THE EFFECT OF FOREIGN AID ON AGRICULTURE, EDUCATION AND HEALTH SECTORS IN GHANA

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DECLARATION

This is to certify that this thesis is the result of research undertaken by Deborah Amartey towards the award of the Master of philosophy (M.PHIL) degree in Economics at the Department of Economics, University of Ghana.

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ABSTRACT

This study has observed the impact of foreign aid to the agriculture, education and health sectors, on the growth of the respective sectors in Ghana, over a period from 1980 to 2013 using the Vector Autoregression (VAR) approach. The necessary time series tests such as stationary test, cointegration test, error correction, and Granger causality tests in vector error correction model were carried out.

The empirical results from the regression reveals that, foreign aid has a significant positive impact on the growth of the agriculture and health sectors in the short run. On the other hand, foreign aid has a significant negative impact on the growth of the sector in the short run. In the long run, however, foreign aid has negative impact on all the three sectors. The study also reveals a significant negative impact of Trade on agricultural growth but insignificant on education and health.

The causality tests show that there is no causal relationship between agriculture aid and the growth of the agriculture sector. However, there is a one way causal relationship that flows from education aid to the growth of the education sector; and from health aid to the growth of the health sector.

For these reasons, it is suggested that the arrangement of accountability and transparency should be devised to reduce any possibility of aid fungibility in the education sector. Also, the fact that foreign aid enhances growth in the health and agriculture sectors suggest that, efforts should be taken in order to derive maximum benefits from aid that goes to these sectors.

DEDICATION

This work is dedicated to God Almighty, for His immeasurable love and unfailing mercies.

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LIST OF ABBREVIATIONS

AAA	Accra Agenda for Action
ADF	Augmented Dickey Fulley
AIC	Akaike Information Criterion
BIC	Bayesian Information Criterion
CAADP	Comprehensive Africa Agriculture Development Programme
CIDA	Canadian International Development Agency
DAC	Development Assistance Committee
DCD	Development Co-operation Directorate
DPs	Development Partners
ECM	Error Correction Model
ERP	Economic Recovery Programme
FCUBE	Free Compulsory Universal Basic Education
GDP	Gross Domestic Product
GETFUND	Ghana Education Trust Fund
GNI	Gross National Income
GNP	Gross National Product
HIPC	Heavily Indebted Poor Countries
HQC	Hannan-Quinn Criterion
IDA	International Development Association
IMF	International Monetary Fund
ISSER	Institute of Statistical, Social and Economic Research
MDBS	Multi Donor Budget Support

MDGs	Millenium Development Goals
MDRI	Multi-Donor Debt Relief
MoFEP	Ministry of Finance and Economic Planning
NHIS	National Health Insurance Scheme
ODA	Offical Development Assistance
OECD	Organization for Economic Cooperation and Development
OECF	Overseas Economic Cooperation Fund
OPEC	Organisation of Petroleum Exporting Countries
OTCA	Overseas Technical Cooperation Agency
PP	Phillip - Perron
RER	Real Exchange Rate
SAPs	Structural Adjustment Programmes
SIC	Schwarz Information Criterion
SIDA	Swedish International Development Authority
STDs	Sexually Transmitted Diseases
USD	United States Dollars
VAR	Vector Auto Regression
WDI	World Development Indicators

CHAPTER ONE

INTRODUCTION

1.1 Background

The Marshall Plan of 1947 helped reinforce the conviction that foreign aid can inspire growth in developing countries and as a result of its success, aid has been recognized by many and has therefore been used in many countries all over the world, especially in developing countries (Collodel, 2011). Early growth models were of the view that, underdeveloped countries were poor due to low levels of savings and investment; and this implies that, the essential funds needed to invest in modern technology and infrastructure are insufficient. A savings gap would therefore exist if the savings is too small to permit the amount of investment that the country would otherwise have the capability to undertake. Foreign aid is believed to boost domestic savings and fill the savings gap (Hansen and tarp, 2000) , hence the need for foreign aid in the quest to improving economic growth in developing countries.

Aid policies changed in the late 1960s and 1970s, and a higher percentage of funds were committed to social programmes (health and education), programmes targeted at directly reducing poverty, and programmes that sustained skills and human capital (Edwards, 2014).

After independence, Sub-Saharan Africa, including Ghana identified the need to achieve quick socioeconomic development in order to be abreast with the developed world and in this quest, foreign aid became an important source of finance in most countries in Sub-

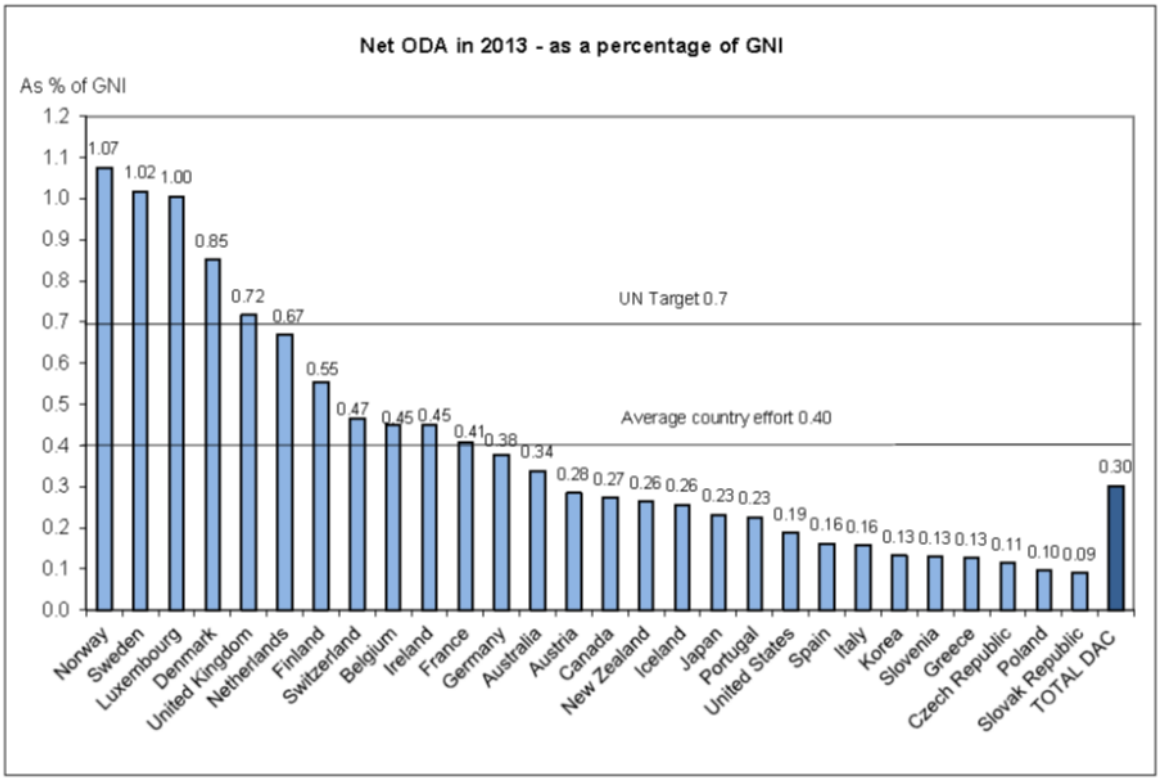
Sahara Africa. Ghana, during the office of Kwame Nkrumah agreed on the 'big push' development strategy for an industrial based growth economy and in order to achieve such an agenda, the country needed to depend on external capital inflows. Thus, due to low domestic savings, worsening terms of trade, and over-valued exchange rate, the country relied on flows from outside the country. Quartey (2005) noted that, aid flows have been associated with low domestic resource mobilization and have led Ghana to become heavily dependent on aid.

The term foreign aid can mean a number of different activities, which includes humanitarian support, natural disasters among others. However, for the purpose of this study, the standard definition of Official Development Assistance (ODA) which is provided by the Development Assistance Committee (DAC) of the Organization for Economic Cooperation and Development (OECD) will be used. An important objective of ODA to developing countries is the promotion of economic development and welfare (Durbarry et al, 1998). ODA is calculated as the sum of grants and loans to aid recipients which is an indication that, aid is not always a free resource transfer and often comes with economic and political conditions.

The UN Millennium Project's analysis indicates that 0.7% of rich world GNI can provide enough resources to meet the Millennium Development Goals and therefore developed countries must follow on commitment and begin increasing ODA volumes (Millennium Project, 2002-2006). By 2013, ODA had reach the following proportions which exceeded the 0.7% target: Norway (1.07% of GNI), Sweden (1.02% of GNI), Luxemberg (1.00%

of GNI), Denmark (0.85% of GNI) and United Kingdom (0.82% of GNI), had exceeded the 0.7% target, (OECD, 2015) as shown in figure 1-1 below.

Figure 1.1: Net Official Development Assistance (ODA) measured as a percentage of GNI in 2013



Source: OECD, 2015

Ghana is recorded as the second largest in West Africa, which is among the top ten (10) recipient countries and received aid of about 3.1% in terms of the amount of foreign aid disbursed within the period 1970-2010/2011 (OECD, 2013). Sector analysis indicates that, the social sector received within the range of 18% and 41% of total ODA between 1970 and 2010; and then followed by the economic sector, ranging from 16%-20% over the same period of years (OECD, 2013).

Thus, from the above, aid has become an important complement to domestic savings and its effectiveness needs to be examined, especially, aid to key economic sectors such as Agriculture, and social sectors as Health and Education.

1.2 Problem Statement

Developing countries are known to have low Gross Domestic Product (GDP) per capita, high population growth rates and unequal income distributions among other factors (Nalo, 1993). Economic policies in developing countries, including Ghana, have focused on likelihoods on attaining increased growth and development. Ghana has experienced various internal and external shocks which include high domestic rates of inflation, political instability in the mid-1960s through to the 1980s, large fiscal deficits, world oil price shocks of the early 1970s, and unfavorable terms of trade shocks. These caused external debt burdens from the mid-1960s to the 1980s and also led to slow and low economic growth in Ghana with negative annual GDP growth rates recorded in 1972 (-2.49%), through to 1983 (-4.56%) [WDI, 2014].

External assistance to Ghana decreased in the 1970s, mainly as a result of political instability and poor economic management. A lot of foreign capital in the form of official development assistance (ODA) has been received into the Ghanaian economy since April 1983, when the Economic Recovery Programme (ERP) was launched. However, there have been questions relating to the impact that foreign aid has had on the country over the programme period. It is of essence to know the answer to these questions owing to the fact that globally, donors' assistance is declining in percentage terms, and locally, Ghana's economy is still weak (Killick, 2000).

Generally, it is understood that, the inflows of foreign aid play an important role in enhancing improvement toward self-sustained growth in developing countries.

Rosenstein-Rodan (1961) who is an advocate of this view stated that, the reason for an international program of aid to underdeveloped countries is to speed up their economic development up to a suitable point where the rate of growth can be achieved on a self-sustaining basis. Thus, the general motive of aid is to provide a positive motivation for a maximum national effort in each underdeveloped country, in order to increase its rate of growth.

Foreign aid is possible to enhance economic and social change in recipient countries when vital government policies and programmes are persued; resources are provided for carrying out programmes that involve a shift in the structure of the economy; activities are promoted; and temporal shortages in specific human and material resources are surpassed (Mikesell, 1970). Foreign aid may also serve as a relief to a developing country from its fiscal constraint, improve technical progress, and augment tax and other government revenues. This will increase the government's ability to maintain expenditures on economic services and capital formation, without, necessarily generating inflationary and balance of payments pressures (Killick, 1991; Bacha, 1990). The supply response from donors and the degree of commitment to development in the recipient country, however, determine the amount and type of foreign aid that can be employed usefully in facilitating these transformations. In order for the developmental effectiveness of aid to be achieved, the recipient country needs a good absorptive capacity. A low absorptive capacity, however, may result in over dependence of the recipient country on aid, which may weaken its political and economic independence (Eshag, 1971). A number of factors which include shortage of skilled manpower, institutional weakness,

budget constraints, and weak domestic policies; are identified to have hindered absorptive capacity in Sub-Saharan African countries (Killick, 1991).

Large amount of inflows of aid may increase the level of foreign reserves and thus raise the monetary base of the economy, depending on the size of the recipient country's economy. This increase in the monetary base may lead to an increase in the domestic credit supply capacity and consequently to inflation. A country's indebtedness and its attendant debt-service problems may increase as a result of a large amount of foreign aid, which may lead to capital flight. This may deepen the country's shortage of foreign exchange as well as the savings necessary to finance investment projects. Also, large amounts of foreign aid inflows may increase aggregate demand in the economy and place pressure on the Real Exchange Rate (RER), which may cause domestic resources to be shifted into the production of non-tradeable goods and subsequently, lead to a fall in production in the tradeable sector. Thus, excessive aid inflows put pressure on the real exchange rate. The real exchange rate appreciation which is caused by aid inflows may discourage the growth of exports and import-substitutes in the recipient country.

Despite the inflows of foreign aid into African countries and for that matter Ghana, there have been controversies about the effectiveness of foreign aid and the results obtained so far are ambiguous (Burnside and Dollar, 1997; Easterly et al., 2003). However, quite a number of these empirical studies that have been embarked on to ascertain the relationship between foreign aid and economic growth are mostly cross-sectional studies (Riddell, 1987; Mosley et al., 1987) whose findings cannot be directly applied to a

specific country (Ghana); and these findings may not accurately and adequately reveal the Ghanaian experience. Thus, although these studies are informative, they have limited policy relevance as the policy makers in the recipient country would want to know what will make foreign aid work in the respective country. Lloyd et al (2001) noted that, to improve the understanding of aid effectiveness, it is appropriate to conduct studies on the impact of aid on growth in specific countries. Most especially, limited number of studies tried to address the relationship between foreign aid given to the various sectors. It is of interest to know which of the sectors, foreign aid is performing well and which sector of the economy is not doing well even after the injection of foreign aid.

The motivation of this study is to look at the effectiveness of foreign aid on the Agriculture, Education and Health sectors for the following reasons: The agricultural sector is considered to contribute to employment and Gross Domestic Product and is noticed to be a very important sector in attaining the Millennium Development Goals, economic growth and development. The Education and Health sectors also play noticeable role in the Millennium Development Goals (MDGs) in eradicating extreme poverty and hunger. Moreover, other goals which are stated in the MDGs clearly set targets that are related to health and education. This implies that donors have some preference for spending on these sectors and as such, there is the need to consider the amount of aid received in these sectors and their respective impacts. It is necessary to look at the impact of foreign aid on the different sectors because foreign aid may have differentiated impacts at the sector levels.

The main research questions are as follows:

- ✓ Of what impact has foreign aid had on the Agriculture, Education and Health sectors in Ghana?
- ✓ What is the short-run impact of foreign aid on the sectors?
- ✓ What are the long-run effects of foreign aid on the sectors?

1.3 Objectives of the study

1. To test the causality between foreign aid and growth at the sector level
2. To determine the effect of foreign aid on the growth of the agricultural, Health and Education sectors
3. To test the short and long run effects of foreign aid on the sectors

1.4 Relevance of the Study

Investigating deeper into the relationship between foreign aid and growth of the sectors is crucial for understanding how aid flows in the country are affecting economic growth; thus giving empirical guide for policy formulation. It will also shed light on the determinants of economic growth and provide helpful feedback for the design and implementation of stabilization policies as aid flows into the country increase with stable macroeconomic and political environments. Thus, the study will be useful for improving policies, monitoring and evaluation in the scope of the foreign aid allocation to the sectors based on their respective impacts.

Most of the literature focuses on the foreign aid effect on economic growth and mostly use international cross section statistical investigations rather than individual country case study (Riddell, 1987; Mosley et al, 1987). Although these studies are informative, they have limited policy relevance as the policy makers in the recipient country would want to know how foreign aid works for the respective country.

