, SSA'da gıda güvenliği üzerinde en büyük etkiye sahiptir. Bu nedenle, artan nüfusla başa çıkmak için tarımsal üretkenliği artırmaya yönelik yabancı tarımsal yardım, gıda güvensizliği sorununun çözülmesi için hayati önem taşımaktadır. (iv) Yabancı tarımsal yardım ile kurumsal kalite arasında nedensel ilişki, daha zayıf kurumlara sahip ülkelerin daha fazla tarımsal yardım aldığı ve bu ülkelerdeki kurumların kalitesini daha da zayıflatan bir kısır döngünün varlığını göstermektedir.

Son olarak, bu çalışmanın son bölümünde, ekonomik büyüme için yatırım devamlılığı gereklidir. Ancak yatırımlar, genellikle gelir seviyesi düşük ülkelerde harcama planlarının formüle edilmesini zorlaştırır ve ekonomik büyüme potansiyellerini azaltır. Bu makale, 1980-2017 döneminde, 19 ağır borçlu, yoksul Sahra Altı Afrika ülkesinde yardım girişlerinin toplam yatırım dalgalanmaları üzerindeki etkisini incelemektedir. Bu çalışmada kullanılan çeşitli ölçüm teknikleri ve gerekli testlerin ardından dış yardımların, dalgalanma ile ters bir ilişkisi olduğunu görülmektedir. Böylelikle yardımın Yoksul ülkelerdeki yatırım oynaklığını azaltıcı bir faktör olarak görülebileceği sonucuna varılmaktadır.

Anahtar Kelimeler: Ekonomik Büyüme, Resmi Kalkınma Yardımları, Kurumlar, Sahra Altı Afrika, Gıda Güvenliği, Dış Yardım, Yatırım Volatilitesi, Yatay Kesit Bağımlılığı, Eğim Heterojenliği, İçsel Panel Granger Nedensellik.

DEDICATION

This PhD. study and research is dedicated to those who, in spite of everything, never give up.

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LIST OF ABBREVIATIONS

ADF	Africa Development Foundation
AASR	African Association for the Study of Regions
CAADP	Comprehensive Africa Agriculture Development Program
CIS	Commonwealth of Independent States
CS-ARDL	Cross-Sectional Augmented Autoregressive Distributed Lag
CS-DL	Cross-Sectional Augmented Distributed Lag
DAC	Development Assistance Committee
FAO	Food and Agriculture Organization
FOCAC	Form On China-Africa Cooperation
GDP	Gross Domestic Product
GMM	Generalised Method of Moments
HIPC	Heavily-Indebted, Poor Countries
ICESDF	Intergovernmental Committee of Experts on Sustainable Development Financing
IFPRI	International Food Policy Research Institute
IICA	Inter-American Institute for Cooperation on Development
IISD	International Institute for Sustainable Development
IMF	International Monetary Fund
IQ	Institutional Quality
MCC	Millennium Challenge Corporation
MDG	Millennium Development Goals
NEPAD	New Partnership for Africa's Development
ODA	Official Development Assistance

OECD	Organization of Economic Cooperation and Development
PAI	Personal Activity Intelligence
PCA	Principal Component Analysis
R&D	Research and Development
SDG	Sustainable Development Goal
SSA	Sub-Saharan Africa
UN	United Nations
UNCTAD	United Nations Conference on Trade and Development
UNDP	United Nations Development Programme
UNICEF	United Nations International Children's Emergency Fund
US	United States
WDI	World Development Indicators
WFP	World Food Program
WGI	Worldwide Governance Indicators
WHO	World Health Organization

Chapter 1

INTRODUCTION

Foreign aid to increase capital formation is often required by capital-inadequate countries in different regions around the world, especially Sub-Saharan Africa (SSA). Foreign assistance in countries like these is an important factor, inter alia, in driving employment, promoting local homogenization and encouraging economic and commercial participation and trade. A number of prominent United States (US) development assistance programmes, including the Africa Development Foundation (ADF) and Millennium Challenge Corporation (MCC) among others, play a vital role in stimulating local economies but also in supporting youth entrepreneurship, sustainable agriculture and improved accessibility to power. Within this framework, the aim of foreign aid worldwide, and especially in Africa, is to augment savings and investment, to eradicate severe poverty and consequently to improve the standard of living (Ogundipe, et al., 2014). The literature suggests that SSA is the largest recipient of foreign aid.

Sub-Saharan Africa (SSA) was the recipient of the largest sum of aid from the Organization of Economic Cooperation and Development (OECD) countries, chiefly via the Development Assistance Committee (DAC). Several new contributors have joined the SSA aid programmes over the past few decades, including Brazil, China, India, Korea, Malaysia, South Africa, Thailand, Turkey, some Middle Eastern countries and the Commonwealth of Independent States (CIS) amongst others

(Chaponnière, 2009), although of these, China is considered to be the largest[1] foreign aid donor to Africa (Woods, 2008).

The political economy of foreign aid assistance to Africa has changed in recent times, and China's emergent presence in the market has revitalized the deliberation amongst academics and policymakers on the efficacy of aid in SSA. Foreign assistance is a major factor in African countries' abilities to meet the agenda of 2030. In this respect, food security is the most important issue to be dealt with through foreign assistance. In 2018, there were 820 million malnourished people worldwide, with SSA accounting for 223 million[2] of that figure, which exceeds the global average (UNICEF, WFP and WHO, 2019). Consequently, essential steps must be taken to reduce the shortage of food in the region.

The contribution of overseas development assistance (foreign aid) to economic growth in different economies in the past few decades indicates that some countries have achieved their own development objectives, while others have not. Despite a growing perception that aid is effective in promoting growth, aid volatility is still a matter of concern. Lensink and Morrissey (2000) argue that volatility has a negative effect on the macro-economic effectiveness of foreign aid. Mosley and Suleiman (2007) show that the ability of the recipient public sector to implement coherent investment programmes and fiscal policies is reduced by not utilizing the overseas development assistance effectively. In reviewing the development experiences in recent decades, inefficient public administration, weak institutional framework and inappropriate

[1] Form On China-Africa Cooperation (FOCAC) forum was created in the 2000s, while in 2018, China, through FOCAC, promised to provide as much as $60 billion in financial support to Africa.

[2] This is the figure, according to the African Association for the Study of Regions, that is projected to increase to about 355 million people by the year 2050.

economic policies also contribute to the poor aggregate economic performance (Ghura and Hadjimichad, 1996). Institutional capacities to conduct basic functions are far more intrinsic to success or failure in economic development than any other suggestions (Summers 2005).

The effectiveness of tackling the issue of food security in the region may be limited if it is regarded solely as a supply issue. In fact, supplying greater quantities of food to SSA on behalf of foreign aid organizations and wealthy nations has not solved the problem of food insecurity (Rademacher, 2012). The huge costs involved in transporting foreign food to the region, the ongoing controversy over genetically modified foods and the difficulties in distributing foreign food are some of the main problems faced. Therefore, an across-the-board methodology is required to address the problem of food insecurity in the SSA region. Experts advocate that increased agricultural expenditure is an alternate course of action. Also, the findings of Islam, (2011) and Alabi, (2014) indicate that one of the main reasons for food insecurity in SSA is low agricultural investment.

Another means of mobilizing domestic resources is through foreign agricultural aid. In resource-poor economies like SSA, the only way to reduce the agricultural investment gap is through foreign agriculture aid (NEPAD, 2010). $11 billion in agricultural investment will be required globally by 2030 to meet the targets of Sustainable Development Goal (SDG) 2 (eradicate hunger and food security), of which $4 billion is needed by SSA (Laborde et al., 2016a). The role of foreign aid in improving poor countries' economies has been deemed largely unsuccessful and critics further suggest it encourages dependency and incites corruption (Doucouliagos & Paldam, 2009; Dreher & Langlotz, 2017).

Although the literature indicates that infrastructure development is a significant factor in the overall economic development of a country, in less developed regions like SSA, infrastructure development is still a work in progress and needs massive investment. Developing countries' comprehensive needs for infrastructure development amount to roughly $1.5 trillion per year, whereas Africa's requirements are equal to 15% of Gross Domestic Product (GDP) (Bhattacharya & Romani, 2013; UNCTAD, 2016; Fay et al., 2011). The resource-deficient SSA cannot meet its long-term investment needs either, because of insufficient domestic savings and its substantial dependence on natural resources, the income inflow of which is inconstant (Balcilar, Tokar & Williams, 2018; Grigoli & Mills, 2011).

Reliance on volatile income sources has a severe effect on the global macroeconomic environment of a country, leading to low per capita incomes in poor countries. In such cases, the country's economic circumstances can be helped by inflows of foreign aid, which can assist in reducing the country's income shock as a consequence of volatile natural resource revenues. In this way, foreign aid in recipient countries can bridge the gap and help to balance investment volatility. Foreign aid can contribute to economic growth in several ways, including the accretion of both physical and human capital, meeting domestic demand through imports and increasing productivity while enabling technology transfer amongst others (Morrissey, 2001).

There is a long history of theoretical models describing the relationship between foreign aid and economic growth. The two-gap[3] model was the first to explain the need

[3] The literature suggests that the two gaps (the gap between investments and savings and the gap between imports and exports) as referenced in the two-gap model could be bridged by either acquiring aid from wealthy countries or via trade surpluses.

for aid to encourage the progress of developing countries. The model argument is based on the fact that less developed countries require a "Big Push[4]", that is to say a growth in investment via aid finance to get them out of the poverty trap. The two-gap models were the subject of criticism (Little, et al., 1970; Balassa, 1971; Bhagwati, 1978; & Krueger, 1978) resulting in alternate poverty-related rationalizations of developing countries. The different explanations given in these studies may have diverse consequences on the distribution of foreign aid. However, the above-mentioned analysis explains that foreign aid flows to developing countries is essential.

The development economists of the 1950s and '60s believed that to realize the necessary per capita growth rate, developing countries ought to meet their investment targets and use foreign aid to bridge financing gaps. An alternative argument concerning the correlation between foreign aid and economic growth can be found in the new endogenous growth theory, which is a variation of the long-standing neoclassical growth theory of Robert and Romar (Robert, 1988; Romer, 1986). In this theory, human capital and research and development (R&D) activities, are a significant factor for economic growth. The reasoning is supported by the evidence that low human capital, i.e. below-average health and education standards, leads to poverty. Consequently, the only way for poor countries to improve their physical and human capital infrastructure in order to achieve sustained economic growth is through foreign aid. On the contrary, modern theories consider that foreign aid plays no part in determining economic growth. They attribute sustained economic growth to sensible government policies and the competent functioning of institutions. Thus, according to

[4] The Big Push argument maintains that a large inflow of aggregate assistance in social and productive sectors will lead to growth in all sectors of society. This argument has its roots in the Jeffrey Sachs School of thought and is based on the 'poverty trap' theory and consistently low levels of production, which inhibit the growth of poor countries.

these theories, foreign aid is needed as an incentive to encourage prudent government policies and promote higher-quality institutions rather than to utilize the accumulation of human and physical capital (Sharma, 1997; Dollar and Easterly, 1999; Harms and Lutz, 2004 & Easterly, 2005).

The dependency theory measuring the connection between donor aid and the general economic development of poor countries is insightful. The dependency theory suggests that economic growth in developed nations is not necessarily related to growth in developing nations (Ferraro, 1996). The reasoning behind this theory is based on the fact that wealthy nations continuously extract resources from developing countries to supplement their economic growth, except in cases of vast insolvency.

Theorists believe that the modernization theory inadequately explains why persistent growth in wealthy nations is not transferred to poor nations, which resulted in the development of the dependency theory in the 1950s. It was expressed by (Frank, 1967) that the modern theory fails to explain the motive behind aid to poor countries. Dos Santos (1971) is of the opinion that a specific structure in world economies is produced by dependency, where this configuration generates development opportunities for wealthy countries at the expense of poor countries. All definitions of the dependency theories share three features. In an international structure, dependency consists of two states; dominant and peripheral. OECD countries are peripheral states whereas dominant states include Latin America, Africa and Asia. A low per capita income and dependence on a single commodity for foreign exchange are noticeable characteristics of dominant countries.

It is suggested in ample literary sources that peripheral states are under the long-term control of rich countries and attain numerous political and economic objectives/interventions. A contemporary and multitudinous example of dependency is colonialization, where developing countries were controlled both politically and economically by wealthy, industrialized nations. Rich countries used a variety of economic strategies to rule periphery states, including but not limited to molding the poorer nations into colonial extraction centers. It is believed that the higher living standards in wealthy nations is maintained through the extraction of resources from poor countries. As a result of colonization, countries were not only exploited but the earnings generated in the colonies was repatriated (Rodney, 1972). Within that environment, wealthy nations utilize donor aid, the media and education systems to achieve dominance over poorer countries.

There is also literature which looks into the roles of culture, traditions and habits play in a country's development without foreign aid. What one can infer from Rostow's theory of development is that Africa should replace traditional practices with Eurocentric views, thoughts and principles to escape from the vicious cycle of dependence on foreign aid (Njoh, 2006). Several economists consider that as culture is both undefined and forceful, policy-making in relation to foreign aid cannot be centered on culture and principles. There are, however, groups of social scientists who believe that culture is a way of life influencing beliefs, traditions, ethics, knowledge and customs, and thus cannot restrict development.

A good example to illustrate the role of values in a country's development can be seen in Ghana and South Korea. In the early 1960s, economically Ghana and South Korea were considered to be equals, but thirty years later, South Korea had become a

developed country whereas Ghana was still reliant on foreign aid, including aid from South Korea. Huntington (2000) is of the view that amongst other factors[5] culture played an important role in this economic development. Furthermore, Landes (2000) believes that what can be learnt from the history of economic development is that culture that makes all the difference[6]. Sen (2004) elaborated this view to explain how much difference culture makes in economic development. He is of the opinion that culture is a multidimensional concept which impacts our lives in many aspects, for example our evolution, political involvement, economic conduct and moral development as well as our sense of identity.

Nevertheless, the importance placed on a country's culture is dependent on whether or not the donor wishes to be involved in development. If the donor seeks participatory development, they attribute more significance to the country's culture and vice versa (Abraham and Platteau, 2004). On the contrary, Codjoe (2003) argues that it is colonization combined with Africa's incorporation into the global capitalist system which is responsible for underdevelopment as opposed to the culture. This argument, that Africa's underdevelopment is a result of colonization, is supported in (Rodney, 1972). The writer reasoned that Africa was incapable of defending its interests and controlling its internal affairs due to colonization.

The mixture of cultures in Africa could also be a factor in its underdevelopment, according to (Calderisi, 2006). Likewise, Pomerantz (2004) believes that continued development in Africa cannot be based only on money as culture also plays a

[5] South Koreans believe in frugality, self-restraint, structure, investment, hard work and education.

[6] Landes' conclusion is that foreign aid can help but it can also harm.

significant part. In addition, she reasoned that the issue of African culture, i.e. history, politics and society, is consistently brought up when foreign aid fails to meet the required targets. There are many drawbacks associated with aid, including apathy, the concept of easy money, gratification, ignorance and others, but uppermost is that the example enforced bears no relation to the domestic socio-cultural dynamics of the recipient countries (Reusse, 2002). The rationality behind his reasoning is that in order for foreign aid to be effective, an understanding of the local culture is necessary. The aid recipient countries' development plans cannot be put into action without their culture being a part of the interventionist model of donor countries (Satterthwaite, 2001).