1.5 Organization of the Study

The study is organized into six main chapters with each chapter comprising appropriate sections including the general introduction. The rest of the study is organized as follows. Chapter two takes an overview of foreign aid flows. Chapter three seeks to undertake a review of relevant literature containing theoretical and empirical reviews with respect to the theories of foreign aid and growth models. Chapter four presents the research methodology adopted for the study, touching on issues such as data description and definition, and model specifications. The fifth chapter also analyzes the estimated growth models. The research concludes in chapter six, with a summary of major findings, policy implications of results and recommendations, the practical limitations of the study, issues for further research and conclusion.

CHAPTER TWO

OVERVIEW

2.1 Introduction

This chapter looks at the history of foreign aid, trends of foreign aid to Africa and Ghana, and an outline on the agriculture, health and education sectors.

2.2 History of Foreign Aid

The establishment of the Development Assistance Committee (DAC) and Development Co-operation Directorate (DCD) of the OECD was an essential part of the creation of a network of national and international aid agencies and programmes and related institutions. The success of the Marshall Plan created considerable positivity about the view for helping the poorer countries in quite different circumstances through external assistance.

The Development Assistance Group (DAG) established in 1960 was as a forum for consultations among aid donors on assistance to less-developed countries. Members of this group were, Belgium, Canada, France, Germany, Italy, Portugal, the United Kingdom, the United States, the Commission of the European Economic Community, Japan, and the Netherlands. With the entry into operation of the Organization for Economic Co-operation and Development, the DAG merged with the Development Assistance Committee (DAC). The OECD's Development Co-operation Directorate (DCD) work with the DAC on formulating international development commitments. In 1960/61, the United States was the source of more than 40 per cent of total official aid to

developing countries, and one-third from France and the United Kingdom (Fuhrer, 1994). The World Bank set up the International Development Association (IDA) 1960, with an initial subscription of about $900 million, to provide very soft loans to poorer developing countries (Fuhrer, 1994). The DAC was involved in improving and harmonizing the financial terms of aid both in view of the impact on developing countries′ debt and of burden-sharing considerations. Of much concern to DAC was the improvement in aid coordination and therefore in 1966, DAC approved Guidelines for Co-ordination of Technical Assistance. DAC further went ahead to urge developing countries to put strong emphasis on encouraging agricultural development and food production and assisted developing countries in this effort.

2.3 Institutional Developments

In 1960, Canada created an "External Aid Office" which later became the Canadian International Development Agency (CIDA) in 1968. In 1961, the United Nations General Assembly set two specific objectives which were to achieve a growth rate of 5 per cent per annum in the developing countries by 1970 and also to increase the flow of international assistance and capital to developing countries in order to appropriately reach 1 per cent of the combined national income of the economically advanced countries (Fuhrer, 1994). An Agency for International Development was also established in 1961 to manage bilateral economic assistance. Japan also established the Overseas Economic Cooperation Fund (OECF) in 1961 as a source of development loans for developing countries. Japan further established the Overseas Technical Cooperation Agency (OTCA) in 1962, to administer parts of Japan′s technical assistance; this was then incorporated

into the Japan International Cooperation Agency (JICA) in 1974. France was recognized as the first country in 1961, to establish a Ministry for Co-operation to be responsible for assisting independent, mainly African, developing countries. Sweden established an Agency for International Assistance in 1961 and this was transformed into the Swedish International Development Authority (SIDA).

In 1969, DAC adopted the "Official Development Assistance (ODA)" concept, separating ODA from "Other Official Flows" (OOF) and an agreed definition for ODA was given in 1972 by DAC as follows: ODA is the flows to developing countries and multilateral institutions provided by official agencies, including state and local governments, or by their executive agencies, each transaction of which meets the following tests: It is administered with the promotion of the economic development and welfare of developing countries as its main objective; and it is concessional in character and contains a grant element of at least 25 percent (Fuhrer, 1994).

When foreign aid is given to the recipient country, a number of formal conditions are usually attached:

- ✓ ODA loans are provided on the principle that the recipient country returns the money with interest, according to the financial terms specified in the loan agreement.
- ✓ ODA grants and loans can be tied to procurement in the donor country or, in case of partial tying, in the donor country as well as a certain number of developing countries.

- ✓ ODA grants and loans may be tied to specific development projects under supervision of the donor.
- ✓ In the case of programme aid, the money is committed and disbursed in accordance with the recipient country's compliance with an agreed set of policies in relation to the domestic economy.

The payment and procurement are, however, generally seen by development specialists, recipient country governments and many agency officials as undesirable features of aid flows. Hjertholm and White (2000) outlined that one reason for being concerned with the financial terms of aid flows is their subsequent impact on the debt servicing burden of recipient countries, and hence on the future sustainability of their balance-of-payments and their fiscal balances.

Developing countries experienced economic crisis during the 1970s caused by lower export earnings because of the fall in commodity prices, and the OPEC oil price shock and this led to the global crisis in 1974. World Bank (1994) noted that, the GDP per capita in most developing countries declined after growing at an average of 2.6 percent a year between 1965 and 1974. This called for quick disbursing assistance that was made available in the first instance by the IMF, then by the emergence of import support aid, and by 1980, the start of World Bank structural adjustment loans (which are programme aid). In spite of these, the World Bank prompted poor domestic policies, arising from the Marxist development paradigm, as the main cause of stagnation in Africa during the

1960s and 1970s. Such policies include overhauled exchange rates, heavy government spending and inward-looking trade policy (World Bank, 1994).

Owing to the effect of the oil price shock, ten DAC members pledged to a Memorandum of understanding on Untying of Bilateral Developments Loans in favour of Procurement in developing countries. Food and agricultural issues were therefore considered and this became the subject of regular review in subsequent years. The publication of Pearson Commission Partners in Development which also included a recommendation of 0.7 per cent target for Official Development Assistance was made, and this target was adopted by the United Nations in 1970. Sweden was noted as the first DAC member to attain the 0.7 per cent ODA/GNP target in 1974, followed by the Netherlands in 1975, Norway in 1976 and Denmark in 1978 (Hjerthlom and White, 2000).

In the early 1980s, developing countries encountered serious debt servicing problems prompted by over-borrowing, ineffective use of resources on the one hand, the two oil price shocks, and a sharp rise in international real interest rates and depressed export earnings resulting from OECD countries′ economic stabilization policies on the other. A serious crisis occurred in August 1982, when Mexico confirmed the inability to meet debt obligations (followed by Brazil and others). This marked the beginning of a long process of policy reform and structural adjustment efforts by developing countries to challenge structural and macro-policy problems in Africa.

The IMF, World Bank, and other international or bilateral donors insisted and sponsored substantial reforms, which have often included a set of macro-economic measures together with structural changes within the domestic economy. Most countries in Africa have embarked on Structural Adjustment Programmes (SAPs) of one form or another which include Currency devaluation, changes in fiscal, financial and pricing policy, and legal regulatory and institutional reforms. Changes in fiscal, financial and pricing policy included the removal of subsidies and tariffs. Institutional reforms also included privatization of government-owned enterprises and the introduction of cost-recovery. Structural Adjustment Programs (SAPs) to some extent have been successful in achieving the macro-economic changes. However, execution of the associated micro or sectoral changes has been less successful (De Haan et al, 1991; Umali et al, 1992).

2.4 Trends of Foreign Aid to Africa

Trends in net ODA flows from donors to Africa in the last two decades showed a mixed picture of increases and decreases with a record high of US$ 45 billion in 2006 and a decrease of more than 20 percent to US$ 36 billion in 2007. Excluding debt initiatives and emergency assistance, net ODA disbursements to core development programs or country programmable aid fluctuated between US$ 18 and US$ 33 billion per year since 1980. The share of ODA flows to African low-income countries increased steadily from about 78 percent in the second half of the 1990s to 90 percent in 2005-2007, while the share of ODA to middle income countries was more than halved to 10 percent over the same period. This development reveals donors' increasing focus on the poorest countries. ODA flows to ADF eligible countries followed the same trend as that of ODA to all

African countries, increasing from about US$ 16 billion in 1980 to US$ 40.3 billion in 2006 and declining to US$ 30.6 billion in 2007. In 2009, ODA from members of the Organization for Economic Co-operation and Development (OECD), and Development Assistance Committee (DAC) increased in real terms to US$119.6 billion, which represented 0.31 percent of DAC members' combined gross national income (ADF, 2009).

2.5 Trends of Foreign Aid to Ghana

Ghana has been a beneficiary of Official Development Assistance (ODA) since independence, receiving an average of about US$500 million annually between 1960 and 2013; most of which were received in the latter part of this period with an average of US$873 between 1984 and 2013, and about US$72 million between 1960 and 1983 (WDI, 2014).

Aid flows immediately after independence was of no interest in Ghana until the mid-1960s because the Nkrumah government did not have much belief in the major donors; USA and Britain (Harrigan and Younger, 2000). The new National Liberation Council (NLC) that overthrew the Nkrumah administration were attracted to foreign assistance and pursued assistance from the International Monetary Fund (IMF) in reaction to the balance of payments crisis in 1965/66 (Quartey, 2014). Aid inflows as a share of GDP increased from 1960 through to 1965 but however, most of these inflows were used to settle commercial debts (Harrigan and Younger 2000; Quartey 2002). Though there was some amount of aid inflows in the 1970s through to 1980, it did not improve the

country's payment position as foreign aid was in the form of loans instead of grants and therefore, Ghana's foreign debt increased from US$895 million in 1975 to US$1407 million in 1980 (Harrigan and Younger 2000). Most of the inflows were received from the mid-1980s and onwards and this was as a result of the Economic Recovery Programme and Structural Adjustment Programme that the country embarked on.

A debt relief was granted in 2002 as a result of the ratio of gross public debt to GDP rising to 142.6 percent in 2001. Subsequently, international support once again jumped and between 2004 and 2007, it was averaged US$990 million annually (Ashong and Gerster, 2010). This was as a result of heightened donor confidence from the improved macroeconomic performance and the introduction of the Multi-donor Budget support framework in 2003. In nominal terms, total ODA to Ghana increased from US$1003 million in 2003 to US$1656.5 million in 2007. It fell to US$1649.6 million in 2008 and rose back to US$2102.5 million in 2009 (Ashong and Gerster, 2010). Though it was projected to increase in 2010, it fell again to US$1896.8 million.

Government made use of the high return public investments and infrastructure rehabilitation in the late 1980s and early 1990s, which caused markets to function at a level in relation to the pre-ERP. The government's decision to nullify the monetary effects of the inflows sternly limited credit to the private sector (Younger, 1992) and this ultimately led to the Dutch disease situation (Quartey, 2005). Ashong and Gerster (2010) stated that the ODA funds received in Ghana are in four broad categories: Debt relief resources from the Multi-Donor Debt Relief (MDRI) initiative and the Heavily Indebted

Poor Countries (HIPC) initiative; Project support in the form of project loans and project grants; Programme aid in the form of loans and grants; and Balance of payments support from the International Monetary Fund.

In June 2003, a Framework Memorandum was signed between the Government of Ghana (GoG) and nine Development Partners (DP) establishing the Multi Donor Budget Support (MDBS) programme in order to assist in the implementation of Ghana's development and poverty reduction policies. Development partners based the MDBS on the contribution of financial resources directly to the Government's coffers to supplement Ghana's domestically generated revenues. The nine development partners are; the African Development Bank, Canada, Denmark, the European Union, Germany, the Netherlands, Switzerland, UK, and the World Bank. France and Japan joined in 2005 and 2008 respectively, increasing the number to eleven (11) development partners. The MDBS aims to:

- ✓ Provide more harmonized assistance to Ghana
- ✓ Increase the predictability of donor flows
- ✓ Improve dialogue between the DPs and the Government of Ghana
- ✓ Reduce competing demand on Government of Ghana from Development Partners
- ✓ Reduce tied Aid
- ✓ Promote Government of Ghana's accountability for service delivery
- ✓ Facilitate broad based discussion on the reform agenda
- ✓ Improve DPs' co-ordination

The MDBS constitutes about 30% of the total donor inflow to Ghana. From 2003 to 2010, the MDBS programme organized a total of US$2803.77 million to support implementation of budget activities (MoFEP).

Table 2.1: Multi-Donor Budget Support to Ghana for the period 2003 to 2010

	2003	2004	2005	2006	2007	2008	2009	2010
Pledges in USD	281.40	302.16	285.33	372.43	319.57	347.90	601.10	451.5
Actual in USD	277.90	309.03	281.88	312.16	316.57	368.13	525.20	403.9
Budget support (% total ODA)	30.0	26.7	29.3	33.0	26.5	25.7	34.6	23.4
Budget support (% Gov't Expenditure)	-	12.7	10.2	8.3	7.7	8.3	9.3	5.5
Budget support (% GDP)	3.6	3.5	2.6	1.5	1.3	1.3	2.0	1.3

Source: Official MoFEP data, Ghana

MDBS can be thought of as having a good year-on-year predictability, mostly within a range of +5% or -5% of planned disbursements. However, it has been of little importance in relation to total aid and the Government's own budget (Killick et al, 2007). For instance, MDBS inflows in 2005 revealed only a quarter of all aid receipts and below a tenth of total government spending.

The need to ensure that aid reacts to poverty reduction and the achievement of the MDGs called for the Paris Declaration, which was made in March, 2005 with the view to change the ways in which foreign aid is delivered and managed. This was a follow up on the Declaration accepted at High-Level Forum on Harmonization and at the Marrakech Roundtable on Managing for Development Results (February, 2004). As the volumes of

aid and other development resources increase to achieve the MDGs, aid effectiveness must as well be of importance in order to support partner country efforts to strengthen governance and improve development performance. This was undertaken by Ministers of developed and developing countries and Heads of multilateral and bilateral development institutions. The Declaration adopted five partnership commitments as the center for development cooperation. These include; Ownership, Alignment, Harmonization, Managing for Results and Mutual Accountability. These commitments were for donor and recipient countries in supporting effective aid in a setting of a significant scaling up.

In September 2008, Ministers of developing and donor countries responsible for promoting development and Heads of multilateral and bilateral development institutions validated the Accra Agenda for Action (AAA) in Accra, Ghana with the aim to accelerate and deepen implementation of the Paris Declaration on Aid effectiveness (in March, 2005). The Accra Agenda for Action pivots on three main points which are; Ownership, Inclusive partnership and Delivering results.

2.6 Overview of Sectors and Aid Allocations

This section looks at a brief overview of the agriculture, health and education sectors; and also talks about the inflows into the respective sectors.

2.6.1 Agricultural Sector

Agriculture is seen to play a significant role when it comes to employment and its contribution to Gross Domestic Product. Quartey (2014) stated that, any policy initiative

that is set to reduce poverty in Africa should be geared towards the agricultural sector as the main priority area. This is because; the agricultural sector is noticed to be very important in attaining the Millennium Development Goals, economic growth and development. Fan et al (2009a) agreed that there is the need for a stronger acting African agricultural sector in order to achieve the Millennium Development Goals (MDGs), economic growth and development. However, in spite of its role, agriculture's share of GDP is considered not high as compared to its share in those economic activities, and therefore people who depend on agriculture for their livelihood live in poverty (Kaya et al, 2008). Thus, the sector faces a number of problems causing agricultural productivity and production growth to be lower (Zimmermann et al, 2009). In order to promote productivity and production improvements in Ghana, a total of 2,269 hectares of land was put under cultivation by 339 Registered Certified Seed Growers to produce 4000 metric tons of certified seed during the 2009 cropping seasons (ISSER, 2010). There has been some significant amounts of agricultural finance in the form of Official Development Assistance (ODA), private capital flows, private philanthropy, and assistance from the domestic money bank; yet not sufficient in transforming the sector into a modern and highly productive sector (Quartey, 2014).

In spite of the general increase in foreign aid to Sub-Saharan Africa over the past years, aid given to the agricultural sector has fallen since the 1990s to the late 2000s, with maximum concern shifting to the social sectors; mainly education and health sectors. Quartey (2014) stated that, even though the agricultural sector is noted to contribute greatly to economic growth and development in Sub-Saharan Africa, the support it

receives from governments and individuals is very minimal; highlighting of the fact that, most African governments allocate less than one (1) percent of their budgets to agriculture. The Comprehensive Africa Agriculture Development Programme (CAADP) admits the fact that, overall investments in agriculture need to be significantly increased if Africa is to overcome its agricultural crisis Brown et al., 2009).