It is essential to understand what defines foreign aid in the context of severe worldwide poverty. The latest figures indicate that approximately half of the world's population live below the poverty line (make $2 per day) and are deprived of basic necessities such as access to clean drinking water, education and healthcare among other things. Despite negative opinions, foreign aid helps the marginalized parts of societies in resource-deficient countries such as those in SSA. Foreign aid literature can be divided into three parts, namely the consequences of foreign aid, the distribution of foreign aid and the determinants of foreign aid.

The first thread of literature examines the effects of aid and is largely produced by academics in international donor organizations. A vast amount of work attempts to answer one simple question: does aid actually work? Examples include (Masud and Yontcheva 2005; Rajan and Subramanian 2005) amongst others. International donor organizations are forthcoming on the subject of contributions but have little to say about the consequences, due to the fact that their aid efforts are ineffective. For this

reason, the Paris Declaration on Aid Effectiveness was adopted. The Paris agenda ensures both recipients and donors must achieve tangible results through development efforts, but the Paris Declaration is only the first step on a long road, albeit in the right direction.

The second thread of literature is concentrated on the allocation of foreign aid budgets and focuses on answering the question: who gives aid to whom, and why? That is to say, who receives the most aid: the poorest countries, ex-colonies, or strategic allies? Studies in this field use various features of recipient countries as independent variables. Which are the main factors determining foreign aid allocation; respect for human rights and democracy (Alesina and Weder 2002; Neumayer 2003; Gates and Hoeffler 2004) or the recipient's needs (Alesina and Dollar 2000; Berthélemy 2006; Nunnenkamp and Thiele 2006)? There is also literature which explores whether foreign aid is driven by self-interest or philanthropy (Schraeder et al. 1998).

The third and final thread of literature focuses on why some donors give more aid than others, which is correlated with the determinants of foreign aid. In these studies, the amount of foreign aid is calculated as part of GDP, and also examines the distribution of aid, concentrating on characteristics of the donor states rather than the recipients (Breuning and Ishiyama 2003). Research indicates that the higher the amount of foreign aid, the more generous the local welfare system (Lumsdaine 1993; Noël and Thérien 1995) in cases where the amount of aid is determined by institutional quality (Imbeau, 1989). Conversely, Round and Odedokun (2003) believe that the generosity quotient of ODA/GDP and the local welfare system are not significantly interrelated.

The connection between foreign aid and economic growth cannot be viewed as a matter of simple causality, in spite of the positive and stimulating effect of aid on overall economic activity in developing countries, as it is a multifaceted economic and political procedure (Jerve & Nissanke, 2008). Whether or not aid is effective is debatable. Some consider aid to be effective due to development benchmarks imposed by donors regarding the purpose and application of aid activities alongside the use of sophisticated empirical processes in addition to access to superior data (McGillivray, 2003a, 2003b). There are opposing views concerning the connection between countries with better policy regimes and the effectiveness of foreign aid[7]. Supporters of the positive connection include (Burnside and Dollar, 2004; Collier and Dollar, 2002 & Collier and Hoeffler, 2002) while those who oppose the positive connection between the quality of policy regimes and aid effectiveness include (Hansen and Tarp, 2001; Lensink and White, 2001; Dalgaard et al., 2004 & Gomanee et al, 2003) amongst others. Aid effectiveness encompasses different types of aid[8].

Different studies have utilized different methods to explore aid effectiveness. General macro-level studies failed to reach a conclusion and their results are vague, whereas micro-level studies argue that aid is effective (Moreira, 2005). In spite of the vast amount of research carried out on the relationship between growth and aid, the argument on the macro front is still ongoing. There are studies which find that aid is growth-neutral and insist on alternatives (Rajan and Subramanian, 2005; Oya, 2006; Easterly, 2007; Doucouliagos and Paldam, 2009; Dreher and Langlotz, 2017 inter alia), whereas others find that aid has a negative effect on growth due to fostering

[7] For more detailed considerations and the varying dimensions of aid effectiveness (both current and future) please see Ndikumana and Pickbourn, 2016; Wako, 2011; 2018; Tait, et al., 2015.

[8] For detailed discussions please read Easterly et al., 2004

dependence and diminishing the quality of institutions in recipient countries by encouraging corruption (Knack, 2001; Bobba and Powell, 2007; Djankov et al. 2008). Those who support aid effectiveness both conditionally and unconditionally include (Clemens et al. 2012; Arndt et al. 2015; Burnside & Dollar, 2000) amongst others.

The literature advocates that institutional quality plays an important part in aid effectiveness. The efficiency and good institutional quality in Western European countries were the main reason for the success of the Marshall Plan in the aftermath of the Second World War (Degnbol-Martinussen and Engberg-Pedersen, 2003). However, the results of many studies indicate that aid is detrimental to growth which is a cause for concern (Rajan & Subramanian, 2005; Djankov et al., 2008). Institutional quality is a factor in economic growth and thus if aid has a negative effect on growth it can also hinder the development of institutional quality. Consequently, the joint effect of aid and institutional quality can either have a substitutive role in growth or a complementary impact on growth.

Chapter 2

EXAMINING THE INTERACTIVE GROWTH EFFECT OF DEVELOPMENT AID AND INSTITUTIONAL QUALITY IN SUB-SAHARAN AFRICA

2.1 Introduction

Sub-Saharan African (SSA) economies are generally resource-starved. The level of savings required to substantially increase capital investment (human and physical) for economic growth is difficult to achieve. This gap can be filled through foreign capital. However, since most SSA countries lack the kind of social, economic and political environment needed to attract foreign direct investment, the alternative source of foreign capital that can be accessed is foreign aid.

Foreign aid, also called official development assistance (ODA), refers to the transfer of resources in the form of grants and loans from three major types of donors—rich governments, private foundations and non-governmental agencies—to developing nations. ODA is often further classified into different modalities such as project-based lending, sector-wide approaches and general budget support.

Historically, the supply of foreign aid to SSA has been dominated by the Organisation of Economic Cooperation and Development (OECD) countries mainly through the Development Assistance Committee (DAC). The entry of new, non-traditional donor countries labeled emerging donors, such as Brazil, China, India, Korea, Malaysia,

South Africa, Thailand, Turkey, some Middle Eastern countries and the Commonwealth of Independent States (CIS) have occurred over the past three decades (Chaponnière, 2009). Among these emerging donors, China stands out as the largest foreign aid provider to Africa (Woods, 2008). The creation of the Forum on China-Africa Cooperation (FOCAC) in the year 2000 firmly established China as a major aid giver to SSA. In 2018, China, through FOCAC, promised to provide as much as $60 billion in financial support to Africa.

Unsurprisingly, the increasing importance of emerging donor countries, especially China, has reopened the debate on the relevance of foreign aid. China's economic presence in Africa in recent years has renewed the debate about the nature and effects of Chinese foreign aid to Africa in particular, and the usefulness of development assistance in general. The renewed interest in the aid effectiveness literature is also tied to pressure imposed on donor countries to increase foreign aid by the founding of the Millennium Development Goals (MDGs) in 2000 (Maruta & Cavoli, 2017). More importantly, the fact that the 2030 agenda and the sustainable development goals (SDGs) are currently being proposed as an opportunity to revitalise the aid effectiveness agenda calls for further studies into the aid-growth nexus.

An examination of existing research on aid effectiveness initially shows that findings differ according to the approach used. Micro-level studies based on cost-benefit analysis however unanimously agree on the effectiveness of foreign aid, while macro-level studies produce ambiguous results (Moreira, 2005). This contradiction is commonly referred to as the micro-macro paradox (Mosley, 1986). At the macro-level, in spite of the large body of literature on aid and growth, the debate is yet to be settled. Many researchers question the effectiveness of foreign aid, arguing against increasing

it and clamouring for better alternatives. These researchers, such as Rajan and Subramanian (2005), Oya (2006), Easterly (2007), Doucouliagos and Paldam (2009), and Dreher and Langlotz (2017) assert that aid is growth-neutral. Knack (2001), Bobba and Powell (2007), and Djankov *et al.* (2008) even argue that foreign aid is not only ineffective but also growth-depressing. They claim that aid is detrimental to the institutions of the recipient countries as it strengthens corruption and encourages dependence. Other researchers such as Clemens *et al.* (2012) and Arndt *et al.* (2015) however conclude that foreign aid unconditionally causes economic growth. A more conservative intermediate position in literature is that foreign aid spurs economic growth under some specific conditions (Burnside & Dollar, 2000).

Concerning the conditions required for foreign aid effectiveness, the quality of institutions in recipient countries has been put forward as crucial. According to Degnbol-Martinussen and Engberg-Pedersen (2003), the good quality of institutions and the efficient administrative and judicial structures of European countries significantly contributed to the success of the post-World War II Marshall Plan. However, available evidence also suggests that foreign aid is detrimental to the quality of institutions in recipient countries (Knack, 2001; Rajan & Subramanian, 2005; Djankov *et al.,* 2008). This raises some concerns. The first is that foreign aid may harm the very institutions with the capability to make it thrive. The second is that if foreign aid is truly detrimental to institutional quality, then it may indirectly lower the growth impact of institutional quality since institutional quality is a determinant of economic growth. Thus, on one hand, the synergistic growth impact of aid and institutional quality may be a negative one, indicating a substitutive growth impact. On the other

hand, the synergistic growth impact of these two variables may be positive, indicating a complimentary growth impact.

This paper investigates the macro-level, aid-growth relationship, institutions-growth relationship and the synergistic growth effect of aid and institutions in SSA. The main objective is to determine whether the synergistic impact of ODA and institutions in SSA is complimentary or substitutive.

The key contributions of this paper are as follows; (i) Foreign aid has a direct, positive growth impact and an indirect negative growth impact through its interaction with domestic institutions. (ii) The synergistic growth impact of aid and institutions in SSA is substitutive rather than complimentary. (iii) The substitutive effect is most pronounced in Western Africa, followed by Eastern Africa, then Southern Africa, and least pronounced in Central Africa. (iv) Good quality institutions are positively correlated with growth and the institutions that reduce rent-seeking and protect property rights are the types of institutions with the biggest growth effects. (v) Sustained net inflow of aid can weaken domestic institutions and lower their growth impacts, and the relevance of foreign aid to economic growth wanes as the quality of domestic institutions improve in the region.

The rest of this study is organised in the following manner; section 2 gives an overview of official development assistance to SSA, section 3 provides a review of relevant literature, section 4 describes the methodology adopted, section 5 outlines the results obtained and their interpretations, and section 6 presents the main conclusions.

2.2 Official Development Assistance in SSA

Due to the concentration of extreme poverty in SSA, the region has been the largest beneficiary of foreign aid over the years. As shown in figure 1, foreign aid to SSA has increased over the years. According to the World Development Indicators (WDI) statistics provided by the World Bank, net ODA inflow to SSA stood at $5.3 billion in 1960.

Aid inflow rose by 38% from $5.3 billion to $7.3 billion between 1960 and 1970. Over this same period, SSA rose from being the third largest aid recipient behind Eastern Asia and Pacific, and Middle Eastern and North Africa to become the second largest aid recipient behind Eastern Asia and Pacific. This era coincides with the introduction of country classification into developed and developing countries as most of SSA emerged from colonisation. During this period, the idea of tackling poverty in SSA became a major concern in the United Nations (UN) and the Bretton Woods institutions. In this era, foreign aid policies were strongly influenced by the Harrod-Domar model and the unlimited supplies of labour model by W. Arthur Lewis.

Between 1970 and 1980, net ODA inflow to SSA increased by 126% to reach $16.4 billion. SSA remained the second largest recipient of foreign aid in this era, behind Middle Eastern and North Africa which overtook Eastern Asia and Pacific as the biggest aid recipient worldwide. During this period, there was a major shift in the approach towards development assistance. The focus shifted from macroeconomic growth to more social considerations such as life expectancy, infant mortality, disease control, education and income, and gender equality. In this period, the UN and associated organisations argued that while the old model of development assistance

resulted in significant economic growth, it had a very limited effect on social indicators. Foreign aid policies were mainly influenced by the Solow neoclassical growth model and the basic needs approach during this era.

Foreign aid to SSA rose by another 50% to $25billion between 1980 and 1990. SSA thus became the foremost aid recipient. The works of Bhagwati (1978) and Krueger (1978) were particularly influential in conditioning foreign aid upon economic liberalisation in recipient countries.

Net ODA inflow declined by 26% from $25 billion to $18billion between 1990 and 2000. SSA however retained its spot as the largest aid recipient. The decline in foreign aid to SSA during this period has been associated with the end of the Cold War. Bearce and Tirone (2010) argue that with the fall of the Soviet Union in 1991, the strategic motivation of donor countries to use foreign aid as a tool for containing the spread of Soviet influence became weakened. Donor countries had no reason to continue using aid as enticement to reject communism and thus could demand more effective use of aid (Milner & Tingley, 2013). The post-Cold War reassessment of aid brought about a close examination of foreign aid by the donor community. According to the United Nations Human Development Report (UNDP 1996: 1), 100 countries or 1.6 billion persons in the world experienced economic decline in the 1980s despite the enormous amount of foreign aid given to them. It was suggested that foreign aid might in fact be producing distorting effects on recipient economies. For example, the largest share of the United States' foreign aid went to countries that ended up as collapsed states, such as Liberia, Rwanda, Sierra-Leone, Somalia, Sudan and Zaire. Foreign aid policy during this period was strongly influenced by two lines of research. The first is the incentive compatibility and strategic ownership approach (programme ownership)

which encouraged the inclusion of recipient countries in the process of foreign aid programme design and implementation. The second is the capital mobility and the international transmission of crises approach which strongly affected the application of capital controls.

ODA inflow again surged by 130% from $18billion to $42billion between 2000 and 2010. SSA remained the foremost aid recipient and received approximately 53% of total aid given worldwide. This era witnessed the advent of the Millennium Development Goals (MDGs) as a response to the failure of growth-focused poverty alleviation strategies. An international action plan to increase aid provision for tackling poverty in eight areas was formulated. The 2005-10 Paris declaration on aid effectiveness by over one hundred partner countries was also launched during this period.

Between 2010 and 2016, net ODA flow again increased by 7% from $42billion USD to $45billion. The largest regional share of ODA again went to SSA during this period. This era corresponds with the full emergence of China as one of the most influential aid givers in SSA.

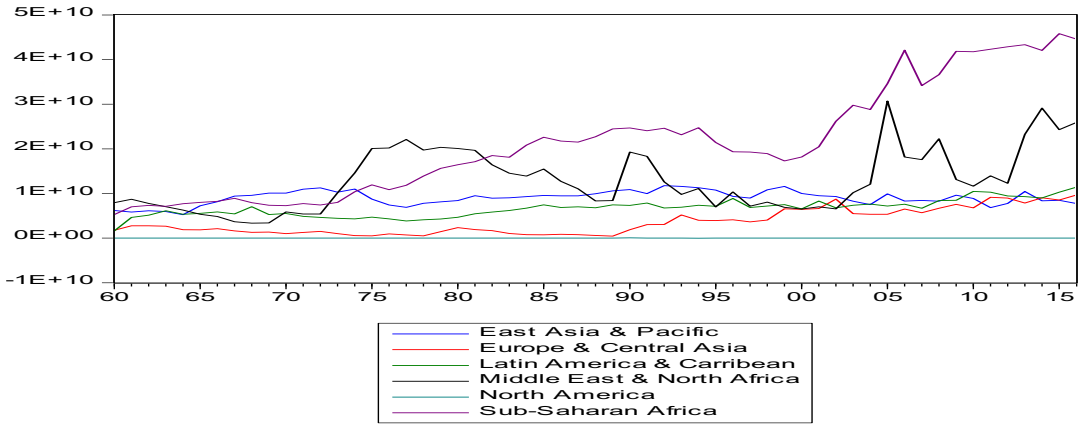


Figure 1: ODA time-series trend for different regions

2.3 Literature

Historically, the aid effectiveness literature has passed through various stages that are classified into first, second and third generations. Aid effectiveness research in each generation was mainly dictated by the underlying theory, objectives, development models, data and equipment available at that historical moment (Thorbecke, 2000).

The first-generation aid-growth literature of the 1960s and early 1970s revolved around the savings-investment gap. Focus was on the role of savings in economic growth. It was argued that poor countries lacked the capability to hit the level of savings required to achieve the investment rate that can spur growth (Easterly, 1999; Hjertholm *et al.,* 2000). The theoretical basis for this savings-investment relation was the Harrod-Domar growth model. According to Hanson and Tarp (2000), the belief at the time was that aid flows increased capital stock in a one-to-one ratio, with no part of it going to consumption. Up to a point, there was a consensus that foreign aid positively impacts growth. However, it was eventually pointed out that aid might actually be displacing domestic savings (Haavelmo, 1965; Griffin & Enos, 1970).

The second-generation aid-growth literature focused on the study of the direct linkage between aid and growth. Studies in this generation share common characteristics with the first-generation studies with regards to the growth models used and the importance attached to capital accumulation as a source of economic growth (Vathis, 2013). Again, studies in this generation reached no consensus on the growth impacts of aid. For example, while Hanson and Tarp (2000) claim that aid drives investment, Mosley *et al.* (1992) argue the opposite.

The third-generation aid-growth literature is characterized by the use of new data and methodologies, the augmentation of the traditional growth models with factors such as policies and institutions, and the introduction of new approaches to modelling endogeneity and non-linearity in aid analysis (Hanson & Tarp, 2000; Vathis, 2013). Like in the preceding generations, studies in this generation provide no clear-cut answer to whether aid has been effective in causing economic growth.

The aid-growth empirical literature can be classified into four groups based on findings. The first strand of literature finds that foreign aid has no significant effect on growth and thus terms aid as growth-neutral. For example, Boone (1996) concludes that aid does not significantly increase investment, neither does it benefit the poor. Rajan and Subramanian (2005) find no evidence of either a positive or a negative relationship between aid and growth. Doucouliagos and Paldam (2009) find no significant effect of aid on economic growth and conclude that aid has not been effective. Dreher and Langlotz (2017) likewise find no significant relationship between aid and economic growth.

The second strand of literature holds a more pessimistic view on aid effectiveness by arguing that aid is not only ineffective but also growth-depressing. This implies that aid aggravates corruption, civil conflicts and dependency, and lowers domestic production in recipient countries. For example, Knack (2001) suggests that aid dependence undermines institutional quality in recipient countries by reducing accountability and encouraging corruption and rent-seeking behavior. The same conclusion is reached in the study by Djankov *et al.* (2008) where aid is found to provide a windfall of resources that induces rent-seeking behavior similar to what is popularly known as the natural resource course. Oya (2006) argues that donor-

recipient relationships have left scarce policy space to recipient governments to formulate innovative trade, agricultural and industrial policies. Moyo (2009) argues that African countries are poor precisely because of all the aid they receive.

The third strand of literature finds aid to be unconditionally growth-enhancing. For example, Clemens *et al.* (2012) point out that increases in aid have been followed by increases in investment and growth, and conclude that this means that aid causes some degree of economic growth in recipient countries. Arndt *et al.* (2015) widen the scope of aid effectiveness literature to include proximate sources of growth, social welfare indicators and economic transformation measures. They find that the long-run cumulative effect of aid is a positive one. Galiani *et al.* (2016) find that aid has a positive, statistically significant and economically sizable effect on economic growth. Mekasha and Tarp (2013, 2018), using a combination of meta-analysis, funnel plots and regression-based tests, confirm the positive impact of aid on economic growth.

The final strand of literature includes those who hold the intermediate position that aid is only effective under certain conditions. Many of the studies in this category identify the quality of institutions and policies emanating from them as key to aid effectiveness. Burnside and Dollar (2000, 2004) find that aid positively affects growth in good policy environments. Collier and Dehn (2001) and Collier and Dollar (2004) reach the same conclusion. According to Durbarry, Gemmell and Greenaway (1998), Burnside and Dollar (2000), Whitaker (2006), and Abuzeid (2009), the quality of institutions is crucial in aid performance; this therefore implies that aid becomes more effective in high-quality public institutions.

2.4 Methodology

2.4.1 Data

Data examined 39 Sub-Saharan African countries for the period 1996-2017 by constructing a yearly panel data set. The countries included are listed in the appendix. Djibouti, Eritrea, Ethiopia, Mauritania, Sao-Tome and Principe, Somalia and Zimbabwe were excluded from the data set due to a lack of sufficient historical data.

Real GDP growth serves as the dependent variable. It is calculated as the annual percentage growth rate of gross domestic product at market prices using constant 2010 U.S dollars. The first regressor of interest is foreign aid, which is measured through the annual, total net official ODA (as percentage of gross national income) given to the selected countries to promote improved welfare and economic development. ODA comprises of three inflow sources—loan disbursements given on concessional terms and grants provided by official agencies attached to Development Assistance Committee (DAC) member countries, loan disbursements given on concessional terms and grants given by multilateral institutions, and loan disbursements given on concessional terms and grants given by non-DAC member countries. ODA includes loans with 25% minimum grant element computed at 10% discount rate. Estimating ODA as a share of gross national income performs two functions; it helps us identify the extent of aid dependency in each of the selected countries, and it also helps in controlling for the scale of the economies.

The second regressor of interest is institutional quality. The six dimensions of institutional quality provided in the World Bank's Worldwide Governance Indicators (WGI) as described by Kaufmann, Kraay and Mastruzzi (2011) serve as the measures

of institutional quality. First is voice and accountability, a measure of perceptions of freedom of expression and association, free media and the extent to which citizens are able to participate in government selection. Second is political stability and absence of violence or terrorism, a measure of perceptions of the probability that existing government will be overthrown or destabilized through violence or unconstitutional channels. Third is government effectiveness, a measure of perceptions of civil and public service quality and freedom from political pressure, policy formulation quality, policy implementation quality and government credibility. Fourth is regulatory quality, a measure of perceptions of government's ability to create and implement good policies and regulations that support the development of the private sector. Fifth is rule of law, a measure of perceptions of confidence and compliance with societal rules, especially qualities of contract enforcement, property rights and the judicial system. It also includes the likelihood of occurrence of crime and violence. Sixth is the control of corruption, a measure of perceptions of the extent to which public power is employed for private gain. Each of these measures is generated by taking the mean values of the underlying sources that correspond to the concept of governance being measured. The measures as used in this study are in units of a standard normal distribution, with zero mean and standard deviation of one, running in percentile rank term within a range of 0 and 100, with higher values indicating better governance.

To aggregate all the six dimensions into a single overall index for institutional quality, I created a composite index for institutional quality via Principal Component Analysis (PCA). I was thus able to ensure that the individual dimensions were converted into linear combinations that account for relatively large proportions of their variance. I also introduced additional control variables (initial GDP, population growth rate,

inflation and trade openness) suggested by neoclassical growth theory and widely used in empirical growth literature. It is worthy of note that although investment is also a key determinant of economic growth, it was not included as one of the explanatory variables because the hypothesized route for aid to affect growth is through investment. Its inclusion thus poses potential multicollinearity challenges.

Data on total net official development assistance, GDP growth, initial GDP, population growth rate, inflation and trade openness were obtained from World Development Indicator (http://data.worldbank.org). The descriptive statistics for the regressand and the regressors of interest are reported on a country-by-country basis in table 1. Central African Republic, Burundi and Gabon have the lowest mean growth rates respectively over the period considered, whereas Equatorial Guinea, Mozambique and Rwanda have the highest mean growth rates over the said period. South Africa, Gabon, Mauritius and Nigeria are the countries to have received the least aid, while most aid inflows were received by Liberia, Burundi, Guinea Bissau and Sierra Leone over the study period. The quality of institutions is weakest in Equatorial Guinea, Congo Democratic Republic, Angola and Chad but strongest in Botswana, Cape Verde, Seychelles and Namibia.

Table 1: Summary statistics

Panel A: GDPG				
	Mean	Std. Dev	Minimum	Maximum
Angola	6.365	5.161	-2.580	15.029
Benin	4.421	1.511	1.712	7.190
Burundi	1.846	3.554	-8.000	5.414
Cameroon	4.327	1.115	2.021	6.781
Congo, Rep	3.339	3.606	-3.100	8.752
Gambia	3.523	3.394	-4.295	7.050
Ghana	5.762	2.681	2.178	14.047
Guinea	3.045	2.739	-1.951	7.956
Guinea-Bissau	2.314	7.437	-28.100	11.600
Kenya	4.215	2.289	0.232	8.406
Madagascar	3.107	4.420	-12.674	9.785
Malawi	4.309	3.027	-4.975	9.600
Mali	5.124	3.324	-0.836	15.376
Mozambique	8.354	4.836	1.679	26.845
Niger	4.632	3.580	-1.410	11.850
Senegal	4.403	1.943	0.655	7.154
Sierra Leone	4.794	9.314	-20.599	26.417
Tanzania	6.197	1.445	3.525	8.464
Togo	4.117	3.770	-2.300	14.377
Uganda	6.359	2.143	3.142	10.785
Botswana	4.535	4.234	-7.652	11.343
Burkina Faso	6.029	1.971	1.820	11.015
Cape Verde	6.157	4.908	-1.270	15.171
Central African Republic	1.305	8.992	-36.037	8.587
Chad	6.314	8.457	-6.256	33.629
Comoros	2.848	2.213	-1.292	10.848
CDR	3.299	4.784	-6.911	9.470
Cote d'Ivoire	3.437	4.209	-4.387	10.707
Equatorial Guinea	20.794	35.379	-9.110	149.973
Gabon	2.063	3.893	-8.933	7.092
Lesotho	3.398	2.241	-2.286	6.901
Liberia	2.767	9.097	-30.145	9.535
Mauritius	4.305	1.533	1.615	8.203
Namibia	4.203	2.743	-0.868	12.270
Nigeria	5.428	3.495	-1.617	15.329
Rwanda	8.196	2.838	2.202	13.850
Seychelles	3.811	4.764	-5.887	11.962
South Africa	2.803	1.760	-1.538	5.604
Zambia	5.717	2.430	-0.386	10.298
Panel B: ODA				
Angola	2.342	2.705	0.172	8.106
Benin	8.229	1.692	5.229	12.453
Burundi	22.517	10.429	5.873	40.410

Cameroon	3.964	2.063	2.084	8.984
Congo, Rep	6.774	9.310	0.905	35.353
Gambia	10.118	4.064	4.333	18.452
Ghana	7.270	4.142	2.145	16.342
Guinea	6.660	2.268	3.198	10.533
Guinea-Bissau	21.031	16.116	8.075	71.785
Kenya	4.037	0.930	2.446	6.068
Madagascar	10.277	6.441	3.836	29.232
Malawi	18.482	4.926	10.120	26.251
Mali	11.196	2.331	8.337	17.951
Mozambique	19.512	7.683	12.514	50.073
Niger	13.285	2.611	8.816	18.341
Senegal	6.572	1.514	3.975	10.582
Sierra Leone	19.665	6.405	9.177	31.471
Tanzania	8.814	2.528	4.763	13.499
Togo	6.446	3.632	2.399	14.776
Uganda	10.990	3.412	6.118	16.393
Botswana	1.274	1.468	0.413	7.092
Burkina Faso	12.028	2.611	6.909	16.165
Cape Verde	15.571	5.096	7.069	25.131
Central African Republic	13.378	7.530	4.530	31.957
Chad	7.912	4.081	2.943	18.519
Comoros	6.453	1.967	3.550	10.986
CDR	11.785	12.771	0.954	62.187
Cote d'Ivoire	4.193	3.297	0.555	11.217
Equatorial Guinea	2.260	3.788	0.004	16.442
Gabon	0.704	0.548	-0.189	2.566
Lesotho	5.575	2.253	2.650	11.144
Liberia	32.940	24.934	5.134	92.141
Mauritius	0.740	0.506	-0.251	1.699
Namibia	2.791	1.120	1.228	4.699
Nigeria	0.827	1.189	0.240	4.939
Rwanda	18.087	4.745	12.138	34.004
Seychelles	2.558	2.046	0.437	9.202
South Africa	0.343	0.062	0.251	0.459
Zambia	10.965	6.504	3.746	23.070
Panel C: IQ				
Angola	16.149	2.939	10.177	21.644
Benin	40.557	3.816	31.800	44.905
Burundi	25.903	7.635	12.470	37.697
Cameroon	22.388	3.072	16.402	27.869
Congo, Rep	23.178	3.604	16.402	31.800
Gambia	41.212	5.031	33.438	50.475
Ghana	54.526	3.943	47.854	61.287
Guinea	26.960	4.287	18.040	36.387
Guinea-Bissau	19.514	5.210	8.866	26.886

Kenya	26.960	2.948	21.971	31.800
Madagascar	43.848	9.204	25.575	57.683
Malawi	42.091	6.655	28.524	51.785
Mali	37.504	4.056	32.128	45.888
Mozambique	41.867	4.334	31.145	46.216
Niger	34.511	4.391	27.541	39.991
Senegal	53.885	7.340	39.008	65.873
Sierra Leone	31.532	3.416	24.920	41.301
Tanzania	39.425	5.545	33.438	52.441
Togo	31.130	3.765	25.903	37.697
Uganda	30.445	3.404	24.265	36.387
Botswana	90.073	4.189	81.599	99.946
Burkina Faso	53.349	5.843	42.939	63.580
Cape Verde	84.813	5.119	75.047	91.100
Central African Republic	22.865	3.904	14.436	29.507
Chad	16.178	3.715	10.177	23.609
Comoros	31.696	5.689	19.678	39.991
CDR	12.917	4.537	3.624	19.350
Cote d'Ivoire	34.019	10.338	19.350	51.458
Equatorial Guinea	9.641	5.209	0.020	18.695
Gabon	32.828	5.329	23.937	40.646
Lesotho	61.287	3.550	54.406	69.150
Liberia	26.915	13.689	4.279	44.905
Mauritius	71.339	4.333	60.959	78.323
Namibia	72.739	6.409	63.580	86.514
Nigeria	21.703	4.145	13.125	30.817
Rwanda	57.936	18.056	35.404	84.876
Seychelles	74.049	5.742	63.908	88.807
South Africa	70.043	9.145	56.045	83.893
Zambia	42.046	5.767	32.455	50.802

2.4.2 Model

The basic empirical model is specified as follows:

$$\Delta y_{it} = y_{it-}y_{it-1} = \alpha y_{it-1} + \beta' x_{it} + \mu_{it} \quad (1)$$

Where Δy_{it} is real GDP growth in country i at time t, β stands for the vector of coefficients, y_{it-1} stands for initial GDP in country i at time t and x_{it} represents the other independent variables for each country i at time t and includes the following; (i) measures of foreign aid (ODA) and institutional quality (IQ) and their interactions, (ii) control variables. μ_{it} is the error term.