Most foreign assistance to the public sector is identified to rely more on improving the economic infrastructure, education and health; attributing it to some specific challenges (poor technology, small production units and high dependency on rain), that the agricultural sector in most African countries experience (Quartey, 2014). These challenges make agriculture one of the riskiest and relatively less profitable investment projects as compared to the other types of projects. Also, the pressure on African governments to broaden their agendas with education and health may explain why donors have shifted their primacies away from the agricultural sector (Fan et al., 2009b).

Ghana is principally agricultural based which has primary products as its main exports and yet, its share of GDP has not been improving enough. Quartey et al (2010) stated that, the share of agriculture to GDP fell from 38.0% in 2007 to 33.6% in 2008. It continued to experience a declining share of 31.8% from 2009 to 20.6% in 2014 as recorded in the Ghana Budget statement for the year 2015. The amount of foreign aid received in the Agricultural sector has been fluctuating with each rise followed immediately by a fall from the 1980s up to the late 2000s. The period from 1999 to 2005 experienced continuous low inflows of aid to this sector. A substantial increase in inflows

was, however recorded from year 2008 ($112.15 million) until 2011 where an amount of $338.83 million was received to the Agricultural sector. On average, the agriculture sector received significant amounts of $134.84 million between the years 2006 and 2010; and $193.04 million between 2011 and 2013. Grants to this sector over the years have been relatively low compared to that of loans received; however, a substantial increase was recorded from 2009 to 2011.

2.6.2 Health Sector

The goal of the health sector is to ensure a healthy and productive population that reproduces itself safely and its policies and priorities are sited within the context of the Government's overall development agenda as stated in the GPRS II, the National Health Policy and the five year Programme of Work (Ministry of Health, 2007).

Ghana began implementing the National Health Insurance Scheme (NHIS) in 2003 which was aimed at providing all Ghanaians with quality health care services. The Health Fees Exemption Policy was also devised in 1992 which covered children under five years old, lactating mothers, and the elderly above 70 years. The provision of support for Anti-Retroviral Treatment (ART) to assist people living with HIV/AIDS (PLWHAS) was considered. The driving force of policy in the health Subsector is on the expansion of coverage and improving the quality of health services. ISSER (2001) stated that the Ministry of Health in year 2000, set out to achieve four priority objectives which were to attain; 65 percent coverage in child immunization, 42 percent supervised deliveries, 14 percent contraceptive prevalence, and 0.38 of OPD attendance per capita. A national

strategic framework to respond to HIV/AIDS was also approved by cabinet in the year 2000 and this gave way to priority interventions in fighting the spread of the disease. Such interventions included the provision of safer sex materials, improvement in the management of Sexually Transmitted Diseases (STDs), safe blood transfusion, infection control, counseling and nursing as well as clinical management of persons infected with HIV/AIDS.

As stated in the Annual programme of Work, Ministry of Health (2007), the health sector also began implementing a new policy and a five year programme of work (2007-2011) in 2007. This was with the aim of achieving three interrelated and mutually reinforcing objectives which are: ensuring that children survive and grow to become healthy and productive adults that reproduce without the risk of injuries or death; reducing the risk and burden of morbidity, disability, and mortality, especially amongst the poor and marginalized groups; and reducing inequalities in access to health, reproduction and nutrition services, and health outcomes. In the State of the Ghanaian Economy in 2010, challenges of the health sector were identified as follows: inadequate facilities and primary health care, too few medical practitioners, lack of well functioning universal health insurance system, and diseases arising from poor sanitation.

Financing the programme of work within a budget constraint, whilst attaining the hope of health delivery to meet the MDGs, has been the major challenge of the health sector. Osei (2010) noted that health outcomes are hindered by the limited supply of necessary drugs and cautioned that health outcomes require increased resources as well as the effective

use of these resources. Foreign aid to the health sector has significantly increased over the years from 1996 ($107.85 million) till 2012 where it recorded $524.53 million. There were however some slight falls in inflows in between the years. Grants to this sector have relatively been increasing, especially, in 2007 and 2008 where it recorded $111.52 million and $136.13 million respectively. Loans to this sector, however, increased in the year 2012, to $500.98 million with a grant element of only about $23.55 million.

2.6.3 Education Sector

One goal of government's development policy is a nationwide sustained effort to expand, strengthen and make more relevant its educational system and this is reflected in the Millennium Development Goals (MDGs) which aims to achieve universal primary education. Sen (1999) observes education as an investment and important tool for attaining development goals, and therefore, developing countries should organize their resources for education. At independence, Ghana looked to reform education in order to quicken economic and social development. The agenda for education was to reduce poverty through measured economic productivity in the knowledge of science and technology (Acheampong, 2007).

In view of this, the government seeks to provide quality basic education for all children of school going age in the country in the shortest possible time. This forms the major policy in the education Subsector and is known as the Free Compulsory Universal Basic Education (FCUBE). The main purpose of the FCUBE is to ensure that all graduates of the basic education system are prepared for further education and skill training (ISSER,

2001). As a result of the economic decline, bureaucracy and complete lack of interest, the education system was in a state of crisis by 1983 facing severe reductions in government financing, lack of educational materials, weakening of school structures, low enrollment levels and dropout rates. With the support of several development partners (World Bank, Department for International Development), the education system was reviewed and proposals were implemented in 1987 with the objectives to: increase access to basic education; reduce the pre-university education structure from 17years to 12years; make education cost-effective; and improve quality of education by making it more effective to socioeconomic conditions.

In achieving its broad policy on education, the government in 1999 continued to concentrate on the improvement of education in terms of teaching and physical infrastructure, increasing access at all levels and improving the management of educational finances. An amount of 27.3 billion Cedis was spent on the rehabilitation of the infrastructural facilities in the entire 38 teacher-training colleges as at 1999 in order to ensure quality teaching and learning (ISSER, 2000). Developments in this sector in 1999 were accompanied by an increase in the development budget for education. As stated in the State of the Ghanaian Economy in 1999, the government projected that 60 percent of the recurrent budget to education be allocated to basic education in 1998 and this increased to 70 percent and 80 percent respectively in 1999 and 2000. Budgetary allocation to the tertiary sector, however, has remained constant at about 15 percent of the recurrent budget to the education sector during this period. Despite the increase in primary school enrollment in absolute terms in the 1990s, ISSER (2000) noticed a decline

in the proportional participation of children in primary schooling. Thus the population of pupils of all ages enrolled in primary 1-6 relative to the population of 6-11 year olds, declined from 79.3 percent in 1990/91 to 76.5 percent in 1996/97.

The establishment of the Ghana Education Trust Fund (GETFUND) was meant to equip schools at all levels with buildings and other equipment. This has to a large extent enabled educational facilities to be maintained and extended. The introduction of the Metro Mass Transit Limited in 2007 which was tasked to provide free rides for school children at the basic level was also a way to ensuring quality education. The government introduced the School Feeding Programme in 2005, in selected schools at the basic level as a pilot programme. Despite government's effort to improve the educational system, there are still some challenges within this sector, some of which have been identified in the State of the Ghanaian Economy in 2010 as follows: limited cultivation in the habit of reading due to lack of libraries, politicization of education; and the disadvantages associated with the Junior Secondary School (JSS) and Senior Secondary School (SSS) systems as compared to the General Certificate of education (GCE) Examinations.

Foreign aid to the educational sector has been experiencing some fluctuations from the 1990s until after 2002 where it started recording a steady rise in inflows till 2006. Even though it mostly experienced a rise immediately after a fall, the amount of aid inflows into this sector has not been significant enough as per the data received from the Ministry of Finance and Economic Planning (MoFEP). Grants received in the Education sector has increased steadily over the years as compared to that of loans.

In 1999, expenditure made on the social sectors which include health, education and social welfare accounted for 31.37 percent of total government spending, which is equivalent to 7.7 percent of Gross Domestic Product (ISSER, 2000). On the other hand, expenditure on the economic sectors (i.e. Agriculture, mining, etc.), stood at 21.23 percent of government spending in 1999. This indicates that, government spending on the social sectors was relatively higher than the spending on the economic sectors. The contribution of the Agricultural sector to Gross Domestic Product averaged 27.8 percent for the year 2006 to 2013. Also, Health and Education which are Subsectors of the Services sector contributed on average 1.35 percent and 4 percent respectively to Gross Domestic Product.

Table 2.2: Distribution of Gross Domestic Product (at basic prices) by Agriculture, Education and Health Sectors (percent)

Years	Agriculture	Education	Health
2006	30.4	3.7	1.4
2007	29.1	3.9	1.4
2008	31	3.9	1.3
2009	31.8	4.2	1.4
2010	29.8	4.3	1.6
2011	25.3	4.1	1.3
2012	22.9	4.3	1.3
2013	22.4	3.6	1.1
Average	27.8375	4	1.35

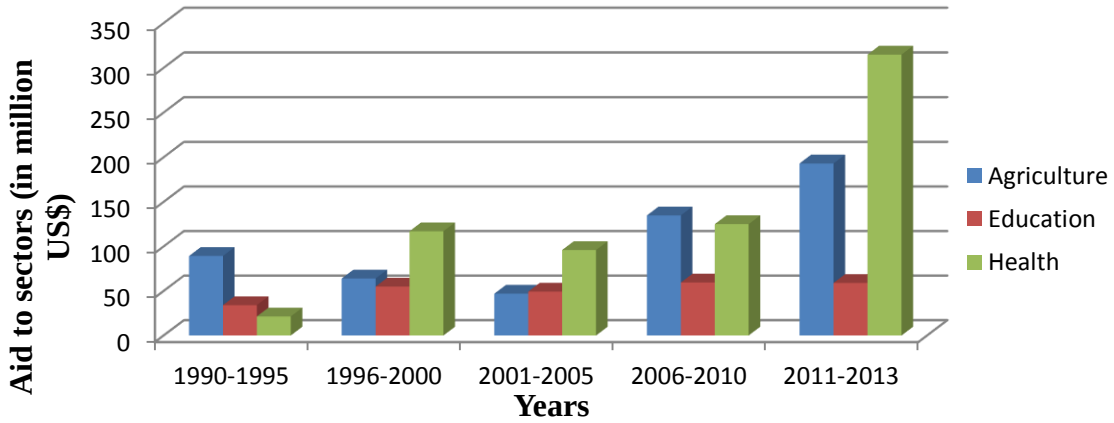
Source: Ghana Statistical Service, 2015

With the recent Rebasing by the Ghana Statistical Service from 1993 to 2006 price, Agriculture is not considered as the main contributor to the nation's Gross Domestic Product. The Services sector's contribution to GDP was 51.4 percent, followed by the Agricultural sector with 29.9 percent, and the Industry sector with 18.6 percent as in the year 2010. Overall, the growth of the Agricultural sector was 5.3 percent in 2010 and the

subsequent year compared to 7.2 percent in 2009 (ISSER, 2010). That of the Services sector experienced an increase from 5.6 percent in 2009 to 9.8 percent in 2010. The education and health sectors have been fluctuating with fall from 12.4 percent and 15.2 percent in 2009 to 3.8 percent and 5.0 percent respectively in 2011; until they experienced another increase of 6.7 percent and 10.9 percent respectively in 2012 (GSS, 2015).

Looking at the figure (figure 2-4) below, it is obvious that the health sector, mostly enjoyed the inflows of Official Development Assistance over the years. On average, the Agricultural sector had the highest inflows ($134.84 million) among the other sectors (Education: $59.50 million; and Health: 125.01 million) only from 2006 to 2010. Relatively, the Agricultural sector, which is a main sector in the country receives lower inflows as compared to the Education and Health sector, which are only Subsectors of a main sector (Services sector). Figure 2-4 may therefore help in explaining that, donors' interest has shifted from the Agricultural sector to the social sectors.

Figure 2.1: 5-year Average Distribution of Aid to Sectors



Source: Author's computation based on data from MoFEP, 2015

CHAPTER THREE

LITERATURE REVIEW

3.1 Introduction

This chapter examines theoretical and empirical studies of aid effectiveness on growth as a whole and on the sectors.

3.2 Theoretical Review

A developing nation must find ways of changing, organizing and exploiting its natural, physical and human resources, coupled with a vibrant and growing Industrial sector (Rostow, 1956). Foreign aid was founded on the principles of modernization theory, according to which poor, underdeveloped countries simply needed an injection of capital (aid) to stimulate economic growth. Foreign aid was given to developing countries to fill their savings and investment gaps, and therefore was supposed to act as a catalyst for growth. In the 1950s, foreign aid was based on the Harrod-Domar growth model which focused on investment as the key driver of growth. Moreira (2005) stated that empirical studies of the aid-growth relationship that have been carried out until the mid-nineties were influenced by the early growth theories, which emphasized that growth process depends on the ability to exceed the constraints regarding the accumulation of physical capital. Investment was observed as the key to economic growth.

Traditionally, the lack of savings crucial to investment was regarded as the most significant limitation to the economic growth of developing countries. This is because; many African countries are characterized by low income levels and hence the limited

capacity to generate savings. According to the Harrod-Domar equation, growth depends on investment, which is financed by savings (both domestic and foreign). If the effect of aid on domestic savings is positive, then one may state that aid will increase growth. Otherwise, aid will probably be detrimental to the economic growth of developing countries. The Harrod-Domar growth model assumes that underdeveloped countries have excess labour and that growth is constrained only by low productivity caused by the inadequate supply of capital. Thus, growth is determined by the availability and productivity of investment capital. A country is said to use its domestic savings to fund productive investment since domestic savings determine how much capital is available for productive investment (Morrissey, 2001). The lack of domestic savings therefore was seen as an important limitation to economic growth in developing countries. Meanwhile, the importance of aid is reflected in the following growth models:

3.2.1 Harrod - Domar Model

The Harrod-Domar growth model predicted that, aid would contribute to growth by increasing the levels of capital and therefore augmenting domestic savings and investment. The model considers a closed economy in which one homogenous good, Y is produced. In its simplest form, the model assumes that output is a function of capital stock and the production function exhibits constant returns to scale (marginal product of capital is constant) such that;

$Y = \min(bL_t, vK_t)$ **v** and **b** are constants

v = average/marginal product of capital

1/v = c = capital per unit of output =average/marginal capital output ratio (ICOR)

The model assumes that labour is in surplus and capital is scarce, a typical of a developing country. The production function becomes

$Y_t = vK_t$

Denoting the growth rate of a variable by ^ and time derivative by ˙ over the variable, we have

$\hat{Y}_t = \frac{dY_t}{Y_t} = \dot{K} = \frac{dK}{K}$

$dK_t = \dot{K}_t = I - \delta K_t$

I = gross investment δ = rate of depreciation

The model assumes no domestic or foreign debt/aid and hence equates gross investment to total domestic savings. Savings also equals a constant, sY (fraction of income/output) and after successive substitution, it yields

$\hat{Y} = \frac{dK}{K} = \frac{(I - \delta K)}{K} = \frac{S - \delta K}{K}$

$\Rightarrow \hat{Y} = \frac{sY - \delta K}{K} = \frac{sY}{K} - \delta$

Thus the output growth is the savings rate times the marginal product of capital less the rate of depreciation. By implication, the savings rate and the marginal product of capital have a positive relationship with the growth rate of output. Therefore, increasing savings rate and increasing the marginal product of capital will increase economic growth. Moreover, output will grow if there is a decline in the depreciation rate.

3.2.2 Solow Growth Model

The Solow growth model is a model of capital accumulation in a pure production economy, which is based on the following assumptions; no international trade, all factors of production are fully employed, labour force grows at a constant rate, a single

commodity is produced with a constant technology. The firm produces according to a Cobb-Douglas production function sated as $Y = AK^{\alpha}L^{1-\alpha}$.

The growth function is given as $g = \frac{s}{n}f(k)$

g=growth, n=labour growth rate, s=savings rate, k=amount of capital per worker

Thus, given the capital output ratio (k) and the labour growth rate (n), the growth rate depends on the savings rate such that; the higher the savings rate, the higher the economic growth (g).

3.2.3 Two-Gap Model

An evolution of the Harrod-Domar model known as the Chernery and Strout (1966) two-gap model was introduced, which added a second gap (the foreign exchange gap) to the savings gap of the Harrod-Domar model. In addition to the savings gap, Chernery and Strout (1966) argued that there was a second gap, namely the foreign exchange gap. The savings gap was matched by a foreign exchange gap resulting from the inability to export and ensuing balance of payments problems. It was argued that filling these gaps with foreign development aid was necessary for developing countries to grow and increase their living standards. The two gap model stated that either of the two gaps would adversely affect growth. A country earns foreign exchange by exporting raw materials, commodities, industrial products and services. Low-income developing countries, however, typically depend on only one or two primary commodities to earn their foreign currency. Primary commodities, however, generate low income and are subject to unpredictable global markets. Dependency on one or two volatile export products means that a country's export earnings and foreign exchange are unpredictable (Hansen and

Tarp, 2000). These developing countries as well are importers of fuel, oil, pharmaceuticals, food and consumer goods which must be paid for with hard-earned foreign currency. In low-income countries, the cost of imports is generally higher than export earnings. The net result is therefore a trade deficit. There exists a foreign exchange gap therefore, when a country does not earn enough foreign currency from its exports to pay for its imports. This foreign exchange gap is the second gap identified by Chernery and Strout (1966).

The two gap model therefore is an open economy Harrod-Domar model designed to show how a shortage of foreign exchange can reduce economic growth by constraining both imports and savings. Beginning with the Macroeconomic identity where Aggregate Output = Aggregate Expenditure. That is, assuming there is no government sector,

$Y = C + I + (X - M)$ $Y = gross\ national\ product$ $C = consumption$ $I = investment (or\ domestic\ capital\ formation)$ $X = exports$ $M = imports$

$Y + M = C + I + X$

$Y - C + M = I + X$

$Y - C = S$ $S = savings$

$S + M = I + X$ $S + M = withdrawals,$ $I + X = injections$

Restating the above,

$M - X = I - S$ $M - X = foreign\ exchange\ gap,$ $I - S = savings\ gap$

If M−X = F, then the above can be presented as

$F = I - S$ or $I = F + S$

This implies that, a savings gap would exist if Savings (S) is too small to permit the amount of investment (I) that the country would otherwise have the capability to undertake. Also, a foreign exchange gap would exist if the export is too small to permit the imports required to make full use of the resources of the economy.

Gap models assumed that foreign aid would boost domestic savings and fill the foreign exchange gaps. In other words, foreign capital inflows (including aid) could fill both of these gaps (Hansen and Tarp, 2000). Aid was provided to developing countries with the intention of filling the savings and foreign exchange gaps. However, with time, the provision of foreign aid resulted in a widening of these gaps (Easterly 1999). Foreign aid was provided to developing countries as concessionary loans, and these loans eventually accumulated a debt-servicing burden that began to widen the gaps (Harrigan and Younger 2000; Quartey 2002). For instance, in the case of Ghana, though aid increased in the 1970s through to 1980, it did not improve the country's payment position as the aid was in the form of loans instead of grants and therefore, Ghana's foreign debt increased from US$895 million in 1975 to US$1407 million in 1980 (Harrigan and Younger 2000). Developing countries, therefore, began to increasingly intensify large balance-of-payments deficits, thus needing more foreign aid to bridge the widening gaps instead of reducing them. As stated earlier, the growth models predicted that aid would fill the savings, investment and foreign exchange gaps and further assumed that 100 percent of foreign aid would be used for productive investment. If aid was used for investment, and investment was productive, then the early models predicted that aid would contribute to growth (Hansen and Tarp, 2000). However, this is not the case with developing countries.

Gomanee et al (2005) observed that a significant portion of aid was used to fund public consumption, which the growth models considered 'wasteful' in terms of growth.

Throughout the periods of aid flows, there have been several changes in development policies and many developing countries have had to comply with new growth strategies in order to direct their economies into the path of sustainable growth. By the 1970s, it was evident that modernization and the concepts of a big push, trickle-down effect and take off to growth were irrelevant in most developing countries (Collodel, 2011).

Growth theory has undergone a thorough process of renewal and has remarkably enlarged its scope, resulting in the development of various growth theories offering different growth strategies. The financial liberalization model (Mckinnon, 1973; Shaw, 1973) explains that financial distortion in developing countries is caused by the government's policies and regulations. Also, the central bank tends to distort the real interest rate and causes credit rationing. This distortion has an unfavorable impact on savings and investment hence hindering economic growth. Neoclassical and endogenous growth theories consider productivity growth to have a leading role in the growth process. Therefore, shifting more resources into improving human capital, technological innovations or research and development, and institutional quality are the keys to successful development (Boakye, 2008). Many studies on aid effectiveness have merged a number of factors accounting for policy and institutional quality into the model of the aid-growth nexus. Dowling and Hiemenz (1982) added four policy variables emphasizing the role of an open-trade regime and domestic resource mobilization in the growth

process. In addition to domestic savings, Mosley et al. (1987) added growth in literacy rates, various types of foreign capital inflows and export growth into the aid-growth regression. Hadjimichael et al (1995) added human capital and various macroeconomic variables that they postulated to affect growth.

In summary, the role of aid in the growth theories is seen as a factor input that contributes to economic growth through a direct increment of the stock of physical capital. The next section discusses the possible effects of aid on growth in the empirical frameworks.

3.3 Empirical Review

The aid effectiveness debate started in the late 1950s and has continued to produce a number of arguments in the literature. Some debate that aid works while others are against it. Others also debate that aid works, but depends on some factors. If we are to take a review of some literature written by some economists as Easterly, Dollar, Collier, Hansen and Tarp, and Roodman, a lot of contradictions will be realized which implies that no one really knows whether aid is effective or not.

3.3.1 Sectors

Notwithstanding his overall disbelief of the effectiveness of most aid, Easterly (2006) noted that aid seems to lead to general development in some sectors, including education, water and sanitation, and health. Michaelowa and Weber (2007) identified that education is potentially a highly significant factor in deriving overall economic development. Relying on theory, education aid is considered to have either a positive impact on a

country or to improve some educational outcomes. Looking at economic outcomes, studies have tried to link education and human capital formation by proposing that education should fuel economic growth since it provides human capital (Gani and Clemes, 2003; Asiedu and Nandwa, 2007). In terms of the effect of education aid on GDP growth, Asiedu and Nandwa (2007) identified that the effect of aid on education depends on the level of development of the recipient country (whether low or middle income country) and also, the level of education at which aid is being directed (whether primary, secondary or tertiary). They had the conclusion that, aid in the primary education increases growth in low income countries, but has no significant effect in post-primary education; and for middle income countries, there is an adverse effect on growth for aid in primary and secondary education. However, there is an increase in growth for aid in higher education.

From a human development point of view, Gani and Clemes (2003) considered a cross-country regression of 65 developing countries and found that, aid to education sector has a positive correlation with human well-being in both low and lower-middle-income countries. Likewise, Moe (2008) studied that aid committed to education in the Southeast countries and revealed that, official development assistance provided for basic, secondary and post-secondary education has a significant relationship with educational development. Michaelowa and Weber (2007) used Generalized Method of Moments and investigated the impact of disaggregated educational aid on results in primary, secondary and tertiary education; they concluded that there is a positive effect of aid at all three levels but however, these estimated effects are relatively low. Dreher et al (2008) also

used OLS, 2SLS and system GMM and looked at aid committed to education (primary school enrollment) in developing countries. They found that aid had a robust and statistically significant positive effect on primary school enrollment rates. Gyimah-Brempong and Asiedu (2008) as well found a significant positive effect on primary school completion. Using a panel data set of 27 African countries, Diawara (2009) found aid to be positively and significantly related to primary and secondary education outcome.

The literature on financial assistance to enhance health outcomes is essential in the discussion concerning aid effectiveness. In spite of his skepticism about foreign aid in general, in his book, Easterly (2006) shows that foreign aid added significantly to the reduction of infant mortality. Williamson (2008) employed the use of fixed effect methodology and corrected for likely endogeneity using lagged aid as an instrument; and argued that foreign aid to the health sector is ineffective which was revealed by both fixed effect and instrumental variable estimation. Mishra and Newhouse (2009) also conducted studies in 118 countries for the year 1973 to 2004 and stated that, a 100 percent increase in per capita health aid leads to a reduction in infant mortality rate by 2 percent. Gebhard and Kitterman (2008) further conducted a test of the relationship between health-targeted aid, infant mortality and life expectancy in recipient countries by using data on non-OECD countries between 1975 and 2000; they concluded that on average, aid does not help improve on health outcomes. Foreign aid is only effective on the conditions of good governance, which include democracy, transparency and sanitation. As far back as in 2006 however, Croghan et al (2006) argued that foreign aid,

health interventions, and technical assistance helped decrease the infant mortality rates in their selected countries, irrespective of factors such as good governance, economic development and quality health care systems. Bangladesh and Ecuador were noticed to experience positive health outcomes despite their lack of health infrastructure, low levels of economic development and poor governance. MacKellar (2005) noted that development assistance for health mainly increased towards HIV/AIDS and infectious disease during the period from 1993 to 2003. Thus, basic health care, reproductive health, health education, basic nutrition, family planning and other health interventions decreased in their share of total development assistance during the stated period. Recently, however, Greco et al (2008) found that donor disbursements for child health and maternal health increased by 63 percent and 66 percent respectively from 2003 to 2006 which suggests that possibly donors are diverting their funds toward the people who need it most.

Agriculture has been considered to have an active role in the development process and hence literature on foreign aid to improve the agricultural sector is important when thinking about aid effectiveness. Clemens et al (2004) argued that sectors such as agriculture, industry and infrastructure do have short-term effects on economic growth. Kaya et al (2008) employed a cross-section time series econometric model to analyze the impact of agricultural aid on agriculture in developing by using agriculture value added as the dependent variable. They found a positive and statistically significant relationship between growth in the agricultural output and agricultural assistance for rural development.

Studies on the relationship between aid and growth of the sectors are relatively limited as compared to that of the relationship between aid and aggregate growth which are voluminous and complex. This section therefore provides a relatively brief survey of a selected sample of the vast aid effectiveness literature debate that has evolved in order to support the aid-growth relationship debate. This analysis can be classified into four historical phases which follow the relevant development theories. The first phase of research looks at the impact that aid had on savings, investments and growth, which covers the period from 1950 to 1975. The second phase of research focused more on the effect of aid on growth, which covered roughly from 1975 to 1995.

In 1996, Boone published a paper that opposed that foreign aid has a negative impact on growth. The following year (1997), Burnside and Dollar published a research work that proved that aid had a positive impact on growth but only in countries with good policy environment. This work by Burnside and Dollar prompted a long controversial debate in the literature. During the third phase, research focused on aid, policy and growth, which were the most common debate in the literature from 1996 to 2003. The most recent phase (fourth phase) in the literature is an evolution of the aid, policy and growth debate in which researchers have increasingly begun to study other variables influencing aid besides the policy variable. The four phases help to analyze and understand the impact that aid has had on growth and development; and also to determine what effect these variables may have on foreign aid, growth and development.

3.3.2 First phase (1950-1975)

The questions as to whether foreign aid works or has been effective emerged from the late 1950s by many researchers. Many African countries do not have high income levels to save adequately in enhancing the accumulation of capital stock. Also, many developing countries have inadequate reserves of foreign currency, which prevents them from investing in infrastructure, modern technology and capital equipment which are all necessary components of industrialization (Morrissey 2001; Escobar 1995; Thorbecke 2000). Domar (1947) supported the argument that foreign aid could be used to boost domestic savings which will stimulate economic growth. According to the earlier two-gap theory, foreign capital inflows (including aid) would fill the savings and exchange gaps (Hansen and Tarp, 2000). The importance of aid results from the Harrod-Domar growth literature which states that countries must save between 15 – 20% of their national income to invest in order to grow. The achievement of the Marshal Plan in Europe strengthened the belief that if foreign aid were provided to developing countries, they too would experience growth and development. In the early literature, studies on aid assumed that for each dollar of aid, a net increase of one dollar in savings and investments would result (Rosenstein-Rodan 1961). Collodel (2011) stated that, analysis made in the 1960s and 1970s were restricted by untried theory, limited data and new research methodology with untested specifications and formulae construction.

Domar (1947) and Rostow (1956), founders of the early modernization theory, both supported the argument that foreign aid could be used to boost domestic savings which in turn would stimulate economic growth. Analysis in the late 1960s and 1970s, generally

came out with a negative impact of aid on savings, investments and growth. Rahman in 1968 for instance, made this observation that aid leads to lower domestic savings and this was also confirmed by Weisskopf (1972). Griffin and Enos (1970) argued that the greater the capital inflows from abroad, the lower the rate of growth of the receiving country. Not all research papers that were published during this period, however, drew such negative conclusions. Papanek (1972, 1973) studied the correlation between aid and growth in 51 countries during 1950 – 1965 and found that savings (aid, private investments and other capital inflows) had a positive effect on growth, and that savings accounted for over a third of growth confirming the theory of the early growth models. He observed that aid had a more effect on growth than savings or any other form of foreign income. But Papanek was one of the minorities in this debate. A close look at the studies done in the first phase (1950 to 1975) shows that foreign aid generally did not have a positive impact on domestic savings, investments or growth. Hansen and Tarp (2000) conducted a survey on a comprehensive inventory, including 131 cross-country regressions identified in the literature published negative from the late sixties to 1998 and found that, there is a significant negative coefficient from aid to savings, which implies that aid cannot be assumed to increase the total savings on a one-to-one basis.

3.3.3 Aid, Savings, Investment and Growth

In the second phase (1975 – 1995), researchers′ focus turned from aid-savings and aid-investments relations to estimating the link between aid and growth. The underlying structural model has been consistent with the Harrod-Domar model and the two gap growth models. The belief has been that, if the savings and investments gaps are filled,

there would be an increase in economic growth. When there is a positive relationship between aid and investment, it is then justifiable to say that aid contributes positively to growth.

Papanek (1973) recommended that the focus should be shifted from aid on savings to an analysis of the relationship between aid, investment and growth when it comes to debate on aid effectiveness. He therefore brought up a model (based on the Harrod-Domar growth model) in which the financial components of investments (domestic savings, aid and other foreign capital inflows) are separated.

Interest in the relationship between the aid-savings and aid-investments continued, though research focus was increasingly on the relationship between aid and growth. During this period, there was also the interest in comparing the impact of aid on the project (micro) and country (macro) level. This was as a result of aid which was increasingly being switched away from direct budget support to project aid and rural development.

Mosley et al. (1987) introduced the "micro-macro" paradox which found that evaluations done at the micro level, mostly had the conclusion that aid works but those made at the macro level have unclear results. Researchers continued with the study on the impact of aid on savings and investments and still found no significant effect. Singh (1985) found that aid had a negative impact on domestic savings. Dowling and Hiemez (1982)

however, found that aid had a positive impact on savings, but their study only focused on Asia and was based on data from the 1970s.

Studies on the relationship between aid and growth during this period can be categorized into those that found no or negative impact on growth and those that found a positive impact on growth. Mosley (1980) used a simultaneous equation model and found a weak, negative correlation between and growth. He, however, found a positive significant relationship for the "poorest" countries in his sample. He also identified that his analysis was incomplete. Mosley et al (1987) confirmed that aid had no impact on growth. Similarly, Boone (1995) also found that aid has no impact on investment and growth. A number of studies (Papanek, 1973; Levine and Renelt, 1992; Killick, 1991) also came out with a positive relationship between aid and growth. However, their results varied in terms of the significance of the aid-growth relationship. For instance, Levine and Renelt (1992) found that there is a significant positive impact of aid on growth, while Killick (1991) found that aid had a moderately positive impact on growth. Killick′s results however were fragile.