2.4.3 Estimation Techniques

2.4.3.1 Panel GMM

While foreign aid may affect economic growth, it is also highly likely that the extent to which aid is extended to a country is dependent on its level of economic growth. Countries with poor growth often receive more aid either on humanitarian grounds or as a means of supplementing their meagre resources (Minoiu & Reddy, 2010). It has also been established that growth models contain endogenously determined variables. According to Glaeser *et al.* (2004), the variables of institutions are not exogenous, as they are highly correlated with economic development. These feedback causations may lead to an endogeneity bias that can result in invalid estimates. To deal with possible endogeneity bias arising from simultaneous causality, I adopted the panel-GMM estimation technique which is superior to conventional instrumental variable estimators in several ways. Unlike the conventional instrumental variable estimators, it is efficient in the presence of heteroscedasticity. Conventional instrumental variable estimators are prone to autocorrelation issues because of the introduction of the lagged dependent variable as a regressor. The Generalized Method of Moments (GMM) technique adequately deals with this problem. The GMM methodology additionally delivers strong results for data sets with temporal aspects smaller in number than the quantity of cross sections (N>T), like in this case, where time is equal to 22 years and there are 39 cross sections.

I employed the system-GMM estimator (Arellano & Bover, 1995; Blundell & Bond, 1998) which transforms data by subtracting the mean of all future observations from the current observation (forward orthogonal deviations). The system-GMM estimator was chosen due to the documented, enhanced effectiveness benefits it provides in

comparison with the first-difference estimator (Baltagi, 2008). In addition, I elected to use the more effectual two-step version of the GMM-estimator. The lagged values of the variables in which are dependent and independent in equal arrangements function as the instruments. The overall validity of the instruments is tested through the Sargan test of over-identifying restrictions, and the Arellano-Bond AR(2) statistics are calculated to test for the presence of autocorrelation in the error terms.

2.4.3.2 Panel Granger causality

The Dumitrescu-Hurlin (2012) Granger causality test is employed to further detect the existence and direction of causal relationships among the variables of interest (growth, aid and institutions). This approach tests for non-causality in heterogeneous panel data models by averaging individual Granger non-causality Wald tests across cross-sections. The underlying regression equation for the test is given as:

$$y_{it} = \alpha_i + \sum_{k=1}^{K} \beta_{ik} y_{it-k} + \sum_{k=1}^{K} \gamma_{ik} x_{it-k} + \varepsilon_{it} \quad (2)$$

Where y_{it} and x_{it} are stationary series. It is assumed that x Granger causes (is a significant predictor) y if its past values affect the current value of y significantly. Differenced data for the non-stationary variables are used in the bivariate causality tests.

2.5 Empirical results

Table 2 presents the panel-GMM regression results. The system contains 7 regression models that are variants of equation 1, with GDP growth as the dependent variable. The first column (M1) reports the regression results from model 1 when the institutional measures are aggregated into a single index (IQ), and interacted with aid (ODA). Columns 2-7 report the regression results for cases where the individual measures of institutional quality (political stability, government effectiveness,

regulatory quality, rule of law, control of corruption, and voice and accountability) are interacted with aid.

All the 7 models indicate that aid by itself exerts a positive and significant impact on economic growth in SSA. The conditional marginal effect of ODA on economic growth (when IQ is zero) ranges between 0.302% and 0.932%. All the models unanimously agree that aid on its own spurs prompt economic growth in SSA. This agrees with the findings of Clemens *et al.* (2012), Mekasha and Tarp (2013, 2018), Arndt *et al.* (2015), and Galiani *et al.* (2016).

With respect to institutional quality, the results show that the aggregate Institutional Quality (IQ) index has a relatively large positive and significant conditional marginal impact on economic growth in SSA. An increase of 0.054% in growth is recorded as a result of a percentage increase in IQ results (when ODA is zero). This aligns with the positions of Acemoglu *et al.* (2001, 2005), Rodrik *et al.* (2004), and Rodrik (2005).

To specifically detect the individual impacts of different types of institutions on economic growth, I further disaggregated the IQ variable into its sub-indices. The results show that all the 6 sub-indices (political stability, government effectiveness, regulatory quality, rule of law, control of corruption, and voice and accountability) have positive and significant conditional marginal effects on economic growth in SSA. The coefficients range between 0.011% and 0.054%. Rule of law and voice and accountability particularly stand out as having the biggest conditional marginal impacts on growth. This indicates that these three factors are the most important institutional determinants of economic growth in SSA and suggests that institutions

that reduce rent-seeking and protect property rights are the most vital to growth in SSA.

Concerning the interaction terms, the coefficients on the interaction between ODA and the overall institutional quality index and between ODA and the institutional quality sub-indices turn out to be significantly negative. The coefficients range between -0.001% and -0.020%. This is an indication that the interactive growth effect of aid and institutions is substitutive rather than complimentary. This suggests that on one hand, increased inflow of ODA lowers the efficiency of institutions, and on the other hand, aid plays an increasingly limited role in the economic growth of countries with good quality institutions.

The results from the control variables are also in line with economic theory and intuition. Initial GDP carries the expected negative sign. The coefficients range between -0.008% and -0.018%, and are all highly significant. This confirms the convergence of income across SSA as established in growth theories. The coefficients on trade openness are all positive and statistically significant, an indication that trade liberalisation stimulates growth. All the coefficients for inflation are negative and statistically significant, a confirmation that high inflation rates inhibit growth. All the coefficients for population growth are positive and statistically significant, thus confirming that in developing regions like SSA, more people provide the labour force required to produce goods and services. This supports the findings of Sethy and Sahoo (2015) and Tumwebaze and Ijjo (2015). The Sargan test results indicate that the validity of the instruments used in the estimations cannot be rejected and all the estimations pass the second order autocorrelation test.

Table 2: Panel GMM estimations (Full sample)

	M1	M2	M3	M4	M5	M6	M7
Initial income	-0.016***	-0.008***	-0.018***	-0.010***	-0.012***	-0.016***	-0.015***
Trade openness	0.901***	0.904***	0.904***	0.994***	0.897***	0.901***	0.736***
Inflation	-0.003***	-0.006***	-0.003***	-0.006**	-0.004*	-0.003*	-0.004*
Population growth	0.115***	0.185**	0.153***	0.086*	0.115***	0.115***	0.106***
ODA	0.382***	0.703***	0.437**	0.932***	0.542***	0.668***	0.302*
IQ	0.054**						
ODA*IQ	-0.020**						
PS		0.019**					
ODA*PS		-0.003*					
GE			0.024**				
ODA*GE			-0.003**				
RQ				0.011*			
ODA*RQ				-0.003**			
RL					0.048**		
ODA*RL					-0.001*		
CC						0.022*	
ODA*CC						-0.003*	
VA							0.052*
ODA*VA							-0.006*
P-value of AR(1) test stat	0.201	0.157	0.127	0.157	0.362	0.194	0.122
P-value of AR(2) test stat	0.325	0.258	0.243	0.260	0.856	0.296	0.225
Sargan test stat	2.843	2.204	2.661	2.649	2.207	2.835	2.801

*Notes: (1) *** Significant at 1%; ** Significant at 5%. (2) PS = political stability; GE= government effectiveness; RQ = regulatory quality; RL =rule of law; CC= corruption control; VA = voice and accountability.*

The main regression model (M1) is re-estimated for each of the 4 sub-regions that make up Sub-Saharan Africa based on the United Nations geo-scheme for Africa (Southern Africa, Eastern Africa, Western Africa and Central Africa). Table 3 presents the regression estimates for sub-regional comparison in SSA. The conditional marginal effects of both ODA and IQ again turn out to be positive and significant across the sub-regions. The interaction terms are likewise negative and significant across sub-regions. The results show that the conditional marginal impact of ODA is biggest in

Southern Africa, followed by Eastern Africa, then Central Africa and lowest in Western Africa. Institutional quality has the biggest conditional marginal impact in Southern Africa, followed by Central Africa, and then Eastern Africa. The impact is again lowest in Western Africa. The interaction coefficients indicate that the substitutive effect between ODA and institutional quality is greatest in Western Africa, second largest in Eastern Africa, third largest in Southern Africa and lowest in Central Africa. The size and signs of the control variable coefficients mirror those reported in Table 2. The Sargan test results again confirm the validity of the instruments, while all the estimations again pass the second order autocorrelation test.

Table 3: Panel GMM estimations (SSA sub-regions)

	Southern Africa	Eastern Africa	Western Africa	Central Africa
Initial income	-0.048***	-0.191	-0.028***	-0.161***
Trade openness	0.999*	0.587*	0.671***	0.085***
Inflation	-0.041***	-0.038**	0.034**	-0.004
Population growth	0.236*	0.305*	0.145***	0.662***
ODA	0.658**	0.511*	0.222**	0.226**
IQ	0.741*	0.321**	0.234**	0.551**
ODA*IQ	-0.008*	-0.012**	-0.013**	-0006*
P-value of AR(1) test stat	0.365	0.484	0.405	0.441
P-value of AR(2) test stat	0.4711	0.224	0.815	0.512
Sargan p-value	0.282	0.320	0.188	0.163

*Notes: (1) *** Significant at 1%; ** Significant at 5%. (2) PS = political stability; GE= government effectiveness; RQ = regulatory quality; RL =rule of law; CC= corruption control; VA = voice and accountability.*

The Dumitrescu-Hurlin panel causality test results are reported in table 4. Significant feedback causal relations are detected between GDP growth and foreign aid, implying that GDP growth granger causes foreign aid and foreign aid granger causes GDP growth in SSA. As for GDP growth and aggregate institutional quality index, I also

find causal effects running in both directions. The same pattern of causality is retained when the individual sub-indices of institutional quality are used instead. Finally, feedback causality also exists between ODA and institutional quality (aggregate index and the sub-indices). This indicates that ODA inflow (institutional quality) is a significant predictor of institutional quality (ODA inflow) in SSA.

Table 4: Results from panel Granger causality tests

Hypothesis	Statistic	Conclusion
Bivariate causality between GDP growth and aid		
ΔGDP→ODA	16.445***	Two-way causality between ODA and GDP
ODA→ΔGDP	7.623***	
Bivariate causality between GDP growth and institutional quality (aggregate index and sub-indices)		
ΔGDP→IQ	5.490***	Two-way causality between IQ and GDP
IQ→ΔGDP	2.219**	
ΔGDP→PS	2.602***	Two-way causality between PS and GDP
PS→ΔGDP	10.250***	
ΔGDP→GE	9.861***	Two-way causality between GE and GDP
RQ→ΔGDP	1.591**	
ΔGDP→RQ	5.376***	Two-way causality between RQ and GDP
RQ→ΔGDP	5.785***	
ΔGDP→RL	9.637***	Two-way causality between RL and GDP
RL→ΔGDP	2.681***	
ΔGDP→CC	5.248***	Two-way causality between CC and GDP
CC→ΔGDP	4.189***	
ΔGDP→VA	7.803***	Two-way causality between VA and GDP
VA→ΔGDP	4.023***	
Bivariate causality between ODA and institutional quality (aggregate index and sub-indices)		
ODA→IQ	5.227***	Two-way causality between IQ and ODA
IQ→ODA	8.379***	
ODA→PS	4.438***	Two-way causality between PS and ODA
PS→ODA	6.224***	

ODA→GE	6.046***	Two-way causality between GE and ODA
GE→ODA	6.256***	
ODA→RQ	2.425**	Two-way causality between RQ and ODA
RQ→ODA	5.547***	
ODA→RL	4.515***	Two-way causality between RL and ODA
RL→ODA	8.242***	
ODA→CC	1.210**	Two-way causality between CC and ODA
CC→ODA	6.254***	
ODA→VA	2.014**	Two-way causality between VA and ODA
VA→ODA	4.638***	

*Notes: (1) *** Significant at 1%; ** Significant at 5%. (2) ΔGDP = GDP growth; PS = political stability; GE= government effectiveness; RQ = regulatory quality; RL =rule of law; CC= corruption control; VA = voice and accountability.*

2.6 Conclusion

Numerous studies emphasize the importance of foreign aid to economic growth. While some of these studies claim that aid unconditionally prompts growth, others argue that the presence of good institutions is a prerequisite for aid effectiveness. Several other studies however suggest that foreign aid can be growth-neutral or even growth-depressing through its detrimental effect on the same institutions with the capability to make it effective. The study addresses the interconnectivity of growth, aid and institutions in SSA.

The highlights of the findings are as follows; (i) Foreign aid in fact has a direct positive growth and an indirect negative growth impact on economic growth through its interaction with domestic institutions. (ii) The synergistic growth impact of aid and institutions in SSA is substitutive rather than complimentary. (iii) The substitutive effect is most pronounced in Western Africa, followed by Eastern Africa, then Southern Africa, and lowest in Central Africa. (iv) Good quality institutions are

positively correlated with growth, and the institutions that reduce rent-seeking and protect property rights are the types of institutions with the biggest growth effects.

The major implication of the findings is that sustained net inflow of aid can weaken domestic institutions and lower their growth impacts, and that the relevance of foreign aid to economic growth wanes as the quality of domestic institutions improves in the region.

In conclusion, aid dependence is clearly a problem in the region. The resultant trade-off between aid and institutions means that it is in the interest of the recipient SSA countries to view and treat aid programmes as temporary (short to medium term) development options. Well-defined exit strategies should be prepared well ahead of time, as failure to do so will see the recipient countries stuck in the twin challenge of aid dependence and inefficient institutions.

For long-term development, recipient SSA countries should target alternative sources of financing such as foreign direct investment through increased openness and development of well-functioning domestic financial systems with the capacity to generate resources required for long-term development. Emphasis should be placed on creating the social, economic and political environment needed to attract foreign direct investment and enhance the domestic financial systems.

Chapter 3

ACHIEVING NATIONAL FOOD SECURITY IN SUB-SAHARAN AFRICAN COUNTRIES: THE ROLE OF FOREIGN AGRICULTURAL AID

3.1 Introduction

Sustained inadequate physical and economic access to food required for an active, healthy and productive life (food insecurity) is a major challenge in Sub-Saharan Africa (SSA), especially as the regional population grows and per-capita growth remains well below the long-term average in many of the countries.