Some region-specific studies found a positive relationship between aid and growth. The encounter with studies that focus on specific region is the difficulty in comparing the conclusions of these studies with that examined from a global perspective. Dowling and Hiemez (1982) limited their study to the Asian region, which was bound to 1970s data and observed a positive impact of aid on growth. Further, Levy (1988) observed that aid had a significant and positive impact on growth in sub-Saharan Africa. Singh (1985)

stated that with the exclusion of state intervention in the analysis, aid would have a significant and positive impact on economic growth.

Research on aid and growth until the mid-1990s, only tested a linear relationship (Clemens et al, 2004). Most of the newer studies that allow for diminishing returns have found a positive relationship. Hadjimichael et al (1995) found that aid had a significant positive impact on growth, but their conclusion was based on the question of diminishing returns. Thus, after a certain level of aid inflows, aid becomes ineffective. It may be clear in this phase that, aid does appear to have some positive impact on growth, but the magnitude of the impact is possibly smaller, and certainly the relationship between aid and growth is fragile. Evidence from Hansen and Tarp (2000) reveals that aid had a positive impact on growth. Variables such as aid fungibility, and the quality of state institutions and governance, which influence the impact of aid on growth emerged during this period.

3.3.4 Aid and Growth Revisited

Studies during the first and second phases (1950 – 1995) of aid on growth have come out with ambiguous evidence and can be concluded that foreign aid had a slight positive impact on growth. The third and fourth phases, had their studies varied in the approach to measuring the impact of aid on growth and the number of studies increased exponentially (Collodel, 2011). Thus, how data were assembled and the type of methodology to use varied. The robustness of conclusion, therefore, was based on model specification;

sample size, time period and data composition. Researchers began to investigate other variables that were influencing the impact of aid on growth which made it more complex. Boone (1996) employed data covering the 1970-92 periods for a sample of 56 LDCs to examine aid effectiveness and he found no significant relationship between aid and growth, criticizing recipient governments for not having appropriate economic policies. Similarly, Burnside and Dollar (1997) examine the interactive effect of aid and policy conditionality on growth for a sample covering 56 LDCs over the 1970-93 periods. While their results indicate a negative insignificant statistic of the aid-growth coefficient, they explained that good policy management is conditional for aid to have a positive effect on growth. They concluded that aid only works when government policies are good, and that aid should be given to countries where governments pursue good policy management.

Obstfeld (1998) however, shows that within the class of growth models considered by Boone, an increase in aid raises both consumption and investment as well as the growth rate provided the economy is initially below the steady state. Boone's empirical results have been questioned for the fact that, Hadjimicheal et al (1995), Durbarry et al (1998), Lensink and White (1999) and Burnside and Dollar (2000) all have their studies based on fairly standard cross-country growth relations which are modified to check the effectiveness of aid by adding foreign aid as a fraction of GDP; and yet found a positive impact of aid on growth. The difference in their result from Boone's study is that, while Boone considers the aid-growth relations as linear, the other four studies modeled the aid-growth relation as non-linear. In spite of that, the empirical formulation of the non-linear relation is not the same in the sense that, Burnside and Dollar used an interaction term

between aid and an index of economic policy whilst the three other studies included aid squared as a regressor.

Studies on Burnside and Dollar (1997, 1998, and 2000) were very influential to the extent that it brought about three main clusters of aid-policy studies. The first group supported the argument that aid has a positive impact on growth in developing countries with good policy environment. These studies include: Collier and Dollar (2001), Collier and Dehn (2001), Lloyd, Morrissey and Osei (2001), Collier and Dollar (2002), Dayton-Johnson and Hoddinott (2003), Islam (2003), and McGillivray (2003), all of whom found that the policy environment was critical if aid was to have a positive impact on growth. Another group also concluded that, aid had a positive impact on growth irrespective of the policy environment. These studies included Durbarry et al (1998), Hansen and Tarp (2000), Lensink and White (2000), Dalgaard and Hansen (2001), Hansen and Tarp (2001), Hudson and Mosley (2001), Lensink and White (2001), Morrissey (2001) and Gomenee et al (2003).

The third group of researchers studied other variables and environments that could influence the impact of aid on growth. Thus the emphasis in the literature changed from studying aid efficiency to determining conditions under which aid could be effective. Collodel (2011) made a summary of 65 selected studies during the third phase and confirmed that, 35 of the studies found aid to have a positive impact on growth but their conclusions were defended. For instance, Collier and Hoeffler (2002), and McGillivray (2003) all found that aid had a positive impact on growth but that the impact was higher

in countries experiencing shocks. Also, Svensson (1999), Kosack (2003) and McGillivray (2003) found aid to have a positive impact on growth, but was considered to be more effective in democratic, politically stable countries. Moreover, Guillaumont and Chauvet (2001) found that aid had a positive impact on growth, but was dependent on the climate and geography of the recipient country. Other variables that could influence the impact of aid on growth were considered during this phase. The more variables that were added, the more difficult it becomes in concluding on the impact that aid has on growth. For instance, while some researchers found that aid had a positive impact on growth only in a good policy environment, others argue that aid had a positive impact on growth irrespective of the policy environment. Therefore, it becomes difficult supporting the conclusion made by Burnside and Dollar. Also, with relation to the question of diminishing returns, some studies (Durbarry et al., 1998; Lensink and White, 2001; Hansen and Tarp, 2001) found that aid was subject to diminishing returns in that, the more aid to a country, the less impact aid had on growth. However, others (Gomanee et al., 2003) stated that aid was not subject to diminishing returns.

3.3.5 Cross-country Studies on Aid Growth Relationship

Researchers continued to study other variables that might influence the impact of aid on growth. The main focus during this phase was the value of cross-country regression analysis as a methodology for measuring the impact of aid. The cross-country regression analysis is queried in terms of model construction, data construction and sampling procedures. Collodel (2011) observed one disadvantage of this methodology being that, the positive impact in one country may cancel the negative impact in another country,

therefore producing a result that is not necessarily reflective of the impact of foreign aid on growth. Cross-country regression analysis is a statistical, econometric methodology that is used to measure the effectiveness of foreign aid. Conducting a cross-country regression means assembling large samples of data from a multitude of countries all at various stages of development, and then statistically calculating whether foreign aid, on the whole, has had an impact on growth and development. This form of analysis treats all countries, aid types and periods as homogeneous units, which they certainly are not. Rajan and Subramanian (2008) pointed out that cross-country regression analysis has serious problems, including the question of endogeneity, the handling of outliers, measurement error, data selection, and data noise. Also, the selection of the sample and the sample period can have a significant influence on the results of an analysis. For example, the Burnside and Dollar (1997, 1998, 2000) studies have been disproved by Easterly (2003), Jensen and Paldam (2003) and Easterly, Kremer, Pritchett and Summers (2004), who found that the policy environment was no longer valid if more countries or further years of data were added to the Burnside and Dollar sample.

The flow of foreign aid to underdeveloped countries is intended to speed up their economic development up to a suitable point where the rate of growth can be achieved on a self-sustaining basis (Rosenstein-Rodan, 1961). Owing to this, developed nations have continually advanced foreign aid to underdeveloped countries. Howerver, most of the studies that have examined the effects of foreign aid on Africa have found mixed results [eg. Burnsideand Dollar (1997); Easterly et al. (2003). Moreover, these studies have primarily considered the effect of foreign aid on economic growth, without considering

its effects on specific sectors. It is however, necessary to look at the impact of foreign on the different sectors because foreign aid may have diverse impacts at sector levels. Also, most of the existing empirical studies have examined the effects of foreign aid at the regional level (Riddell, 1987; Mosley et al., 1987). Lloyd et al (2001) noted that, to improve the understanding ofaid effectiveness, it is appropriate to conduct studies on the impact of aid on growth in specific countries.

Although these studies are informative, they are limited in determining the effects of foreign aid on the specific sectors in individual countries. The motivation of this study is therefore to examine the effectiveness of foreign aid on the Agriculture, Education and Health Sectors in Ghana.

CHAPTER FOUR

METHODOLOGY

4.1 Introduction

This chapter considers the methodological approach to the study of the effect of foreign aid on the agriculture, education and health sectors; a description of the variables used, the econometric approach used in addressing the objectives of the study, and the sources of data.

4.2 Methodological Approach

The study will rely on the framework used by Durbarry et al. (1998), which was used to analyze the impact of foreign aid on economic growth in an augmented Fischer-Easterly model. This framework was modified by Odusanya et al. (2011) and Alabi et al (2011); Odusanya et al. (2011) looked at foreign aid, public expenditure and economic growth whilst Alabi et al. (2011) analyzed the effects of foreign aid on agriculture, manufacturing, health and education sectors. Their studies focused on foreign aid (which was measured as official development assistance), total net private capital flows, savings, trade (to account for trade openness and macroeconomic stability), and the amount of government expenditure. All these variables were measured as a percentage of GDP. The model is given as:

$$\begin{aligned}\text{Growth} = {} & \alpha_0 + \beta_{1i}\text{FAIDOECD} + \beta_{2i}\text{FAIDOECDSQ} + \beta_{3i}\text{PRIV} + \beta_{4i}\text{SAV} \\ & + \beta_{5i}\text{OTHERIFS} + \beta_{6i}\text{TRADE} + \beta_{7i}\text{MONEY} + \beta_{8i}\text{BSUR} + \beta_{9i}\text{INFSTD} \\ & + \beta_{10i}\text{LAT} + \beta_{11i}\text{SSA} + \varepsilon\text{I}\end{aligned}$$

However, as a result of the availability of data on the suitable variables, the model for this study is modified into:

$$Growth_{it} = \beta_0 + \beta_1 FAID_{it} + \beta_2 FAIDSQ_{it} + \beta_4 SAV_t + \beta_5 TRADE_t + \beta_6 FISCDISC_t + \varepsilon_{it} \ldots\ldots\ldots (1)$$

Agriculture value added, primary school enrollment and infant mortality are used as proxies for growth of the Agriculture, Education and Health sectors respectively. Agriculture value added is a measure of agricultural productivity (OECD, 2015). Value added measures the output of the agricultural sector less the value of intermediate inputs. As stated in the Millennium Development Goals (MDGs), improvement of the health and education sectors are considered in eradicating poverty (UN Millennium Project, 2005). Stated specifically in relation to the education sector, is the target to ensure that children everywhere will be able to complete a full course of primary schooling in order to achieve the MDGs; and also, the target to reduce by two-thirds between 1990 and 2015, the under five mortality rate in achieving the MDGs. This gives evidence on how infant mortality and primary school enrollment help explain the performance of the respective sectors.

Table 4.1: List of the variables with definitions and their expected signs

Variable	Definition	Expected sign
FAID	Official Development Assistance (ODA) as defined by the Organization for Economic Cooperation and Development (OECD) as a percentage of Gross Domestic Product (GDP)	Positive
FAIDSQ	The square of the aid term to check for diminishing returns	Negative
SAV	Domestic savings as a share of GDP	Positive
Trade	Openness to trad, defined as (X+M)/GDP	Positive
FISCDISC	General government final consumption expenditure as a share of GDP	Positive

Economic growth is influenced by foreign aid, net capital flows and domestic savings and therefore should be a function of these sources. It is agreed that any practically complete model would need additional variables to explain economic growth. However, the principal focus of the study is the impact of foreign aid on the growth of the sectors and therefore, of much interest amongst the explanatory variables is the foreign assistance (ODA) given to the three sectors; Agriculture, Education and Health.

4.3 Description of variables

Foreign aid is expected to have a positive impact on the respective sectors; as it is regarded, an inflow of foreign aid comes in to complement domestic capital. Therefore, it is expected that, an increase in the inflow of foreign aid will lead to an increase in the output of the respective sectors and hence their respective growth. Thus, the coefficient of foreign aid to the respective sectors, is expected to be positive.

Domestic savings are seen to play an important role, which is the main determinant of investment, and investment is as well a key component of economic growth. It is therefore expected that, domestic savings will have a positive coefficient.

Openness to trade (TRADE) is seen to increase growth through increased investment, access to advanced technology from abroad, expansion of business opportunities for local companies making it possible for exportation, and the creation of employment opportunities.

In relation to the debate concerning the appropriate use of foreign aid, a control for fiscal discipline is introduced in the model; Government consumption expenditure is used as a proxy for fiscal discipline (FiscDisc). Governments of recipient countries sometimes use foreign aid in some areas other than for its scheduled purpose (Basnet, 2013) and therefore, government consumption expenditure is used as a proxy for fiscal discipline which includes all government current expenditures for purchases of goods and services (including compensation of employees); expenditures on national defense and security.

Too much aid can be harmful to economic growth. Chenery and Strout (1966) stated that the ability of foreign aid to speed up economic growth is dependent upon the absorption capacity of aid recipients. Thus a country's ability to make productive use of foreign resources is dependent on various factors such as the availability of skilled labour, infrastructure, government's ability in institutional and administrative roles. Extreme amounts of foreign aid can bring about the Dutch Disease effect which functions through the spending effect. Moreira (2005) noted that, when a portion of the additional income which generated by an excessive inflow of aid is spent on non-traded goods and services (education, health, welfare, construction), it results in an increased demand for this type of goods and services. This in effect causes an appreciation of the exchange rate since the price of the non-traded goods and services rises in relation to the price of those tradable, as a result of the excess demand. The absorptive capacity constraints and Dutch Disease problems contribute to the existence of an inverted U-shaped relationship between aid and growth (Moreira, 2005). An aid squared term is therefore included to allow for non-linear effects of aid on growth.

4.4 Empirical model

One assumption of the Ordinary Least Squares (OLS) is that, the explanatory variables are independent of the explained variable; thus, one case's score is not influenced by another's. Otherwise OLS regression wouldn't be applicable for inference. However, it happens that some important variables may be endogenous and yet need to be considered in the model for appropriate analysis. For instance, both imports and exports are possible to vary with income which can mean endogeneity. Therefore, for the possibility of endogeneity between the dependent and independent variables, a Vector Autoregressive (VAR) approach will be employed to look at the effect of foreign aid on the growth at the sector levels as follows:

$$FA_t = \beta_0 + \sum_{j=1}^{p} \beta_{1j}\, FA_{it-j} + \sum_{j=1}^{p} \beta_2\, AG_{it-j} + e_{it} \dots\dots\dots\dots\dots\dots (2)$$

$$AG_t = \alpha_0 + \sum_{j=1}^{p} \alpha_{1j} AG_{it-j} + \sum_{j=1}^{p} \alpha_{2j} FA_{it-j} + \mu_{it} \dots\dots\dots\dots\dots\dots (3)$$

FA= Official Development Assistance (as defined by the Organization for Economic Cooperation and Development) for the sectors

AG= Gross Domestic Product Growth (GDP) of the sectors

FA_{t-j} and AG_{t-j} represent their lagged values in 'j' years, 'p' is the maximum lag length, and 'e' and 'μ' are error terms. 'β' and 'α' are parameters to be estimated.

Equations 2 and 3 will then be transformed into the following

$$\Delta FA = \beta_0 + \sum_{j=1}^{p} \beta_{1j}\, \Delta FA_{it-j} + \sum_{j=1}^{p} \beta_{2j} \Delta AG_{it-j} +$$

$$\sum_{j=1}^{p} \vartheta_j\, FAIDSQ_{it-j} + \sum_{j=1}^{p} \gamma_j FISCDISC_{it-j} + \sum_{j=1}^{p} \omega_j\, SAV_{it-j} +$$

$$\sum_{j=1}^{p} \delta_j\, TRADE_{it-j} + \mu_i \dots\dots\dots (5)$$

$$\Delta AG_t = \alpha_0 + \sum_{j=1}^{p} \alpha_{1j} \Delta AG_{it-j} + \sum_{j=1}^{p} \alpha_{2j} \Delta FA_{it-j} + \sum_{j=1}^{p} \vartheta_j FAIDSQ_{it-j} + \sum_{j=1}^{p} \gamma_j FISCDISC_{it-j} + \sum_{j=1}^{p} \omega_j SAV_{it-j} + \sum_{j=1}^{p} \delta_j TRADE_{it-j} + \pi_i \ldots\ldots\ldots\ldots\ldots\ldots (6)$$

These equations will be estimated to examine the impact of foreign aid on Agriculture, Health and the education sectors. FA will be the Official Development Assistance for Agriculture, Health and Education respectively. AG will be agriculture value added, primary school enrollment and infant mortality for the respective sectors.

4.5 Econometric approach

4.5.1 Test for Stationarity

Very often, macroeconomic time series data are non-stationary which may result from legislative changes and technological change (Hendry and Juselius, 1999). When this happens, the standard assumptions for asymptotic analysis will not be effective making it difficult for empirical modelling. It is therefore of importance to test for stationarity in order to avoid spurious regressions. This study will employ the use of the Augmented Dickey-Fuller test and the Phillip-Perron test at 1% and 5% significant levels, to check the order of integration of the variables. This is to confirm that the model is in a non-explosive form (Oladipo, 2010). The Augmented Dickey-Fuller test is chosen over the normal Dickey-Fuller test in order to capture all the serial correlation in the dependent variables (Stock and Watson, 2007).

4.5.2 Augmented Dickey-Fuller Test

The null hypothesis for the Augmented Dickey-Fuller test is that, the data needs to be differenced to make it stationary and its alternative is that the data is stationary and does not need to be differenced. Graphs of the time series will be observed to determine whether the test should be done with an intercept, trend or both. Thus Dickey and Fuller deliberate three differential-form autoregressive equations to identify the presence of a unit root.

1. $\Delta Y_t = \gamma Y_{t-1} + \sum_{j=1}^{\rho}(\delta_j \Delta Y_{t-j}) + \varepsilon_t$
2. $\Delta Y_t = \alpha + \gamma Y_{t-1} + \sum_{j=1}^{p}(\delta_j \Delta Y_{t-j}) + \varepsilon_t$
3. $\Delta Y_t = \alpha + \beta t + \gamma Y_{t-1} + \sum_{j=1}^{p}(\delta_j \Delta Y_{t-j}) + \varepsilon_t$

Where: t = time index; α = an intercept constant called a drift; γ = the coefficient presenting process root. That is, the focus of testing; β = coefficient on a time trend; p = lag order of the first-differences autoregressive process; ε = an independent identically distributes residual term.

4.5.3 Philips-Perron (PP) Test

The Phillips-Perron test will be used in addition to the Augmented Dickey-Fuller test because; they are different methods of controlling higher-order serial correlation. The Augmented Dickey-Fuller test makes the parametric correction of higher order correlation whilst the Phillips-Perron test makes a nonparametric method of controlling higher order correlation.

4.5.4 Cointegration

Cointegration is a word that describes two or more time series, which have long-run equilibrium relationship that share a common stochastic trend. The cointegration model will be illustrated as;

$$\Delta Y_t = \alpha_0 + \alpha_1 \Delta X_t - \gamma(Y_{t-1} - \alpha X_{t-1}) + \varepsilon_t$$

The null hypothesis for testing cointegration is that there is a unit root (no cointegration) and its alternative is that, there is no unit root. Rejecting the null hypothesis will lead to the estimation of the parameters of the ECM. The Error correction model replicates the degree of short term variability of the relationship between the variables. The Johansen maximum likelihood method for cointegration test will be employed as it is appropriate to the relationship between multiple variables. Johansen's methodology begins in the vector autoregression (VAR) of order p given by

$$Y_t = \mu + A_1 Y_{t-1} + \cdots + A_p Y_{t-p} + \varepsilon_t$$

Y_t = nx1 vector of variables that are integrated of order one I (1)

ε_t = nx1 vector of innovations

This can be rewritten as

$$\Delta Y_t = \mu + \pi Y_{t-1} + \sum_{i=1}^{\rho-1} \varphi_i \, \Delta Y_{t-i} + \varepsilon_t$$

Where; $\pi = \sum_{i=1}^{\rho} A_i - I \qquad \varphi_i = -\sum_{j=i+1}^{\rho} A_j$

π is the long run matrix and determines the long run dynamic properties of Y_t. Johansen uses two different likelihood ratio tests to determine the rank of the π matrix: the trace test and the maximum eigenvalue test as follows

$$J_{trace} = -T \sum_{j=r+1}^{k} \ln (1 - \lambda_j)$$

$$J_{max} = -T ln(1 - \lambda_{r+1})$$

T = the sample size

4.5.5 Lag selection

An important component in the requirement of VAR models is the determination of the lag length of the VAR. A very small order may lead to ignoring interesting collections of the economic variables whilst a very large order leads to ineffectiveness in estimation which results in large coefficients' standard errors and large confidence bands for the impulse response functions (Escanciano et al, 2010). Various lag length selection criteria such as the Akaike's information criterion (AIC), Bayesian information criterion (BIC), Schwarz information criterion (SIC) and the Hannan-Quinn criterion (HQC) will be used to select the lag length such that, the lag that has the highest repetition will be selected. A Wald lag exclusion test will then be run to check if the optimal lag selected in the model is significant.

4.5.6 Granger causality

One objective of this study is to check if the causal relationship between growth and foreign aid exist. Foreign aid is said to granger-cause growth if, given the past values of growth, past values of foreign aid are suitable for forecasting growth. On testing Granger causality, we take the regression of growth on its own lagged values and on lagged values of foreign aid and test the null hypothesis that, the estimated coefficients on the lagged

values of foreign aid are jointly zero. The same way, we take the regression of foreign aid on its own lagged values and on lagged values of growth and test the null hypothesis that, the estimated coefficients on the lagged values of growth are jointly zero. If we fail to reject the null hypothesis, then it implies we fail to reject the hypothesis that foreign aid does not Granger-cause growth and vice versa. Thus, the causality between growth (Y_t) and foreign aid (X_t) will be

$$Y_t = \sum_{i=1}^{\rho} \alpha_j X_{t-j} + \sum_{i=1}^{\rho} \beta_j Y_{t-j} + \varepsilon_{1t}$$

$$X_t = \sum_{i=1}^{\rho} \gamma_j X_{t-j} + \sum_{i=1}^{\rho} \lambda_j Y_{t-j} + \varepsilon_{2t}$$

4.5.7 VAR Diagnostic Testing

After estimating the VAR model, it is of much interest to check the whiteness of the residuals. Thus, there is the need to check for the absence of serial correlation and heteroscedasticity and also to know if the error process is normally distributed. These diagnostic checks are done on the residuals of the VAR model to confirm that they follow the OLS assumptions about the error term.

4.5.7.1 VAR Stability test

There is the need for VAR models to be stable in order for the impulse-response functions and forecast-error variance decompositions to have known interpretations. Stability of the VAR implies an MA (∞) representation exists which will be the key to

study the impulse response function of a given shock. The VAR stability test is used to check the eigenvalue stability condition after estimating the parameters of VAR model.

4.5.7.2 Residual Vector Normality test

OLS assumes the normality of regression residuals and defilement of such may lead to imprecise inferential statements. The Residual Vector Normality test is therefore used to check if the residuals are normally distributed. The normality test depends mostly on the skewness and kurtosis of the residuals and the test statistics measures whether the skewness and kurtosis of the VAR residuals are significantly different from the normally distributed residuals. Skewness measures the symmetry of the distribution and its expected value is zero whilst kurtosis measures the peak or flatness of the distribution.

4.5.7.3 Vector Autocorrelation test

Autocorrelation occurs when the present value of the residuals are correlated with any of the best values, thereby violating the OLS assumption of no autocorrelation. Autocorrelation in the residual makes the standard errors invalid and the t statistics unreliable. The Lagrange Multiplier (LM) test is used to check for autocorrelation.

4.5.8 Impulse Response Function

An impulse response refers to the reaction of any dynamic system in response to some external change. Rousseau (2002) argued that, impulse response function supports an evaluation of the economic importance of the estimated effects. He explained that, when a reasonable causal ordering can be specified for the variables in a VAR system (based

on economic theory and possibly the results of Granger test), the nonlinear responses of each variable to one time shock in the others can be traced through time. In effect, impulse response analysis estimates the net effect of the direct and indirect effects of a shock, not only in the long run but at all periods following the shock. Impulse response functions are made by tracing the time path of the Vector Moving Average (VMA) in the event of one standard deviation shock in the VAR system.

4.5.9 Variance Decomposition

Variance decomposition is done to make inferences about causal relationships beyond the sample period. This study uses variance decomposition to enhance further results of Granger causality and impulse response functions. The variance decomposition decomposes variation in an endogenous variable into the component shocks to the endogenous variables in the VAR. It gives the significance of each random innovation to the variation in the VAR.

4.6 Data type, Sources and Scope of Study

The study employs mainly secondary macroeconomic time series data in its analysis, which is sourced from the Ministry of Finance, Ghana Statistical Service, and the World Development Indicators. The study covers a period of thirty-four years from 1980 to 2013 and this period was chosen because of availability of data.

4.7 Limitations

1. The study is limited by the low sample size as a result of the insufficient data from the necessary sources.
2. Difficulty in obtaining data in bilateral and multilateral forms that are received by the respective sectors.

CHAPTER FIVE

EMPIRICAL RESULTS, ANALYSIS AND DISCUSSION

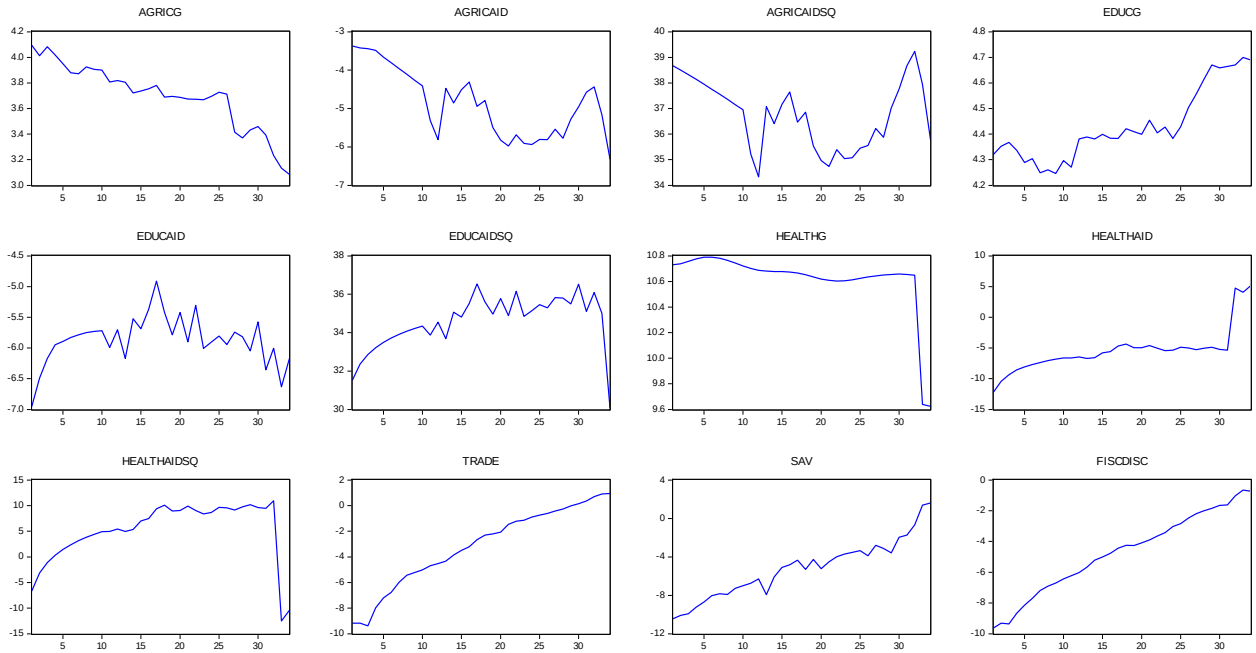
5.1 Introduction

In this chapter, the empirical results from applying the data to the respective models as delineated in the previous chapter are presented and analyzed. It also presents the results of unit root tests which were determined using both the Augmented Dickey-Fuller test (ADF) and Phllips-Perron (PP) test. The chapter presents the estimates of the parameters using a vector autoregressive approach, as well as the granger causality, impulse response function and variance decomposition.

5.2 Unit Root Test

It is of interest to know the data generating process of the series under study in order to ascertain the minimum integral order of the variables for succeeding tests that follow. Both the Augmented Dickey-Fuller test and the Phillips-Perron test are used to determine the order of integration of the variables. The variables were transformed into logarithm forms so as to normalize and linearize the data. The variables that were examined for stationarity are: agriculture value added (Agricg), primary school enrollment (Educg), infant mortality (Healthg), agriculture aid (Agricaid), agriculture aid squared (Agricaidsq), aid to the health sector (Healthaid), health aid squared (Healthaidsq), education aid (Educaid), education aid squared (Educaidsq), domestic savings (Sav), trade, and government consumption (Fiscdisc). The line graphs of all the variables are presented in the graphs below:

Figure 5.1: Line graphs of the variables



Source: Author's computations using Eviews 7

The growth of agriculture and health, health aid, Trade, fiscal discipline, domestic savings and the squared term of aid to the health sector are observed to follow some trend; whilst the rest of the variables have a constant but do not follow a particular trend as shown in Figure 5.1 above. Therefore, in checking for the stationarity of the variables, the use of the equation in Constant (C) and Constant with Trend (C&T) are used.

The results for the ADF and PP unit root tests for all the variables at their levels and first differences, both in constant (C) and Constant with Trend (C&T) are summarized in the Tables 5.1 and 5.2 below:

Table 5.1: Unit root test at levels

Variable	Critical values (C) at: 1%= -3.646342; 5%= -2.954021 and 10%= -2.615817 Critical values (C&T) at: 1%= -4.262735; 5%= -3.552973 and 10%= -3.209642					Order of integration at 5%
	Equation	**ADF**	**Prob.**	**Phillips-Perron**	**Prob.**	
Agricg	C	0.346	0.9773	2.018084	0.9998	I (1)
	C&T	-1.539949	0.7947	-1.585077	0.7772	I (1)
Agricaid	C	-1.579535	0.4815	-1.601667	0.4705	I (1)
	C&T	-2.273267	0.4360	-2.365229	0.3897	I (1)
Agricaidsq	C	-2.281675	0.1835	-2.337567	0.1668	I (1)
	C&T	-2.234185	0.4562	-2.303595	0.4205	I (1)
Educaid	C	-2.674214	0.0895	-4.289057	0.0019	I (1)
	C&T	-2.635405	0.2683	-4.146398	0.0132	I (1)
Educaidsq	C	-2.131910	0.2341	-2.011607	0.2807	I (1)
	C&T	-0.632317	0.9701	0.003934	0.9946	I (1)
Educg	C	0.128378	0.9632	0.091754	0.9602	I (1)
	C&T	-1.887495	0.6383	-1.832462	0.6660	I (1)
Healthaid	C	-0.564901	0.8652	-0.459284	0.8869	I (1)
	C&T	-1.695992	0.7304	-1.736219	0.7121	I (1)
Healthaidsq	C	-1.943420	0.3093	-1.943420	0.3093	I (1)
	C&T	-1.070284	0.9191	-1.070284	0.9191	I (1)
Healthg	C	0.064078	0.9579	0.064078	0.9579	I (1)
	C&T	-0.901538	0.9439	-0.901538	0.9439	I (1)
Fiscdisc	C	-1.866865	0.3431	-2.078041	0.2543	I (1)
	C&T	-2.025327	0.5665	-1.877914	0.6432	I (1)
Sav	C	0.012892	0.9532	0.370564	0.9785	I (1)
	C&T	-2.432557	0.3572	-2.465488	0.3418	I (1)
Trade	C	-2.339138	0.1663	-2.748739	0.0768	I (1)
	C&T	-1.266124	0.8789	-1.124569	0.9093	I (1)