It has long been acknowledged that food accessibility is a significant factor in achieving long-term economic growth (see Agboola & Balcilar, 2012). The availability of food is considered vital to the mental and physical welfare of people in all societies (Agboola, 2009). This signifies that any society suffering from food-insecurity is also likely to experience severe human capital difficulties, and subsequently, limited growth. This important issue is why the elimination of world hunger was one of the chief aims of the United Nations Millennium Development Goals (MDGs) and continues to be a fundamental aim for the more recently-established Sustainable Development Goals (SDGs). There is also substantial evidence showing that agricultural growth exhibits important aggregate impacts on poverty reduction (Christiaensen, Demery & Kuhl, 2011). The effect is even more pronounced

in SSA. According to The World Bank (2010), improvements in the agricultural productivity of SSA is more capable of lowering poverty in the region than an identical improvement would do in any of the other regions of the world. This is mainly because a large percentage of the population in SSA rely on agriculture for their livelihood and food supply.

Regrettably, malnutrition, which had progressively fallen from 2003 to 2013, is on the increase again. The Food and Agriculture Organization (FAO, 2017) states that the number of malnourished people rose from 777 million (10.6% of the global population) in 2015 to 815 million (11% of the global population) in 2016. The region of SSA is the hardest-hit by food-shortages, with the 2015 data demonstrating that 23% of the entire regional population (about 220 million people) are malnourished (FAO, 2015). These figures are above the worldwide average for the aforementioned period and indicate that one in every four Sub-Saharan Africans is malnourished, according to the FAO benchmark, which is the consumption of 1800 kilocalories per day. By 2050, the African Association for the Study of Regions (AASR, 2014) estimates that this figure will have increased to roughly 355 million. In addition, the local population is expected to number roughly 1.5 billion people by 2050, resulting in the region needing 360% more food than it was able to produce in 2006 (Alexandratos & Bruinsma, 2012). It is thus extremely likely that food scarcity will progressively increase in the region unless dramatic measures are taken to realise food security.

Over the years, food insecurity in SSA has been treated almost exclusively as a supply issue. The response of developed countries and aid organizations have therefore been focused mainly on the provision of foreign food aid in the form of imported crops to

SSA (Rademacher, 2012). This approach of merely providing more food to deal with food insecurity has unfortunately failed in solving the problem. Extremely high costs of transporting massive quantities of food to SSA from developed countries, controversy over the safety of imported genetically-modified foods and complexities in the distribution of imported food are some of the reasons why this approach has failed. There is thus the need for a more comprehensive approach to addressing food insecurity in the region.

One crucial way to deal with food insecurity is by boosting agricultural spending. One of the key factors identified as responsible for food insecurity in SSA is the decline in agricultural investment (Islam, 2011; Alabi, 2014). Increased agricultural investment provides farmers with access to better agricultural machinery, fertilizers, better quality seeds and soils, better road networks linking farms and markets, more agricultural credit and more agricultural extension services (Kalibata, 2010).

In an effort to combat declining agricultural investment in Africa, policymakers across the continent decided to prioritize agricultural investment by deliberately mobilizing and channeling domestic resources towards the agricultural sector. The objective was ratified through the introduction of the Comprehensive Africa Agriculture Development Program (CAADP). According to CAADP, each member country is expected to allocate a minimum of ten percent of its annual budget to the agricultural sector and ensure an annual growth of at least six percent in its agricultural GDP. As at 2017, fourteen years after the introduction of CAADP, only twenty SSA countries were on course to achieve the objective of the program by the year 2025. The mean 2017 continental score of 3.60 out of 10 clearly shows that the continent is nowhere near meeting the CAADP commitments. This is unsurprising as most SSA economies

are resource-starved. Generally, the level of savings required to record a meaningful increase in agricultural investment is difficult to achieve.

Foreign agricultural aid has been put forward as a viable complement to domestic resource mobilization. African countries are mostly poor and therefore unable to mobilize sufficient resources to provide the required agricultural aid by themselves (NEPAD, 2010). The agricultural investment gap can be bridged through foreign agricultural aid. A report prepared by Laborde et al. (2016) on behalf of The International Institute for Sustainable Development (IISD) and the International Food Policy Research Institute (IFPRI) showed that the world would require additional yearly agricultural investments of USD 11 billion between 2015 and 2030 to eradicate hunger and achieve food security in the world (SDG2). Laborde et al. (2016) suggest that agricultural aid providers provide USD 4 billion while poor recipient countries provide the remaining USD 7 billion. Most of the poor recipient countries are located in SSA; the region is the largest recipient of foreign agricultural aid. More emphasis on foreign monetary agricultural aid in the form of development loans and microfinancing, and local/regional agricultural support could help SSA achieve food security. This study therefore empirically investigates the effect of foreign agricultural aid on food security in SSA.

The key contributions of this paper are as follows; (i) Foreign aid to agriculture can help to fill the resource gap of SSA countries and significantly improve per-capita calorie intake in the long-term. (ii) The nature of causal relations between per-capita calorie intake and foreign agricultural aid shows that foreign agricultural aid is an important predictor of food security. It also shows that the level of food security in an economy is a significant indicator of the amount of aid that will flow towards its

agricultural sector. (iii) Population size has the biggest impact on food security in SSA. Therefore, foreign agricultural aid particularly directed towards agricultural productivity is vital to solving the problem of food insecurity. This seems to be the most effective means of ensuring that food supply keeps up with population growth. (iv) The presence of feedback causal relations between foreign agricultural aid and institutional quality suggests the existence of a vicious cycle in which SSA countries with weaker institutions receive more aid to their agricultural sector, and the inflow of aid further weakens the quality of institutions in the countries.

The rest of this study is organized in the following manner; section 2 is the review of literature, section 3 provides a description of and justification for the variables used, section 4 describes the methodology, section 5 presents the empirical findings and their interpretations, and section 6 is the concluding segment.

3.2 Literature review

Malthus (1798) was the first recognized theoretical perspective on food insecurity. He warned that the world faced an inherent danger of food insecurity as a result of the geometric rise in population and arithmetic rise in food production. Subsequently, most food security researchers relied on this framework to analyze the challenges posed by food insecurity. Studies following this perspective came to view national and global food insecurity as a supply-side problem stemming from declining food availability (see Nwalie, 2017). As a result, many researchers concluded that the most effective way to address food insecurity was to simply produce more food, and also possibly control the population growth (Ehrlich et al., 1993; Budiansky, 2002; Fresco, 2003; Balmford et al., 2005). This was achieved through acts such as mechanization, technological innovation and commercialization.

It was, however, noted that in spite of the huge increases in global food production, food insecurity remained very high around the world. This was referred to as the paradox of hunger in the midst of abundance (Parikh & Tims, 1986). This resulted in a major change in the theoretical approach to food insecurity led by Sen (1981), who argued that food insecurity at the national level was more of a demand issue affecting food access than it was a supply issue affecting food availability. He explained that hunger does not necessarily occur as a result of food unavailability (Chappell & LaValle, 2011). This approach to evaluating food insecurity places greater emphasis on factors that limit access to food such as poverty, income inequality, gender inequality, discrimination and lack of political will. Proponents of this school of thought include Lappé and Collins (1986), Dreze and Sen (1989), Dahlberg (1993), Sen (1994), Vandermeer et al. (2008), Carter et al. (2010), Regmi and Meade (2013), Herath (2014), and Tadasse et al. (2016). Empirical studies on national food security closely align with the theoretical approaches pioneered by Malthus (1798) and Sen (1981) and can be broadly divided into these two categories.

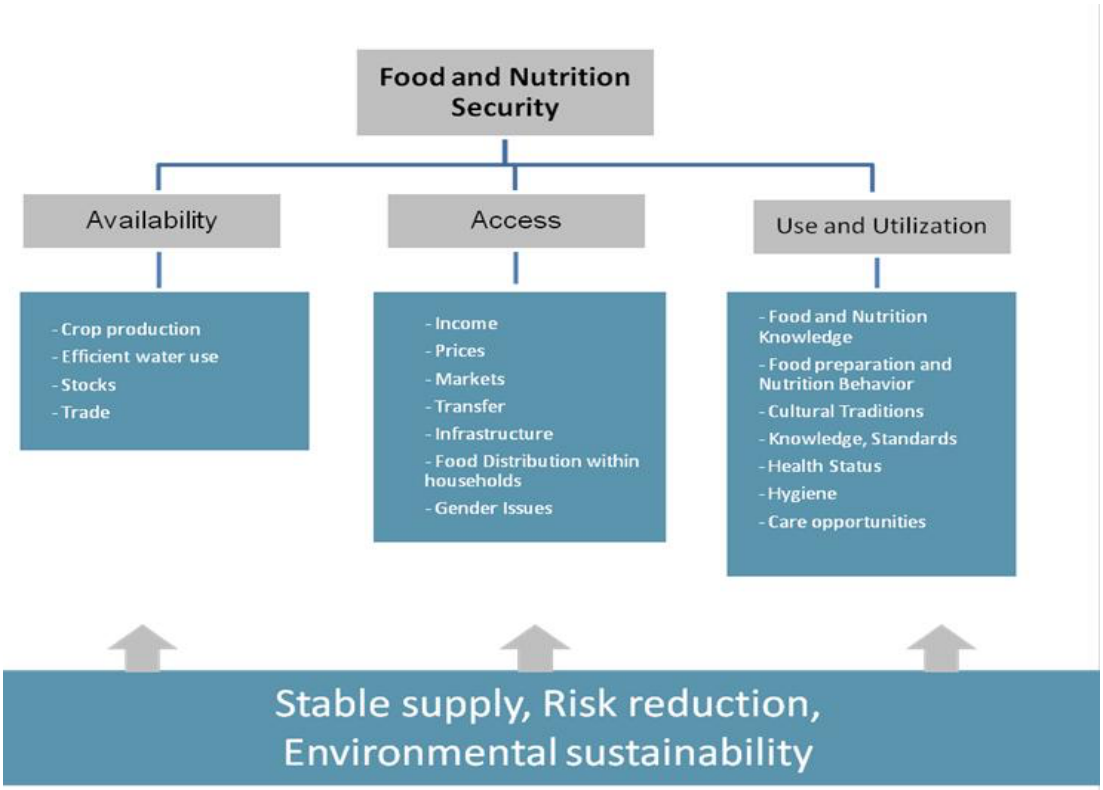
Despite the popularity of Sen's thinking, many arguments still exist in policy and academic circles concerning the superiority of the demand approach (food access) in comparison to the supply approach (food availability). Sijm (1997) criticized the demand-side argument of Sen (1981) for underestimating the importance of supply variables. He argued that concentrating on food access may not only lower interest in improving supply but also produce a disincentive effect on food supply.

Feleke et al. (2005) however compared the relative importance of supply-side and demand-side determinants of food insecurity and posited that the former is more critical to food security than the latter. On the other hand, Adom (2014) posited that

the argument about the more important of the two is unnecessary as the related variables can be viewed directly or indirectly as either supply or demand variables.

Badolo and Kinda (2014) further claimed that food insecurity was not only affected by supply and demand factors but also by the quality of institutions. The authors suggested that food insecurity is as a result of three problems. First is the decline in food availability caused by population growth and scarcity of natural resources. The second is the lack of access to food caused by insufficient personal endowments such as land, equipment, animals, knowledge, skills and employment revenues, and by inefficient exchange conditions. The third is the failure of institutions that result in poor policy choices, weak policy implementation and civil conflict.

Apart from the supply-side and demand-side dimensions, two more dimensions to food insecurity were subsequently identified. The first focuses on the use and utilization of food. Food use deals with the socio-economic aspects of household food security which is both habit and knowledge based. For instance, in a situation where food is available and accessible, households still have to decide on the kind of food to buy, how it should be prepared for consumption and how it should be distributed, whereas utilization relates to the ability of humans to consume food and convert it for use (USAID, 1995; IICA, 2009; Klennert, 2009). The stability dimension to food security deals with the long-term constant food supply to households. It also considers the impact of external risks such as natural disasters and climate change, price volatility, conflicts or epidemics (IICA, 2009; Klennert, 2009).



Source: Modified after FAO

3.3 Discussion of the model variables

There are several methods adopted in measuring food security, the most widely-used of which include household income and expenditure surveys, dietary intake of individuals, anthropometry, experience-based measurement scales, and estimation of per-capita calorie intakes (Pérez-Escamilla & Segall-Corrêa, 2008). All these approaches complement each other and none is clearly superior to the others. Per-capita calorie intake however focuses on food insecurity at the national level while the others are individual or household measures of food insecurity. Since the focus of this study is food insecurity at the national level, per-capita intake is chosen as the measure of food insecurity (dependent variable).

For the regressor of interest—foreign agricultural aid—I select the OECD annual aggregate Development Assistance Committee (DAC) data which comprises the size, source and categories of agricultural aid given to the designated SSA countries. The information is analysed using the data collected from DAC members of OECD, non-DAC donor countries and organisations worldwide. It comprises the aid to specific areas which may have a direct, positive effect on food security, for example, agricultural water, agricultural land, agricultural input along with crop cultivation. It furthermore encompasses other attributes which may indirectly stimulate food security, like agrarian reforms, agricultural extension, agricultural education and training, agricultural research, agricultural services and agricultural policy and management. Thus, it represents investment in all dimensions of food security (availability, access, use and utilization, and stability).

We also include measures for various factors identified in literature as underlying determinants of food insecurity as control variables. These variables are identified below and justification is provided for why they have been selected as controls.

Income: rising national income has both supply-side and demand-side effects on food security. As income rises, the following are likely to happen; the proportion of income that will be dedicated to purchase of food will fall, the people will thus become less vulnerable to price fluctuations. It will raise the purchasing power of the people and thus make them more food-secure. It will raise the propensity to import more food by the domestic economy. It will improve access to agricultural inputs such as fertilizers, pesticides, farm machinery, and high yield varieties. Higher income however also raises domestic demand, which may make food accessibility more difficult. Studies that have recorded a strong correlation between per-capita income and per-capita

consumption of calories include Webb and Von Braun (1993), El Obeid (2001), Wiesmann (2006), Kargbo (2005), Carter et al. (2010), Regmi and Meade (2013), Herath (2014), and Tadasse et al. (2016).

Population: increasing populations put pressure on limited agricultural resources, drive up food demand, lower per-capita income and reduce the impact of food security efforts. The countries with the most rapid population growth are also the countries with the most insecure people (PAI, 2011). This makes it even more difficult to solve the problem of food insecurity in such places. SSA is the region most affected as it has the most rapid population growth in the world (Chen & Ravallion, 2010). The population in the region is projected to keep rising as more than half of the anticipated increase in the world population between 2018 and 2050 is expected to occur in Africa. It is also projected that beyond 2050, Africa will remain the main contributor to the world population (UN DESA, 2017).

Access to agricultural land: the relationship between agricultural land availability and food security has also been well documented. Land has a direct impact by serving as an input for food supply. It also has an indirect impact by serving as a source of employment and income for the population (Von Braun, 1992). Alamgir and Arora (1991) show that in countries such as Taiwan, China and the Republic of South Korea, where major land reform policies occurred, significant improvements were recorded in their national food security. The importance of land to food security is even more pronounced in Sub-Saharan Africa where there are many land litigations (Adom, 2014).