Source: Author's computations using Eviews 7

Table 5.2: Unit root test after first difference

Variable	FIRST DIFFERENCE Critical values (C) at: 1%= -3.653730; 5%= -2.957110 and 10%= -2.617434 Critical values (C&T) at: 1%= -4.273277; 5%= -3.557759 and 10%= -3.212361					Order of integration at 5%
	Equation	**ADF**	**Prob.**	**Phillips-Perron**	**Prob.**	
Agricg	C	-5.050960*	0.0003	-5.505714*	0.0001	I (0)
	C&T	-5.125957*	0.0013	-6.620654*	0.0000	I (0)
Agricaid	C	-4.933795*	0.0004	-4.933784*	0.0004	I (0)
	C&T	-4.804287*	0.0027	-4.804153*	0.0027	I (0)
Agricaidsq	C	-4.953424*	0.0003	-4.953424*	0.0003	I (0)
	C&T	-4.833215*	0.0025	-4.833156*	0.0025	I (0)
Educaid	C	-10.79921*	0.0000	-10.85191*	0.0000	I (0)
	C&T	-11.77861*	0.0000	-12.39423*	0.0000	I (0)
Educaidsq	C	-4.555471*	0.0010	-4.528993*	0.0010	I (0)
	C&T	-5.245359*	0.0009	-5.159430*	0.0011	I (0)
Educg	C	-6.019395*	0.0000	-6.010786*	0.0000	I (0)
	C&T	-6.373622*	0.0000	-6.369660*	0.0000	I (0)
Healthaid	C	-6.264806*	0.0000	-6.264806*	0.0000	I (0)
	C&T	-6.319978*	0.0001	-6.319978*	0.0001	I (0)
Healthaidsq	C	-6.207652*	0.0000	-6.212356*	0.0000	I (0)
	C&T	-7.066870*	0.0000	-7.066870*	0.0000	I (0)
Healthg	C	-5.552787*	0.0001	-5.552787*	0.0001	I (0)
	C&T	-5.949830*	0.0001	-5.949830*	0.0001	I (0)
Fiscdisc	C	-4.996995*	0.0003	-5.008021*	0.0003	I (0)
	C&T	-5.319913*	0.0007	-5.290007*	0.0008	I (0)
Sav	C	-7.388993*	0.0000	-7.402738*	0.0000	I (0)
	C&T	-7.409465*	0.0000	-7.426956*	0.0000	I (0)
Trade	C	-4.612121*	0.0008	-4.632930*	0.0008	I (0)
	C&T	-7.559582*	0.0000	-5.506492*	0.0005	I (0)

(*) indicates rejection of the null hypothesis at 5% level of significance. Source: Author's computations using Eviews 7

From the results in table 5.1 and 5.2, it can be seen that, at 5% critical value, all the variables were integrated of order one at levels using both the Augmented Dickey-Fuller test and the Phllips-Perron tests, except for Education aid, which was stationary at levels

using the Phillips-Perron test. Thus, at 5% critical value, the variables are non-stationary at levels but stationary after first difference. It suffices, therefore, to determine whether or not there is a long run cointegrating relationship among the variables by using the Johansen approach.

5.3 Tests for Cointegration and Long Run Relationships

When the order of integration of the variables is known, it is of interest then to study the long and short run dynamics of the variables using the Johansen cointegration test. This is to determine the maximum number of cointegrating vectors that suitably span the variables entering the VAR for the current analysis. It is important, however, to determine beforehand, the optimal lag length in the VAR model when testing for cointegration.

5.4 VAR Lag Length Selection Criteria

The F-test, the sequential modified Likelihood Ratio test (LR), the Final Prediction Error (FPE), Schwarz Information Criterion (SIC), Akaike Information Criterion (AIC), and Hannan Quinn (HQ) criterion are used to help determine the maximum lag length for the model. Tables 5.3, 5.4 and 5.5 below show the lag selection criteria for Agriculture, Education and Health respectively.

5.4.1 Lag selection for agriculture

Table 5.3: Lag length selection test result for Agriculture

Lag	LogL	LR	FPE	AIC	SIC	HQ
0	-58.92310	NA	2.66e-06	4.188587	4.466133	4.279060
1	119.0886	275.6311	2.92e-10	-4.973461	-3.030640*	-4.340150
2	163.0496	51.05138*	2.32e-10*	-5.487069	-1.878972	-4.310919
3	209.7699	36.17059	2.79e-10	-6.178703*	-0.905331	-4.459715*

*indicates the number of lags selected by the criteria. Source: Author's computations using Eviews 7

As indicated by the asterisk in Table 5.3, LR and FPE suggest an optimal lag of two whilst AIC and HQ suggest a maximum lag of three. SIC on the other hand, suggest a maximum lag of one at 5% level of significance. The dilemma is therefore between the choice of lag three or two. Since it is possible for some of the lags chosen as optimal to have insignificant contributed, it becomes necessary to run the Wald test to determine which lags are jointly significant in the model. The lag exclusion test result presented in Appendix I shows that the P-value of the second lag is less than 5%, which implies a rejection of the null hypothesis which states that the second lag is not significant. The lag exclusion test therefore approves the inclusion of maximum lags of two in the model.

5.4.2 Lag selection for Education

Table 5.4: Lag length selection test results for Education

Lag	LogL	LR	FPE	AIC	SIC	HQ
0	-100.6247	NA	3.91e-05	6.879012	7.156558	6.969485
1	71.62470	266.7087*	6.25e-09	-1.911271	0.031551*	-1.277959
2	108.2779	42.56498	7.95e-09	-1.953411	1.654686	-0.777262
3	165.8500	44.57201	4.75e-09*	-3.345164*	1.928208	-1.626176*

* indicates lag order selected by the criterion. Source: Author's computations using Eviews 7

As indicated by the asterisk in Table 5.4, LR and SIC suggest an optimal lag of one whilst FPE, AIC and HQ suggest a maximum lag of three. The Wald test was established to determine which lags are jointly significant in the model and the lag exclusion test result in Appendix II shows the P-value of the second lag is more than 5%, which implies failure to reject the null hypothesis which states that the second lag is not significant. Insufficient data, however, limit the study to the use of only one lag for this model.

5.4.3 Lag selection for Health

Table 5.5: Lag length selection test result for Health

Lag	LogL	LR	FPE	AIC	SIC	HQ
0	-192.1490	NA	0.014360	12.78381	13.06135	12.87428
1	18.99908	326.9390	1.86e-07	1.483930	3.426752	2.117242
2	126.2254	124.5209	2.50e-09	-3.111317	0.496780	-1.935167
3	238.8111	87.16312*	4.29e-11*	-8.052330*	-2.778958*	-6.333342*

* indicates lag order selected by the criterion. Source: Author's computations using Eviews 7

As shown by the asterisk in Table 5.5, LR, FPE, AIC, SIC and HQ all suggest a maximum lag of three. Since it is possible for some of the lags chosen as optimal to have insignificant contributed, it becomes necessary to run the Wald test to determine which lags are jointly significant in the model. The lag exclusion test result in Appendix III shows the P-value of the second lag is less than 5%, which implies a rejection of the null hypothesis which states that the second lag is not significant. The lag exclusion test therefore approves the inclusion of maximum lags of two in the model.

5.5 Johansen Cointegration Test Result

A linear arrangement of non-stationary series are said to be cointegrated if they incorporate into stationary series. The existence of cointegrating vectors indicates that there is a consequential long run relationship among the variables. In testing for cointegration, the study employs logarithmic values of the variables at levels and their respective lags as identified from the tests earlier. The number of cointegrating equations is identified using the trace and maximum eigenvalue statistics. The null hypothesis is rejected if the value of the t-statistic is more than the critical value of the same row. The cointegration tests results for agriculture, education and health are shown below:

5.5.1 Cointegration test results for Agriculture

Table 5.6: Cointegration test results for Agriculture

Null hypothesis	Trace test			Maximum eigenvalue test		
	t-statistic	Critical value	Prob.	t-statistic	Critical value	Prob.
None	123.2035	95.75366	0.0002*	43.88343	40.07757	0.0178*
At most 1	79.32010	69.81889	0.0072*	28.61719	33.87687	0.1865
At most 2	50.70291	47.85613	0.0264*	22.35038	27.58434	0.2029
At most 3	28.35253	29.79707	0.0727	17.16104	21.13162	0.1645
At most 4	11.19149	15.49471	0.2000	9.930588	14.26460	0.2165
At most 5	1.260903	3.841466	0.2615	1.260903	3.841466	0.2615

*denotes rejection of the hypothesis at the 0.05 level. Source: Author's computations using Eviews 7

In Table 5.6, it can be seen that with respect to Agriculture, the trace test suggests three cointegrating equations whilst the maximum eigenvalue suggests one cointegrating equation, all at 5% significance level.

5.5.2 Cointegration test results for Education

Table 5.7: Cointegration test results for Education

Null hypothesis	Trace test			Maximum eigenvalue test		
	t-statistic	Critical value	Prob.	t-statistic	Critical value	Prob.
None	110.2447	95.75366	0.0035*	36.40279	40.07757	0.1225
At most 1	73.84186	69.81889	0.0230*	27.05547	33.87687	0.2604
At most 2	46.78639	47.85613	0.0628	18.07763	27.58434	0.4887
At most 3	28.70877	29.79707	0.0664	16.50453	21.13162	0.1967
At most 4	12.20424	15.49471	0.1474	12.06137	14.26460	0.1084
At most 5	0.142867	3.841466	0.7054	0.142867	3.841466	0.7054

* denotes rejection of the hypothesis at the 0.05 level. Source: Author's computations using Eviews 7

Table 5.7 indicates two cointegrating equations from the trace test and no cointegrating equation from the maximum eigenvalue at 5% significance level.

5.5.3 Cointegration test result for Health

Table 5.8: Cointegration test results for Health

Null hypothesis	Trace test			Maximum eigenvalue test		
	t-statistic	Critical value	Prob.	t-statistic	Critical value	Prob.
None	285.3780	95.75366	0.0000*	119.1227	40.07757	0.0000*
At most 1	166.2554	69.81889	0.0000*	69.37712	33.87687	0.0000*
At most 2	96.87825	47.85613	0.0000*	53.19743	27.58434	0.0000*
At most 3	43.68081	29.79707	0.0007*	25.27281	21.13162	0.0123*
At most 4	18.40800	15.49471	0.0177*	10.48734	14.26460	0.1819
At most 5	7.920666	3.841466	0.0049*	7.920666	3.841466	0.0049*

* denotes rejection of the hypothesis at the 0.05 level. Source: Author's computations using Eviews 7

For the Health sector, Table 5.8 indicates the trace and maximum eigenvalue test of six and four cointegrating equations respectively, both at 5% significance level.

The above implies that, the variables have a long run relationship. Engel and Granger (1987) suggest that if there is cointegration among variables in the long run, then the cointegrating variables can be represented by an Error correction mechanism.

5.6 Vector error correction model

The existence of cointegrating equations in the system calls for the use of the Vector Error Correction Model to estimate the long and short run cointegrating coefficients. The error correction model provides knowledge on the speed of adjustment as a result of any possible deviation from the steady state.

5.6.1 Short Run Relationships

The results of the short run estimates and the adjustment coefficients normalized on the growth of the sectors respectively, are shown in Tables 5.9, 5.10 and 5.11 below. The

Error Correction Term (ECT) reflects the temporal status of the long run relationships in the system. The sign and size of the estimated coefficient of the ECT in the equation reflect the direction and speed of adjustment of the dependent variable to temporary deviations from the long run equilibrium summarized by the cointegrating vector. A negative and significant ECT is a sufficient condition for the convergence of the variables at equilibrium in the long run.

5.6.1.1 Foreign aid and Agriculture in the short run

Table 5.9: Error Correction Estimates for Agriculture

Variables	Coefficients	Standard error	T - statistics	P - value
Error Correction Term	-1.341714	0.334769	-4.007881	0.0011*
Agricaid (-1)	0.708585	0.544756	1.300737	0.2130
Agricaid (-2)	1.597050	0.659780	2.420579	0.0286*
Agricaidsq (-1)	-0.386201	0.279983	-1.379374	0.1880
Agricaidsq (-2)	-0.838655	0.340769	-2.461061	0.0265*
Trade (-1)	-0.289972	0.114139	-2.540520	0.0226*
Trade (-2)	-0.182290	0.083028	-2.195519	0.0443*
Sav (-1)	0.033433	0.025456	1.313328	0.2088
Sav (-2)	-0.014642	0.017145	-0.854017	0.4065
Fiscdisc (-1)	0.348896	0.154416	2.259465	0.0392*
Fiscdisc (-2)	0.339751	0.134142	2.532770	0.0230*
Constant	0.046949	0.036057	1.302096	0.2125

R-squared	0.712762	Mean dependent var	-0.032220
Adjusted R-squared	0.425525	S.D. dependent var	0.070752
S.E. of regression	0.053626	Akaike info criterion	-2.707257
Sum squared resid	0.043136	Schwarz criterion	-1.967134
Log likelihood	57.96248	Hannan-Quinn criter	-2.465995
F-statistic	2.481439	Durbin-Watson stat	2.544827
Prob (F-statistic)	0.044293		

(*) indicates significant at 5 % level. Source: Author's computations using Eviews 7

With the R-squared of 71.3% in table 5.9 above, it implies an indication of the model serving as a good explanatory power. Also, the probability value of the F-statistic (0.044293) is significant at 5% level. This justifies that the variables are jointly significant in explaining the short run variations in the growth of the agricultural sector.

The Error Correction estimate has a negative value and it is significant at 5% level which implies that there is a reasonable adjustment towards the long run equilibrium state. Thus, since the sign of the coefficient of the error correction term is negative and significant, we accept the results of the model and conclude that, there exists a significant relationship between Agriculture aid, the squared term of Agriculture aid, Trade, Domestic savings, Fiscal discipline and the growth of the agriculture sector. Stated differently, there is a long-term causality running from the independent variables to the dependent variable. This proves that, though the growth of the agriculture sector may temporarily deviate from its long run equilibrium value, it would gradually converge.

The results also show that, in the first time period, foreign aid to the agriculture sector has a positive, but an insignificant relationship with the growth of the agriculture sector; suggesting that though positive, aid to the agriculture sector does not have any influence on the growth of the agriculture sector in the first time/lag period. However, aid to the agriculture sector was found to have a significant influence on the growth of the agriculture sector in the second time/lag period. The piece of evidence here implies that, the influence of Aid to the Agricultural sector on growth is not immediate. Thus a one percent increase in foreign aid to the agriculture sector two years ago, will result in a 1.6% current increase in the growth of the sector. A Wald coefficient test was performed

to know the joint short run effect of aid given to the sector and the result as shown in Appendix IV reveals that, there is a joint short run causality from aid received in the agriculture sector to the growth of the sector at 5% significance level. This result is in line with the work done by Kaya et al (2008) who found a positive and statistically significant relationship between growth in the agricultural output and agricultural assistance for rural development.

The first time lag of the squared term of aid given to the agricultural sector, also was found to have no significant effect on the growth of the sector in the short run, but however, significantly affects growth of the sector in the second time lag which has a negative coefficient. This indicates that, there is a diminishing effect of aid received in the agricultural sector to the growth of the sector, as more of the aid is injected into the sector with time. A Wald coefficient test was conducted to determine the joint short run effect of aid squared term and the result of Appendix V shows that there is a joint short run causality from the aid squared term to the growth of the agriculture sector at 5% significance level. This result supports the conclusions of Hadjimichael et al. (1995), who stated that too much foreign aid is harmful to developing countries beyond a certain threshold level. The result is as well in line with the work done by Durburry et al. (1998) who found the aid squared term to be significant with a negative sign.