Education: the existence of an association between human capital development, especially in farming communities, and food security has been recorded in literature. Education is able to affect food security by opening up access to information on the most efficient agricultural production techniques, nutrition and sanitation (De Muro & Burchi, 2007; Bashir & Schilizzi, 2013; Mutisya et al., 2016). Education is also positively correlated with improved job opportunities, improved efficiency, higher income and better decision-making (Gebre, 2012; Bashir & Schilizzi, 2013).

Institutional quality: several authors have confirmed that good institutions are vital to achieving food security. Keen (1994) argued that wrong government policy choices may result in the failure to deliver food. Sen (1999) suggested that factors such as political rights, democracy and free press can help lower food insecurity. He argued that because democratic governments can be penalized by voters, they have adequate political incentive to do everything they can to prevent food insecurity. Other researchers like Smith and Haddad (2000) in a similar fashion suggested that good governance is key to food security since government actions affect education, health services and income redistribution. Haddad and Oshaug (1998) likewise claimed that democratic governments are more likely to pay attention to human rights provisions such as rights to food and nutrition.

Table 5: Definition and Sources of Variables

Variable	Definition	Source
Food security	Per-capita calorie intake measured in kilocalories per capita per day	www.fao.org/faostat/
Foreign agricultural aid	Aid flow to agriculture, forestry, fishing and rural development	www.oecd.org/agriculture
Income	Adjusted net national income per capita (constant 2010 US$)	https://data.worldbank.org/indicator/NY.ADJ.NNTY.PC.KD
Population	Total number of residents regardless of legal status or citizenship	https://data.worldbank.org/indicator/SP.POP.TOTL
Agricultural land	Share of land area that is arable, under permanent crops, and under permanent pastures	https://data.worldbank.org/indicator/AG.LND.AGRI.K2
Education	Adjusted net enrollment rate, primary (% of primary school age children)	https://data.worldbank.org/indicator/SE.PRM.TENR
Institutional quality	Provision of the political, social and economic goods by government	Ibrahim Index of African Governance (IIAG) http://iiag.online/

3.4 Empirical Framework

Stemming from extant empirical literature on food security, an empirical model that encompasses foreign agricultural aid alongside other determinants of food security is outlined thus:

$$FS_{it} = \alpha FS_{it-1} + \beta' x_{it} + \mu_{it} \quad (3)$$

FS_{it} represents food security in country i at time t, the lagged value of the food security (FS_{it-1}) is introduced to control the persistence of food insecurity dynamics. β refers to the vector of coefficients, and x_{it} represents the regressors for each country i at time t — foreign agricultural aid, income, population, land, education and institutional quality. μ_{it} stands for the error term. Data on the selected variables was collected and annual panel data set spanning the period 2002-2017 was constructed for 31 sub-Saharan African countries[9]. The variables are all used logarithmically.

[9] The list of countries included is presented in the appendix.

3.4.1 Estimation techniques

3.4.1.1 Panel GMM

The dynamic panel Generalized Method of Moments (GMM) approach is employed in the estimations. There are several reasons for choosing the GMM estimator. Firstly, given the fact that the time dimension (16 years) is inferior to the amount of cross-sections (31 countries), we are restricted to estimating equation (3) through the panel GMM approach. The technique is able to generate robust outcomes for data sets with temporal aspects lesser than the amount of cross sections (N>T). Secondly, food insecurity is dynamic in nature. Malnutrition reduces the physical ability of farmers and consequently lowers agricultural productivity, this in turn further induces more malnutrition in future periods (Zidouemba, 2017). Some of the regressors are likely to be endogenous. For example, malnutrition could lower productivity and result in reduced income, while lower income could cause malnutrition. Education is also endogenous. On one hand, malnutrition resulting from food insecurity is correlated with poor cognitive development and weak educational achievement (Black et al., 2013). On the other hand, human capital is regarded as a key determinant of productivity, employment and income (Becker, 2009). The GMM estimator is a suitable means of estimating coefficients of predetermined and endogenous variables. It is able to generate consistent parameter estimates when there are correlations between country-specific effects and lagged dependent variables (Holtz-Eakin et al., 1988). The technique is also useful in cases where fixed individual effects are arbitrarily distributed and the idiosyncratic disturbances exhibit individual-specific patterns of autocorrelation and heteroscedasticity (Roodman, 2009).

The system-GMM estimator (Arellano & Bover, 1995; Blundell & Bond, 1998) which transforms data by subtracting the mean of all future observations from the current observation (forward orthogonal deviations) is employed in the regression estimation. The system-GMM estimator is more effective against the first-difference estimator (Baltagi, 2008). Unlike the difference-GMM which magnifies gaps when unbalanced panels with missing data points are differenced, the system-GMM minimizes data loss through forward orthogonal deviations.

The more effective two-step variation of the GMM-estimator is also employed. The lagged values of the variables addedin equation (3) in equal arrangements operate as the instruments. The overall validity of the instruments is tested through the Sargan test of over-identifying restrictions while the Arellano-Bond AR (4) statistics are calculated to test for the presence of autocorrelation in the error terms.

The data generating process general model for the system-GMM is as follows:

$$y_{it} = \alpha y_{it-1} + \beta' x_{it} + \mu_{it} \quad (4)$$

$$\mu_{it} = \varepsilon_i + v_{it} \quad (5)$$

$$E(\varepsilon_i) = E(v_{it}) = E(\varepsilon_i v_{it}) = 0 \quad (6)$$

where ε_i refers to the fixed effects and v_{it} represents the idiosyncratic shocks.

The system-GMM estimator transforms the data series through forward orthogonal deviations in the manner below:

$$W_{it+1} \equiv C_{it}\left[W_{it} - \frac{1}{T_{it}}\sum_{S>t} W_{is}\right] \quad (7)$$

3.4.1.2 Panel Granger causality testing

Granger causality testing involves examining whether lagged information regarding the included variables provides any statistically significant information about the other

variables. I am particularly interested in testing whether lagged information on foreign agricultural aid is able to provide statistically significant information about food security in SSA. The Dumitrescu-Hurlin (2012) Granger causality technique is used to test for causal relations among the variables included in equation (3). This causality procedure tests for non-causality in heterogeneous panel data models by averaging individual Granger non-causality Wald tests across cross-sections. The regression equation executed to determine the pattern of causality is the following:

$$y_{it} = \alpha_i + \sum_{k=1}^{K} \beta_{ik} y_{it-k} + \sum_{k=1}^{K} \gamma_{ik} x_{it-k} + \varepsilon_{it} \quad (8)$$

3.5 Empirical Results

Results from the dynamic panel GMM estimation are reported in table 6. To begin with, the tests employed to determine the validity of the GMM procedure provide satisfactory results. The reported p-value of the Sargan test supports the null hypothesis of valid instruments. The second order autocorrelation test is also passed, judging from the p-values of the autocorrelation tests reported.

The coefficient of the lagged dependent variable is positive and significant. This confirms the strong inertia in food insecurity dynamics suggested by Zidouemba (2017). The coefficient of foreign agricultural aid supports the hypothesis that the variable can significantly improve food security in SSA. Raising aid to the agricultural sector by 1 percent makes it possible to raise per-capita calorie intake and consequently, food security, by 0.021 percent. The control variables—per-capita income, education, population, land and institutional quality—all have the expected signs and are significant at the usual significance thresholds. The result is thus in consonance with economic theory and intuition.

Specifically, a percentage increase in per-capita income is able to increase per-capita calorie intake by 0.013 percent in the long-run. A percentage increase in school enrollment can raise per-capita calorie intake by 0.034 percent in the long-run. A percentage increase in population size can induce a 0.367 percent decline in per-capita calorie intake in the long-run. Increasing access to agricultural land by 1 percent can lead to a 0.073 percent increase in per-capita calorie intake. When the quality of institutions increases by 1 percent, per-capita calorie intake will increase by 0.008 percent

Table 6: Panel GMM estimations

FS_{t-1}	0.081***
	(0.007)
FAA	0.021***
	(0.000)
PCI	0.013***
	(0.000)
EDUC	0.034**
	(0.048)
POP	-0.367***
	(0.000)
LAND	0.073***
	(0.000)
IQ	0.008*
	(0.087)
Specification tests	
Sargan test statistic	50.253
P-value of Sargan test statistic	0.277
AR(3) test statistic	-3.156
P-value of AR(3) test stat	0.116
AR(4) test statistic	1.544
P-value of AR(4) test stat	0.123

*Note: in parentheses, the p-values of the test statistic. * Significant at 10%, ** Significant at 5%, *** Significant at 1%.*

I further carried out Granger causality tests to determine the pattern of causal relationships among the variables. The results from the Pairwise Dumitrescu-Hurlin Granger Causality Tests are reported in table 7. Feedback long-run causality was

detected between the following variables; per-capita calorie intake and foreign agricultural aid, per-capita calorie intake and education, per-capita calorie intake and population, foreign agricultural aid and per-capita income, foreign agricultural aid and population, per-capita income and education, per-capita income and population, per-capita income and institutional quality, education and population, education and institutional quality, population and agricultural land. Causality effects were detected running in a one-way direction from per-capita income to per-capita calorie intake, from land to per-capita calorie intake, from agricultural land to foreign agricultural aid, from agricultural land to per-capita income, from institutional quality to per-capita calorie intake, and from institutional quality to foreign agricultural aid.

Of particular interest to us is the pattern of causal relations between per-capita calorie intake as a measure of food security and the other explanatory variables. The bidirectional causal relationship between per-capita calorie intake and foreign agricultural aid again confirms the hypothesis that foreign agricultural aid is an important driver of food security. In addition, the result also suggests that the level of food security in an economy is a significant determinant of the amount of aid that will flow towards its agricultural sector. The more food-insecure a country is, the more the likelihood that it will attract aid.

With regards to the control variables; the bidirectional causality detected between per-capita calorie intake and education confirms extant literature claiming that on one hand, education affects food security by opening up access to information on the most efficient agricultural production techniques, nutrition and sanitation, and on the other hand leads to improved job opportunities, improved efficiency, higher income and better decision-making, all of which improve food availability and access.

The feedback causality between per-calorie intake and population lends credence to the claim by Personal Activity Intelligence PAI (2011) that the countries with the most rapid population growth are also the countries with the most insecure people. One is a significant predictor of the other.

The one-way causal effect from per-capita income to per-capita calorie intake is a clear indication that income is a vital demand-side variable that is able to affect access to food. The one-way causal impact of agricultural land access on food security in a similar pattern establishes the variable as a key supply-side variable that is able to influence food availability. Institutional quality similarly Granger causes per-capita calorie intake. This supports the claims of other researchers like Smith and Haddad (2000) that good governance is key to food security since government actions affect education, health services and income redistribution.

Table 7: Pairwise Dumitrescu-Hurlin Granger Causality Test

	FS	FAA	PCI	EDUC	POP	LAND	IQ
FS	-	2.384*	2.316	6.736***	15.130***	3.224	2.023
	-	(0.069)	(0.616)	(0.000)	(0.000)	(0.429)	(0.325)
FAA	4.124**	-	4.069**	2.390	5.302***	3.346	3.248
	(0.040)	-	(0.024)	(0.777)	(0.000)	(0.226)	(0.291)
PCI	4.096	3.295**	-	6.572***	11.097***	3.385	4.421***
	(0.059)*	(0.028)	-	(0.000)	(0.000)	(0.225)	(0.005)
EDUC	6.648***	4.068**	4.998***	-	17.706***	4.966	5.632***
	(0.000)	(0.019)	(0.000)	-	(0.000)	(0.738)	(0.000)
POP	11.705***	6.351***	8.512***	6.947***	-	9.892***	8.436
	(0.000)	(0.000)	(0.000)	(0.000)	-	(0.000)	(0.155)
LAND	5.157***	4.217**	4.159**	4.428	16.133***	-	4.286
	(0.000)	(0.012)	(0.017)	(0.898)	(0.000)	-	(0.676)
IQ	4.960***	4.701***	3.113**	3.034**	11.405	3.929	-
	(0.000)	(0.000)	(0.042)	(0.046)	(0.790)	(0.119)	-

*Note: in parentheses, the p-values of the test statistic. * Significant at 10%, ** Significant at 5%, *** Significant at 1%.*

3.6 Conclusion

Combating food insecurity is a global priority. The worldwide desire to end food insecurity has resulted in objectives such as the Millennium Development Goals (MDGs) and the Sustainable Development Goals (SDGs). It has also resulted in gatherings such as the World Summit on Food Security and the New Alliance for Food Security and Nutrition. All these efforts aimed at addressing the challenge of food insecurity have, however, not yielded the desired results. This failure has been blamed in part on the lack of consensus on the best approach to dealing with food insecurity (see Petrikova, 2016). Popular suggestions put forward to solve the problem include raising agricultural spending to increase productivity, embarking on social transfer programs to ensure equity in national food distribution, and improvements in socio-economic infrastructure. The only thing common to these recommendations is the need for significant increases in agricultural investment. It is, however, obvious that most SSA countries do not have sufficient financial resources to adequately budget for agricultural spending. One potential means of filling this resource gap is via foreign agricultural aid. This study shows that aid to the agricultural sector of SSA economies can significantly improve per-capita calorie intake in the long-term.

It is no coincidence that the economies with the most rapidly-growing populations are also the economies with most widespread food insecurity. This study shows that population size has the biggest impact on per-capita calorie intake in SSA. Foreign agricultural aid particularly directed towards agricultural productivity is vital to solving the problem of food insecurity. Increasing agricultural productivity seems to be the most effective means of ensuring that food supply keeps up with population growth. Aids to enhance productivity become even more important in the face of

rapidly declining natural resources, in which availability of land for agriculture is gradually reaching its limits. Increased agricultural productivity can raise the level of rural employment, disposable income and food entitlements without simultaneously increasing the pressure on the environment (Breisinger et al., 2011).

The fact that there is feedback causality between foreign agricultural aid and institutional quality suggests that SSA countries with weaker institutions receive more aid to their agricultural sector, and the inflow of aid has further weakened the quality of institutions in these countries. This vicious cycle has been suggested by researchers such as Easterly and Easterly (2006) and Moyo (2009).

Chapter 4

THE INVESTMENT VOLATILITY-DAMPENING ROLE OF FOREIGN AID

4.1 Introduction

The necessity of foreign aid is still widely debated. Nationals of aid-giving countries often strongly question the wisdom in giving out large amounts of money in the form of aid when there are also critical financial needs back at home. An important example is the 'skinny budget' proposal recently put forward by President Donald Trump of the United States, which proposes a 28-percent reduction in the budget of the USAID and the Department of State, both responsible for aid. Aid-recipient countries, on the other hand, often find the concept of charity surrounding foreign aid patronizing. On the empirical front, many researchers have argued that in addition to being ineffective, foreign aid further strengthens dependence and corruption in the poor recipient countries (Rajan & Subramanian, 2005; Oya, 2006; Easterly, 2007; Doucouliagos & Paldam, 2009; Dreher & Langlotz, 2017).

To achieve economic development, long-term investment is needed to drive the expansion of production capabilities. The financing requirement to meet global investment needs is extremely daunting. About 5 to 7 trillion USD is required annually for infrastructural development only (ICESDF, 2014). As for developing countries, the infrastructural development needs amount to about 1 to 1.4 trillion USD per year (Bhattacharya & Romani, 2013; UNCTAD, 2016a). In Africa, a minimum of 15% of

GDP is required to achieve modest improvements in infrastructural needs (Fay *et al.,* 2011). Although the global stock of financial assets, which amounts to 218 trillion USD, and the global yearly savings of 22 trillion USD per annum (ICESDF, 2014) is sufficient to meet global financial needs, the bulk of the financial assets is domiciled in rich, developed countries (UNCTAD, 2016b).

Poor, developing Sub-Saharan African countries are mostly unable to meet and sustain their long-term investment needs for two key reasons. First is that they are resource-starved and therefore cannot achieve the level of domestic savings required to sufficiently finance investment. This has been well documented (see Balcilar, Tokar & Williams, 2018). Second is that they are mostly natural resource-dependent and natural resource revenues are highly volatile (Gelb & Grasmann, 2010; Grigoli & Mills, 2011).

The income instability caused by volatile natural resource revenues makes medium-term investment spending plans difficult to design in poor, resource-dependent Sub-Saharan African countries. This usually results in public investment volatility. Private investments as well as public investment are adversely affected as volatility in resource revenues generally impacts macroeconomic conditions in recipient countries. A sustained inflow of aid can help make up the investment shortfalls in periods when natural resource revenues suffer shocks. Aid is thus likely to soften the negative effect of investment volatility in recipient countries. The aim of this paper is to examine the impact of foreign aid on total investment volatility in poor Sub-Saharan African countries.

Foreign aid mainly serves as a complementary financial source to domestic financial sources, such as savings for capital accumulation and economic growth (Ekanayake & Chatrna, 2010). According to Morrissey (2001), the channels through which aid contributes to growth include the following; (a) it increases investment in both human and physical capital, (b) it increases import capacity of countries, and (c) it facilitates the transfer of technology and thus raises productivity. This paper contributes to existing literature by proposing the volatility-stabilizing effect of aid on the investment climate of poor countries as a new channel through which aid indirectly impacts economic growth. The main contribution of this study is the suggestion that aid be viewed as a dampening factor for investment volatility.

On the empirical front, the study contributes by employing the recently-developed cross-sectionally augmented distributed lag (CS-DL) approach to estimating long-run effects in dynamic heterogeneous panels. The approach adequately accounts for cross-country heterogeneity, cross-sectional dependence and dynamics.

The rest of this paper is structured in the following manner; section 2 provides a review of relevant literature, section 3 describes the empirical methodology, section 4 presents the empirical results, and the last chapter discusses the conclusion and policy implications of the findings.

4.2 Literature Review

4.2.1 Foreign Aid Literature

Aid literature can be categorized into three different generations. The first two generations particularly concentrate on the role aid plays in helping poor, developing countries meet their investment needs for economic growth. The first generation is

focused on the so-called gap models — savings-investment gap model of Domar (1946), foreign exchange gap model of Chenery and Strout (1966), and fiscal gap model of Bacha (1990). The main concern of this body of literature is the impact of financing limitations on economic performance in poor countries and how aid could be used to fill the financing gaps. Aid inflow is viewed as a means for poor countries to meet their financial requirements for investment (Easterly, 1997; Hjertholm *et al.,* 2000; Morrissey, 2001).

The second generation focuses instead on the study of the direct linkage between aid and economic growth, rather than the indirect linkage through savings previously adopted (Museru, Toerien & Gossel, 2014). This generation of studies, however, displays similar characteristics with the previous generation in terms of the role ascribed to capital investment in economic growth and the types of growth models adopted. Studies in this category include Hanson and Tarp (2000) who find that aid improves investment, and Mosley, Hudson and Horrell (1992) who claim the opposite. Levy (1988) is an important second-generation study as it is one of the early studies devoted to poor Sub-Saharan African countries. The findings show that aid and capital accumulation are both important for the economic growth of the region.

The third-generation aid literature is more concerned with issues of new data and methodologies, the modelling of nonlinear and endogenous relations and growth model extensions with new variables such as policies and institutions (Hanson & Tarp, 2000; Vathis, 2013).

Overall, the first and second-generation studies mostly conclude that aid influences economic growth, with investment as the main transmission mechanism. These sets of

studies show that there is ample literature on the role of aid as a complement to domestic savings for investment.

With regards to empirical findings, aid literature can again be grouped into 4; (i) Those who conclude that aid has no significant effect on the economic performance of recipient countries. For example, Boone (1996) argues that aid neither significantly increases investment, nor does it benefit the poor. (ii) Those who claim that aid worsens the economies of recipient countries. For example, Djankov, Montalvo and Reynal-Querol (2008) find that foreign aid creates a windfall of resources which encourages rent-seeking behavior. (iii) Those who argue that aid unconditionally benefits economies. For example, Arndt, Jones and Tarp (2015) conclude that aid unconditionally stimulates growth through its role in enhancing physical and human capital accumulation. (iv) Those who claim that aid is only economically beneficial under certain conditions. Researchers such as Burnside and Dollar (2000, 2004), Whitaker (2006), and Abuzeid (2009) posit that institutional quality affects aid performance.

4.2.2 Volatility in aid literature

Research has also touched on the impact of volatility in the aid literature. Some studies have proposed aid volatility as a potential source of income volatility, they claim that aid is generally more volatile than income and fiscal revenues and more pro than anti-cyclical in nature (Hamann & Bulír, 2001; Pallage & Robe, 2001; Bulír & Hamann, 2008). Chauvet *et al.* (2019) report that aid softens the negative impact of income volatility on income distribution. Chervin and Van Wijnbergen (2010) find that aid positively impacts economic growth when aid volatility is controlled for. Ebeke and Ehrhart (2011) show that tax revenue volatility has a negative effect on public

investment in Sub-Saharan Africa. Museru, Toerien and Gossel (2014) find that volatility in public investment limits aid effectiveness in Sub-Saharan Africa. Lensink and Morrissey (2000) claim that aid volatility reflects expected changes in aid inflow and thus has no growth effect in Africa. Chauvet and Guillaumont (2009) and Guillaumont and Le Goff (2010) show that on average, aid is able to dampen growth volatility. In summary, the review of literature shows that while aid has been extensively considered in aid literature, the impact of aid inflows on investment volatility in poor countries is yet to be investigated.

4.3 Methodology

4.3.1 Data

To study the objective, I have constructed a panel dataset that covers the period 1980-2017 for Sub-Saharan African countries that are regarded as heavily-indebted, poor countries (HIPC). It is noteworthy that countries in this category which do not have sufficient historical data are dropped from the sample. I ended up with 19 countries for the analysis, and the list of countries is presented in the appendix. The constructed panel dataset includes foreign aid, total investment volatility, foreign direct investment and domestic credit.

Foreign aid data is taken from the World Development Indicators provided by the World Bank (http://data.worldbank.org). It is measured as the official development assistance comprising of loan disbursements and grants given by members and non-members of the development assistance committee. Total investment volatility is computed using total investment data obtained from the world economic outlook database of the International Monetary Fund (IMF) (https://www.imf.org). Following Grigoli and Mills (2014), total investment volatility is computed as the absolute value

of the percentage change in the deviation of total investment as share of GDP (x_{it}) from the trend component obtained through Hodrick-Prescott (HP) filter ($\tau_{x,it}$). The corresponding equation is given as:

$$Total\ investment\ volatility\ (x_{it}) = \left|\frac{[(x_{it}-\tau_{x,it})-(x_{it-1}-\tau_{x,it-1})]}{\tau_{x,it-1}}\ x\ 100\right| \quad (9)$$

Growth models such as the Ramsey-Cass-Koopmans model, the Harrod-Domar model, the Solow model, and the Romer model emphasize the importance of savings channeled through the financial sector to investment for economic growth. I thus include domestic credit provided by the financial sector as a control variable. Foreign direct investment is also included for control since it serves as another important source of foreign financing which complements domestic savings.

4.3.2 Preliminary tests

Slope heterogeneity and cross-sectional dependence tests

There are two methodological complications related to panel data studies. One is that countries in the panel are liable to be affected by conditions individual to each of them. As an example, in this study, the politics of aid inflow and investment patterns are expected to differ between individual countries. Secondly, it is probable that economies in the Sub-Saharan African region have some shared features, or mutual motivational factors, or display spill over effects that make them inter-reliant. Empirical methods that fail to tackle these two concerns in the event of their presence in the data sets will generate unsound and undependable results. For this reason, I begin by checking for country-specific heterogeneousness and cross-sectional dependence.

The Pesaran and Yamagata (2008) homogeneity delta tests are employed to check for country-specific heterogeneity. The delta tests present two test statistics under the null hypothesis of slope homogeneity:

$$\tilde{\Delta}= \sqrt{N\left(\frac{N^{-1}\tilde{S}-k}{2k}\right)} \tag{10}$$

$$\tilde{\Delta}_{adj}= \sqrt{N}\left(\frac{N^{-1}\tilde{S}-E(\tilde{z}_{it})}{\sqrt{var}(\tilde{z}_{it})}\right) \tag{11}$$

The Pesaran (2004) CD, Breusch-Pagan LM (1980), Pesaran (2004) scaled LM and the Bias-corrected scaled LM developed by Pesaran, Ullah and Yamagata (2008), all under the null of no cross-sectional dependence, are employed to test for cross-sectional dependence:

The Breusch-Pagan (1980) LM test statistic for dependence is written as:

$$LM = \sum_{i=1}^{N-1}\sum_{j=i+1}^{N} T_{ij}\hat{p}_{ij}^2 \rightarrow \boldsymbol{\chi}^2 \frac{N(N-1)}{2} \tag{12}$$

Where $\hat{p}_{ij}^2$ is the correlation coefficients from the residuals.

The Pesaran (2004) scaled LM test statistic is written as:

$$LM_s = \sqrt{\frac{1}{N(N-1)}}\sum_{i=1}^{N-1}\sum_{j=i+1}^{N}(T_{ij}\,\hat{p}_{ij}^2 - 1) \rightarrow N(0,1) \tag{13}$$

The LM statistic is specified as:

$$CD_p = \sqrt{\frac{2}{N(N-1)}}\sum_{i=1}^{N-1}\sum_{j=i+1}^{N} T_{ij}\,\hat{p}_{ij} \rightarrow N(0,1) \tag{14}$$

The Bias-corrected Scaled LM test is an approximated bias-corrected form of the scaled LM test. The test statistic is set out as:

$$LM_{BC} = \sqrt{\frac{1}{N(N-1)}}\sum_{i=1}^{N-1}\sum_{j=i+1}^{N}(T_{ij}\,\hat{p}_{ij}^2 - 1) - \frac{N}{2(T-1)} \rightarrow N(0,1) \tag{15}$$

4.3.3 Estimation technique

Cross-sectionally augmented distributed lag approach

Two newly-created assessment methods for long-run coefficients in dynamic heterogeneous panels with cross-sectional dependence can generate robust outcomes

despite the aforementioned issues (slope heterogeneity, cross-sectional dependence). These methods are the cross-sectionally augmented distributed lag (CS-DL) and cross-sectionally augmented autoregressive distributed lag (CS-ARDL) methods of Chudik and Pesaran (2015) and Chudik *et al* (2016). I elected to use the CS-DL method as it provides a better small sample performance than the CS-ARDL. Whereas the CS-ARDL necessitates a minimum of 50 periods, the CS-DL delivers robust estimations when 30≤T≥50 (Chudik *et al*., 2016). Additional advantages of the CS-DL comprise the following: robustness to serial correlation, weak cross-sectional dependence and structural breaks. It also permits the use of unit roots in both factors and/or regressors and is therefore suitable for both I (0) and I (1) variables and does not need the individual lag orders to be indicated.

Firstly, I assume that investment volatility is demonstrated by the ARDL (P_{yi}, P_{xi}) specification:

$$y_{it=} \sum_{\ell=1}^{p_{yi}} \wp_{i\ell}\, y_{i,t-\ell} + \sum_{\ell=0}^{p_{xi}} \beta'_{i\ell}\, x_{i,t-\ell} + u_{it} \qquad (16)$$

where y_{it} = investment volatility, x_{it} = (Aid, domestic credit, foreign direct investment), $u_{it} = \gamma'_i F_t + \varepsilon_{it}$, F_t =M x 1 vector of unobserved common factors.

Equation (16) can be reproduced in a distributive lag form thus:

$$y_{it=}\theta_i x_{it} + \alpha'_i(L)\Delta x_{it} + \tilde{u}_{it} \qquad (17)$$

The estimate of θ_i yields the long run coefficients and the subsequent auxiliary regression operates as the causal regression for the CS-DL estimators:

$$y_{it=}\, c_{yi} + \theta'_i x_{it} + \sum_{\ell=0}^{p-1} \delta_{i\ell}\, x_{i,t-\ell} + \sum_{\ell=0}^{p\bar{y}} w_{y,i\ell}\, \bar{y}_{t-\ell} + \sum_{\ell=0}^{p\bar{x}} w'_{x,i\ell}\, \bar{x}_{t-\ell} + e_{it} \qquad (18)$$

Where $p = p\bar{x}$ =3, $p\bar{y} = 0$

4.3.4 Bootstrap panel Granger causality test

I further tested for causal relationships between investment volatility and the regressors through the Emirmahmutoglu and Kose (2011) bootstrap panel causality procedure based on meta-analysis in heterogeneous mixed panels. This approach is very handy as it does not require the variables in the VAR system to be stationary. It is thus suitable for panels made up of stationary, non-stationary, cointegrated and non-cointegrated series (Seyoum, Wu & Lin, 2014). When employed with bootstrapping, it is also robust to cross-sectional dependence and slope heterogeneity. The method is based on a modified Wald (MWALD) test in a lag augmented VAR (LA-VAR) which has a conventional asymptotic chi-square distribution when a VAR (p + dmax) is estimated, where p stands for lag order and dmax represents the maximal order of integration. The regression equations are shown below:

$$
\begin{aligned}
Y_{1,t} &= \alpha_{1,1} + \sum_{i=1}^{ly_1+dmax_j} \beta_{1,1,i} Y_{1,t-i} + \sum_{i=1}^{lx_1+dmax_j} \gamma_{1,1,i} X_{1,t-i} + \varepsilon_{1,1,t} \\
Y_{2,t} &= \alpha_{1,2} + \sum_{i=1}^{ly_1+dmax_j} \beta_{1,2,i} Y_{2,t-i} + \sum_{i=1}^{lx_1+dmax_j} \gamma_{1,2,i} X_{2,t-i} + \varepsilon_{1,2,t} \qquad (19) \\
&\vdots \\
Y_{N,t} &= \alpha_{1,N} + \sum_{i=1}^{ly_1+dmax_j} \beta_{1,N,i} Y_{2,t-i} + \sum_{i=1}^{lx_1+dmax_j} \gamma_{1,N,i} X_{N,t-i} + \varepsilon_{1,N,t}
\end{aligned}
$$

and

$$
\begin{aligned}
X_{1,t} &= \alpha_{2,1} + \sum_{i=1}^{ly_2+dmax_j} \beta_{2,1,i} Y_{1,t-i} + \sum_{i=1}^{lx_2+dmax_j} \gamma_{2,1,i} X_{1,t-i} + \varepsilon_{2,1,t} \\
X_{2,t} &= \alpha_{2,2} + \sum_{i=1}^{ly_2+dmax_j} \beta_{2,2,i} Y_{2,t-i} + \sum_{i=1}^{lx_2+dmax_j} \gamma_{2,2,i} X_{2,t-i} + \varepsilon_{2,2,t} \qquad (20) \\
&\vdots \\
X_{N,t} &= \alpha_{2,N} + \sum_{i=1}^{ly_2+dmax_j} \beta_{2,N,i} Y_{2,t-i} + \sum_{i=1}^{lx_2+dmax_j} \gamma_{2,N,i} X_{2,t-i} + \varepsilon_{2,N,t}
\end{aligned}
$$

In equation systems 11 and 12, $Y_{i,t}$, i = 1,…, N is total investment volatility and $X_{i,t}$, i = 1,…,N represents the regressors (aid, domestic credit and foreign direct investment). N stands for the number of countries in the panel (j = 1,…, N), t is the time period (t = 1,…,T), l is the lag length and $dmax_j$ is the maximal order of integration. The bootstrap

panel causality test of Emirmahmutoglu and Kose (2011) employs the Fisher (1932) meta-analysis statistical procedure in which N number of separate time series tests are conducted, and the significant individual p-values are combined into a single panel test statistic. The Fischer test statistic has a chi-square distribution with 2N degrees of freedom and is given as:

$$\lambda = -2\sum_{i=1}^{N} ln_{(pi)} \;\; i = 1,2,\dots,N. \tag{21}$$

pi represents the p-value of the Wald statistic for the i[th] cross section. Equations 11 and 12 are estimated and panel Granger causality tests with bootstrap critical values.

4.4 Results

The first part of the empirical analysis involved the carrying out of cross-sectional dependence and cross-country heterogeneousness tests. The results are presented in Table 8. The test statistics produced by the cross-sectional dependence tests lead to the rejection of the null hypothesis of no cross-sectional dependence at ($p < 0.01$) significance level for the variables—foreign aid, domestic credit and foreign direct investment. This is an indication that shocks are transmitted across the Sub-Saharan African countries. There was no cross-sectional dependence found in investment volatility. The null hypothesis of slope homogeneity is also rejected in this data series at ($p < 0.05$) significance level or better in all the variables apart from investment volatility. This confirms that Sub-Saharan African countries display unique economic characteristics.

Table 8: Preliminary tests

	Investment Volatility	Aid	Domestic credit	Foreign direct investment
Cross-sectional dependence tests				
Breusch-Pagan LM	173.929	823.922***	1365.428***	405.503***
	(0.423)	(0.000)	(0.000)	(0.000)
Pesaran scaled LM	-0.869	34.278***	63.559***	11.653***
	(0.384)	(0.000)	(0.000)	(0.000)
Bias-corrected scaled LM	-1.321	33.826***	63.107***	11.200***
	(0.186)	(0.000)	(0.000)	(0.000)
Pesaran CD	-1.334	17.717***	20.255***	7.774***
	(0.182)	(0.000)	(0.000)	(0.000)
Slope homogeneity tests				
$\hat{\Delta}$	-1.178	4.665***	2.032**	6.086***
	(0.881)	(0.000)	(0.021)	(0.000)
$\hat{\Delta}_{adj}$	-1.268	5.020***	2.186**	6.549***
	(0.898)	(0.000)	(0.014)	(0.000)

*Note: *,** and *** indicate significance at 0.1, 0.05 and 0.001 significance levels respectively*

Table 9 details the medium long-run effects of the regressors on overall investment volatility. All the estimates are statistically significant at 10% significance level or better. The estimates are also robust across all three lag specifications. With respect to aid, all the estimates turn out as negative and range between -0.06 and -0.02. This suggests that the mean value of aid has a dampening impact on investment volatility. I may thus infer that sustained aid flow is able to stabilize investment spending in poor countries.

All coefficients on both domestic credit and foreign direct investment are also negative. They fall in the range of -0.184 to -0.174 for domestic credit, and -0.019 to -0.018 for foreign direct investment. These results suggest that both variables exhibit

similar dampening effects on investment volatility. This stabilizing impact is higher for domestic credit and lower for foreign direct investment when compared with aid.

Table 9: CS-DL mean long-run effect estimates

	1 lag	2 lags	3 lags
Aid	-0.060*	-0.052*	-0.020**
	(0.059)	(0.055)	(0.019)
Domestic credit	-0.184*	-0.179*	-0.174**
	(0.065)	(0.055)	(0.017)
Foreign direct investment	-0.019**	-0.018*	-0.019**
	(0.019)	(0.064)	(0.014)

*Note: *,** and *** indicate significance at 0.1, 0.05 and 0.001 significance levels respectively*

The Wald test statistics from the bootstrap panel causality tests between investment volatility and the regressors are presented in table 10. Only the λ test statistics for the entire panel are reported. I find feedback causality between aid and investment volatility, domestic credit and investment volatility, and foreign direct investment and investment volatility.

Table 10: Bootstrap panel Granger causality

Hypothesis	Statistic	P-value	Conclusion
Aid→Volatility	143.164***	0.000	Two-way causality between aid and volatility
Volatility→Aid	89.388***	0.000	
DC→Volatility	94.384***	0.000	Two-way causality between domestic credit and volatility
Volatility→DC	86.282***	0.000	
FDI→Volatility	99.149***	0.000	Two-way causality between foreign direct investment and volatility
Volatility→FDI	124.102***	0.000	

*Note: *,** and *** indicate significance at 0.1, 0.05 and 0.001 significance levels respectively*

4.5 Conclusion

This paper contributes to aid literature by empirically investigating the impact of foreign aid on total investment volatility in a panel of 19 Sub-Saharan African countries categorized as heavily-indebted, poor countries over the period 1980-2017. The newly developed CS-DL estimation technique which accounts for cross-sectional dependence, cross-country heterogeneity and dynamics was employed. In addition, bootstrap panel causality tests were carried out to establish the direction of causal interactions between overall investment volatility and the regressors.

The key conclusion is that foreign aid serves an important purpose. In addition to being a means of filling the financial gap often experienced by poor countries, it also has a significant dampening effect on investment volatility.

The findings also indicate that domestic savings channeled through the financial system and foreign direct investment both have a similar dampening effect. It is, however, mostly difficult for poor countries to muster the level of savings required to facilitate adequate domestic credit. Poor countries also lack the kind of socio-economic and socio-political environment required to attract substantial foreign direct investment. Foreign aid can function as a useful stabilizer and dampening factor of investment volatility.

The analysis proposes a policy framework which supports global efforts to achieve increased and sustained flow of aid into poor countries as a complement to domestic savings.

Chapter 5

CONCLUSION

An abundance of literature from sources around the world has been published on the aid-growth connection in resource-poor economies such as those of Sub-Saharan Africa. The literature advocates that aid can have a positive, neutral or negative effect on growth, but this is reliant on other conditions in the country. Generally, aid effectiveness is largely dependent on the quality of institutions of the country. Still, foreign aid in particular can undermine institutional quality in recipient countries, which raises other concerns. Thus, the mutual growth outcome of the quality of institutions and aid can be positive or negative depending on other socio-economic factors.

Sub-Saharan Africa is one of the most food-insecure regions in the world. The UN has set a goal: to eradicate hunger worldwide by 2030, attaining food security, improved nutrition and the development of sustainable agriculture (SDG-2). As well as SDGs, there are multiple aid organizations active in SSA combating food insecurity, but results have not been satisfactory, as different methods have been used by the various donors trying to achieve food security in the region. Nevertheless, it is widely agreed that agriculture aid in the region is one of the best ways to deal with food insecurity as it increases productivity while also improving the socio-economic infrastructure. Although SSA has a large agricultural potential, the insufficient amount of investment in the agricultural sector and inadequate budgetary support do not permit the sector to

make the maximum possible contribution to food security. For that reason, agriculture aid from prosperous nations is still recommended.

Apart from agricultural aid, the region requires long-term support to develop its infrastructure, which is at an emergent stage in SSA and needs huge investment. SSA's domestic savings are very low as insufficient technology, combined with political upheavals caused by the wealthy ruling class, means that the region is unable to utilize its own resources. In addition, SSA is reliant on natural resources which are highly-volatile revenue sources and which inhibit the region's ability to meet their medium-term and long-term investment plans. This leads to volatile public and private investments, which have a negative effect on the region's macroeconomic activities.

The aim of this study is three-fold: Firstly, to examine the nexus between aid, growth and the quality of institutions in SSA at macro-level; that is, to examine whether the two public goods i.e. official development aid and institutions in SSA, are substitutes or complements and growth-encouraging or growth-depressing. As such, I studied 39 Sub-Saharan African countries over the period 1996-2017 by constructing a yearly panel data set. The study used descriptive statistics, panel GMM and panel Granger causality to achieve its purpose. The net official ODA, institutional quality and supplementary control variables such as population growth rate, initial GDP, inflation and trade openness were regressed on the real growth rate of the chosen SSA countries. Every indicator value ranges from 0 to 100 where a higher value indicates better governance and vice versa. All six dimensions were combined through Principal Component Analysis (PCA) so as to have an overall single index for institutional quality. The institutional quality is made up of six indicators including voice and

accountability, political stability and absence of violence or terrorism, government effectiveness, regulatory quality, rule of law and control of corruption.

Secondly, to study the effect of foreign aid on food security in SSA. Is there a positive correlation between per capita calorie intake and greater foreign agriculture aid? Is foreign agriculture aid a predictor of food security? The study aims to verify whether or not the control variables such as population size and institutional quality are determinants of food security. In this context, the study used a two-step system GMM and panel Granger causality test to realize its objectives. In particular, foreign agriculture aid, income, population, education, institutional quality and agricultural land were regressed under the backdrop of the two-step system GMM on food security to determine the statistical importance of these variables on food security.

The third and final aim of this research report is to study the stabilizing role of foreign aid in domestic investment. A stable investment climate in a poor country is favorable to its economic growth. This theory was empirically investigated using the cross-sectional augmented distributed lag (CS-DL) approach to calculate the long-run effects in dynamic heterogeneous panels. This approach sufficiently accounts for cross-country heterogeneity, cross-sectional dependence and dynamics. The analysis was concentrated on 19 countries from the period 1980 to 2017.

The following paragraphs make reference to the main findings and policy outcomes of this study. From the first chapter it can be deduced that foreign aid in fact has a direct positive growth and an indirect negative growth impact on economic development due to its interaction with domestic institutions. The synergistic growth impact of aid and institutions in SSA is substitutive as opposed to complimentary. The substitutive effect

is most prominent in Western Africa, followed by Eastern Africa, Southern Africa, and lastly in Central Africa. Good quality institutions are positively linked with growth, and the institutions which decrease rent-seeking and protect property rights are the types of institutions with the biggest growth effects.

The chief outcomes from the second chapter can be summarized thus: the long-term effect of foreign agriculture aid on per-capita calorie intake is positive. An ever-increasing population is one of the issues which contributes to food insecurity in SSA. Foreign agricultural aid, especially aimed at agricultural productivity, is fundamental to resolving the problem of food insecurity. Increasing agricultural productivity appears to be the most efficient way to make sure that the food supply matches the needs of the growing population. Aid which boosts productivity is even more significant considering the steadily-diminishing natural resources, meaning the amount of available agricultural land is constantly decreasing. The presence of feedback causality between foreign agricultural aid and institutional quality implies that SSA countries with weaker institutions receive more aid to their agricultural sectors, and this influx leads to a further deterioration of the quality of institutions in those countries.

The fourth chapter's findings indicate that foreign aid has a substantial dampening effect on investment volatility. The research results also imply that both domestic credit and foreign direct investment reduce investment volatility. This stabilizing effect is higher for domestic credit and lower for foreign direct investment in comparison with aid. The feedback causality between aid and investment volatility, domestic credit and investment volatility, and foreign direct investment and investment volatility is also evident. The results further suggest that domestic savings

focused on the financial system and foreign direct investment also have a comparable dampening effect. It is nevertheless hard for poor countries to accumulate the level of savings required to enable sufficient domestic credit. Poor countries moreover lack the kind of socio-economic and socio-political environment necessary to attract ample foreign direct investment. Foreign aid can act as a valuable stabilizer and dampening factor of investment volatility. Thus, I can conclude that prolonged aid flow can stabilize investment expenditure in poor countries.

5.1 Policy Outcomes

The main conclusion that can be reached based on the findings of this research report are examined below. The steady influx of foreign aid may negatively affect domestic institutions, which is linked to weakened economic growth. That is, the more effective and independent domestic institutions are, the less impact foreign aid has on economic growth. The SSA must avoid the dependency trap and consider aid programs as short-term development opportunities. Furthermore, strategies to overcome the challenges of ineffective institutions and aid dependency must be implemented.

In order for SSA countries to reap the full benefits of foreign aid, pro-development programs to facilitate the channeling of resources to support development plans in the region are needed. Furthermore, to convert the philanthropy of wealthy nations into economic prosperity, the money given ought to be spent on development projects as opposed to debt-servicing and government expansion. In order to limit aid dependency, alternate, innovative sources of funding can be investigated to support the Sustainable Development Goal 2030 agenda in SSA. In this respect, several proposals have been made, such as International Finance Facility, a global premium bond, a global lottery, development-focused, special drawing rights, the Tobin tax and

a global environment tax. These sources could complement formal assistance and allow the SSA countries to attract extra development investments. The findings in this research are also making a clear conclusion that foreign aid can be a crucial tool to achieve 2030 Sustainable Development Goal by supporting the insufficient agricultural investment budgets of the SSA countries.

It would be prudent for the relevant parties not to overestimate aid through IMF-backed programs when considering aid forecasts and distributions based on donors' pledges. Likewise, budgetary distributions for long-term development projects in countries receiving foreign aid ought to accurately calculate the inflow of promised capital. Additionally, prior occurrences should be viewed as the standard for estimated aid distribution rather than the commitments made by donors. In this way, the budget can be planned so as to facilitate aid disbursement.

The significance of heterogeneity in aid is underlined to elucidate the volatility in aid influx. This can influence policy outcomes in aid-receiving countries by giving them the opportunity to control aid volatility by using a combination of adjustments to foreign exchange reserves, tax and spending plans, as well as domestic non-monetary financing. Countries can likewise increase their forecasting with regards to short-term aid. In order to realize the 2030 agenda in SSA and ensure overall economic development, it is necessary for donor countries to explore innovative and less volatile sources of financing. Furthermore, tax distortion is prevalent in poor countries such as SSA, which subsequently has a negative effect on domestic investment. Thus, the configuration of domestic investment may explain modest growth in SSA as opposed to the amount of domestic investment.

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