The results further show that Trade has a negative significant relationship with the growth of the agriculture sector, both in the first and second time lags. This indicates that, Trade takes an immediate effect on the growth of the sector, taking into account also the

past information on Trade. The Wald coefficient test of their joint relationship in Appendix VI reveals that, the time lags of Trade jointly affect the growth of the agriculture sector in the short run at 5% significance level. The result supports the findings of Kaya et al. (2008) who also identified a significant negative relationship between Trade and Agricultural growth. The result also concurs with the findings of the studies by Karikari (1992) and Djokoto (2013).

Domestic savings does not influence the growth of the agriculture sector in both the first and second time lag periods as there exists a statistically insignificant relationship between Domestic savings and the growth of the sector. This is confirmed by the Wald coefficient test in Appendix VII, which shows that there is no significant joint short run causality from Domestic savings to Agricultural growth, implying that in the short run, the domestic savings variable does not have a major impact on agricultural growth.

Furthermore, it can be seen from the results that, there exists a positive and significant relationship between fiscal discipline and Agricultural growth in both time lag periods. The Wald coefficient test in appendix VIII reveals a joint short run causality from Fiscal discipline to the growth of the agriculture sector at a significant level of 5%; implying that, government consumption expenditure which is a proxy for fiscal discipline contributes positively to agricultural growth. This result is in line with the findings of Basnet (2013).

5.6.1.2 Foreign Aid and Education in the short run

Table 5.10: Error Correction Estimates for Education

Variables	Coefficients	Standard error	T - statistic	P –value
Error Correction Term	-0.474806	0.176118	-2.695952	0.0129*
Educaid	-0.349518	0.168473	-2.074619	0.0494*
Educaidsq	0.201875	0.091319	2.210650	0.0373*
Trade	0.045472	0.040888	1.112118	0.2776
Sav	-0.007035	0.014345	-0.490408	0.6285
Fiscdisc	-0.146301	0.074682	-1.958993	0.0623
Constant	0.022795	0.014894	1.530414	0.1396

R-squared	0.516266	Mean dependent var	0.010511
Adjusted R-squared	0.348011	S.D. dependent var	0.039226
S.E. of regression	0.031673	Akaike info criterion	-3.834435
Sum squared resid	0.023073	Schwarz criterion	-3.422197
Log likelihood	70.35096	Hannan-Quinn criter.	-3.697790
F-statistic	3.068347	Durbin-Watson stat	2.063387
Prob (F-statistic)	0.016664		

(*) indicates significant at 5 % level. Source: Author's computations using Eviews 7

In the long-term relationship between a dependent variable (growth of the education sector) and the independent variables (aid to education, squared term of aid to education, Trade, Domestic savings and Fiscal discipline), the VECM results show that, the error correction term estimated at -0.475 is statistically significant at 5% level and negative. This means there is a long run relationship between the dependent variables and the independent variables. Thus the system corrects its previous period's disequilibrium by 0.47% a year.

In the short run relationship between aid to education and the growth of the education sector, aid to education is found to have a significant but negative effect on the growth of the education sector. This suggests that an increase in aid to the Education sector reduces

the growth of the sector, which is in contrast with the work done by Anwar and Aman (2010), and Michaelowa (2004). . The negative effect of aid to Education could possibly imply that only a little share of foreign aid given to the education sector is made use of effectively and efficiently, while most of it is wasted. This means that, possibly, foreign aid given to the education sector is greatly less than the needs of the country. The result, however, agrees with the findings of Asiedu and Nandwa (2007) who, revealed that, foreign aid, in primary and secondary education has adverse effect on growth in middle income countries.

The squared term of aid received in the education sector recorded a positive and significant effect on the growth of the education sector implying that, as more and more foreign aid is given to the education sector, with time the effect it has on the growth of the sector becomes positive which indicates an improvement. This result therefore is in contrast with the diminishing returns as proposed by Hadjimichael et al. (1995).

Trade is noted to have a positive but insignificant effect on the growth of the education sector in the short run, which implies that Trade does not influence growth of the sector in the short run. This positive result is in line with the conclusion made by Loening (2005) that, the growth effect of trade on primary education is positive. Domestic savings also have no influence on the growth of the education sector with a negative, but insignificant effect.

Also, the results show a negative, but statistically significant impact of Fiscal discipline on the growth of the education sector at 10% level of significance in the short run. This implies government consumption expenditure contributes negatively to the growth of the education sector.

The R-squared of 51.6% gives an indication of the model serving as a good explanatory power. Also, the probability value of the F-statistic (0.016664) is significant at 5% level. This justifies that the variables are jointly significant in explaining the short run variations in the growth of the education sector.

5.6.1.3 Foreign Aid and Health in the Short run

Table 5.11: Error Correction Estimates for Health

Variables	Coefficient	Standard error	T -statistic	P –value
Error Correction Term	-0.364673	0.124830	-2.921361	0.0112*
Healthaid (-1)	-0.113353	0.028320	-4.002544	0.0013*
Healthaid (-2)	0.038840	0.058532	0.663569	0.5177
Healthaidsq (-1)	0.062004	0.015110	4.103584	0.0011*
Healthaidsq (-2)	-0.015810	0.030235	-0.522918	0.6092
Trade (-1)	-0.001137	0.008864	-0.128306	0.8997
Trade (-2)	-0.004267	0.006781	-0.629222	0.5393
Sav (-1)	0.002421	0.003438	0.704319	0.4928
Sav (-2)	0.000803	0.002127	0.377557	0.7114
Fiscdisc (-1)	0.001875	0.016510	0.113550	0.9112
Fiscdisc (-2)	-0.003466	0.013174	-0.263073	0.7963
Constant	0.015869	0.032214	0.492617	0.6299
R-squared	0.776073	Mean dependent var	0.124293	
Adjusted R-squared	0.680104	S.D. dependent var	0.099507	
S.E. of regression	0.056280	Akaike info criterion	-2.661245	
Sum squared resid	0.066517	Schwarz criterion	-2.198668	
Log likelihood	51.24930	Hannan-Quinn criter.	-2.510456	
F-statistic	51.24931	Durbin-Watson stat	-2.142106	
Prob (F-statistic)	0.000043			

(*) indicates significant at 5 % level. Source: Author's computations using Eviews 7

The VECM results show that, the error correction term is negative and statistically significant at 5% significance level. This allows for the acceptance of the model and conclude that, there exist a significant relationship between the independent and the dependent variables. Thus the independent variables have long run causality on the dependent variable.

The results indicate that, in the first time/lag period, aid to health has a negative and statistically significant relationship with the growth of the health sector. This indicates that, infant mortality, which is set as a proxy to measure the growth of the sector, falls immediately aid to the health sector increases. This indicates an improvement in the health sector as a result of injection of aid into the health sector. This result is in line with the findings of Burnside and Dollar (1998) who found that aid reduces infant mortality under good economic management. Similarly, Mishra and Newhouse (2009) also found health aid to have a beneficial and statistically significant effect on infant mortality. During the second time/lag period, however, aid to the health sector was found to have an insignificant relationship with the growth of the health sector. This can mean that, the improvement in the growth of the health sector does not depend on past inflows of aid to the sector.

The results also show that the squared term of aid given to the health sector, has a positive and significant relationship with the growth of the health sector in the first time/lag period. This indicates that, increasing aid to the sector up to a maximum level brings about diminishing returns. During the second time lag period, however, the

squared term of aid given to the health sector has a statistical insignificant relationship with the growth of the sector.

Trade on the other hand, has a negative, but an insignificant relationship with the growth of the health sector in both first and second time lag periods indicating that, Trade has no effect on the growth of the sector in the short run. Likewise, Domestic savings were found to have a positive but insignificant effect on the growth of the health sector in both the first and second time lag periods implying that domestic savings have no influence on the growth of the health sector in the short run.

Furthermore, there exists no statistically significant relationship between Fiscal discipline and the growth of the health sector in the short run implying that, Fiscal discipline has no significant effect on health in the short run. This is similar to the results obtained from Burnside and Dollar (1998), who identified that, there is no effect of government consumption on infant mortality.

Looking at the individual effects of trade, domestic savings and fiscal discipline, it can be observed that, they individually have no significant effect on the growth of the health sector in the short run. However, by conducting the Wald coefficient test to check their joint relationship, it can be deduced from Appendix IX that, the first and second lags of Trade, Domestic savings, Fiscal discipline, aid to the health sector and the squared term of aid given to the health sector, jointly have a short run causality on the growth of the health sector.

The R-squared of 77.6% gives an indication of the model serving as a good explanatory power. Also, the probability value of the F-statistic (0.000043) is significant at 1% level. This justifies that the variables are jointly significant in explaining the short run variations in the growth of the education sector.

5.6.2 Long Run Relationships

The long run relationship between the dependent variables and the independent variables was ascertained by the statistical significance of the error correction term. The estimated long run coefficients, standard errors and t-statistics of the lagged value of the variables are respectively shown in the tables 5.12, 5.13, and 5.14 below:

5.6.2.1 Foreign aid and agriculture in the long run

Table 5.12: Estimated long run model, dependent variable: Agricg

Variable	Coefficient	Standard error	T – statistic
Agricaid	-0.910862	(0.10208)	[-8.92276]
Agricaidsq	0.419255	(0.04734)	[8.85683]
Trade	-0.068089	(0.03991)	[-1.70600]
Sav	0.124492	(0.02059)	[6.04498]
Fiscdisc	-0.178156	(0.04339)	[-4.10594]
Constant	-23.92867	-	-

Source: Author's computations using Eviews 7

The information in Table 5.12 above can be expressed as follows:

$$\ln Agricg = -23.92867 - 0.910862\ln Agricaid + 0.419255\ln Agricaidsq$$
$$- 0.068089\ln Trade + 0.124492\ln Sav - 0.178156\ln Fiscdisc \ldots\ldots (5.1)$$

Equation 5.1 shows that, in the long run, the growth of the agriculture sector (Agricg) can be explained by foreign aid to agriculture (Agricaid), the squared term of aid to the agriculture sector (Agricaidsq), Trade, Domestic savings (Sav) and Government Consumption Expenditure (Fiscdisc). The long run impact of aid to the agriculture sector on the growth of the sector is found to be negative, implying that, aid has an adverse impact on the growth of the agricultural sector in the long run. Thus, in the long run, a 1% increase in aid to the agricultural sector will result in an approximately 1% fall in the growth of the sector. This positive result concurs with the findings of Herzer and Morrissey (2009), who found a negative long run effect of aid on output. The quadratic aid term appeared to have a positive impact on the growth of the agricultural sector in the long run. Trade is also seen to negatively affect agricultural growth in the long run and this result may be an indication of the importation of cheap agricultural products which compete with those locally produced, leading to reduction in agricultural performance. Domestic savings have a positive effect on the growth of the agricultural sector in the long run, whereas Fiscal discipline recorded a negative impact. The coefficient estimated in this study suggests that a 1% increase in domestic savings will cause 0.12% change in the growth of the agricultural sector. Katircioglu and Naraliyeva (2006) conducted a study looking at the effect of domestic savings on economic growth and they found a positive long run effect.

5.6.2.2 Foreign Aid and Education in the Long run

Table 5.13: Estimated long run model, dependent variable: Educg

Variable	Coefficient	Standard error	T – statistic
Educaid	-1.241770	(0.18531)	[-6.70122]
Educaidsq	0.893213	(0.12275)	[7.27646]
Trade	0.108500	(0.03368)	[3.22147]
Sav	-0.127015	(0.02129)	[-5.96637]
Fiscdisc	-0.389330	(0.06883)	[-5.65650]
Constant	-44.90731	-	-

Source: Author's computations using Eviews 7

The information in Table 5.13 above can be expressed as follows:

$$\ln\text{Educg} = -44.90731 - 1.241770\ln\text{Educaid} + 0.893213\ln\text{Educaidsq} + 0.108500\ln\text{Trade} - 0.127015\ln\text{Sav} - 0.389330\ln\text{Fiscdisc} \ldots\ldots (5.2)$$

The long run impact of aid to the education sector on the growth of the education sector is found to be negative, implying that, it has an adverse impact on the growth of the education sector. Trade has a positive impact on the growth of the education sector in the long run implying that a 1% increase in trade will result in a 0.11% increase in the growth of the sector. This result concurs with Kim and Kim (2000) argument that, the growth effect of trade on education is non-negative. A similar work done by Oladipo (2010), who studied the impact of trade on long run economic growth, also found a positive long run effect of trade on growth.

5.6.2.3 Foreign Aid and Health in the Long run

Table 5.14: Estimated long run model, dependent variable: Healthg

Variable	Coefficient	Standard error	T – statistic
Healthaid	0.056001	(0.00984)	[5.69004]
Healthaidsq	-0.006202	(0.00546)	[-1.13687
Trade	0.018394	(0.00191)	[9.61821]
Sav	-0.003818	(0.00124)	[-3.06728]
Fiscdisc	-0.019193	(0.00244)	[-7.85217]
Constant	-10.36148		

Source: Author's computations using Eviews 7

The information in Table 5.14 above can be expressed as follows:

$$\ln Healthg = -10.36148 + 0.056001\ln Healthaid - 0.006202\ln Healthaidsq + 0.018394\ln Trade - 0.003818\ln Sav - 0.019193\ln Fiscdisc \ldots (5.3)$$

The long run impact of aid to the health sector on the growth of the health sector is found to be positive, implying that a 1% increase in aid to the health sector will result in a 0.06% increase in the growth of the sector. The aid squared term shows a negative impact which indicates that there is no diminishing returns in the long run. Trade also, has a positive effect on the growth of the health sector in the long run showing a 0.02% increase in the growth of the sector resulting from a 1% increase in Trade. The result agrees with the findings of Herzer (2014), who found a robust positive long run effect of trade on health; and Herzer (2015), with a conclusion that trade has a positive and significant impact on population health, as measured by life expectancy.

5.7 Granger causality test

Granger causality test is run in order to determine the causality and direction among the variables. This test tries to find whether or not past values of one variable lead to a change in the present values of another variable. The main interest for this study of causality, is to check if there is any granger causality between foreign aid to to the sectors and the growth of the respective sectors. In principle, if changes in foreign aid to the sectors result in changes in the growth of the sectors, then it can be said that, foreign aid to the sectors granger cause growth of the sectors. Thus, if past values of foreign aid to the sectors increase the prediction of growth of the sectors, then it is said that foreign aid to the sectors granger causes growth of the sectors. The hypothesis of the Granger Causality test are shown in Tables 5.15, 5.16, 5.17 below:

5.7.1 Foreign Aid and Granger causality in the Agriculture sector

Table 5.15: VAR Granger Causality/Block Exogeneity Wald Test for Agriculture

Null hypothesis	Chi-sq	df	Prob.
Agricaid does not Granger Cause Agricg	0.596661	1	0.4399
Agricg does not Granger Cause Agricaid	0.343331	1	0.5579
Agricaidsq does not Granger Cause Agricg	1.084347	1	0.2977
Agricg does not Granger Cause Agricaidsq	0.262957	1	0.6081
Trade does not Granger Cause Agricg	0.615422	1	0.4328
Agricg does not Granger Cause Trade	0.194403	1	0.6593
Sav does not Granger Cause Agricg	0.013082	1	0.9089
Agricg does not Granger Cause Sav	0.341105	1	0.5592
Fiscdisc does not Granger Cause Agricg	1.165080	1	0.2804
Agricg does not Granger Cause Fiscdisc	0.835361	1	0.3607
Agricaid, Agricaidsq, Trade, Sav and Fiscdisc jointly do not Granger Cause Agric growth	18.22958	5	0.051

(*) indicates significant at 5 % level. Source: Author's computations using Eviews 7

The Granger Causality test in Table 5.15 above shows that, at 5% level of significance, the study fails to reject the null hypothesis that, aid to the agriculture sector does not Granger cause the growth of the agriculture sector and vice versa. This implies that, there is no granger causality between aid to the agriculture sector and the growth of the sector. Likewise, we fail to reject the null hypothesis that, squared term of aid to the agriculture sector, Trade, Domestic savings, and Fiscal discipline individually do not granger cause Agricultural growth. However, the test result showed that aid to the agriculture sector, the squared term of aid to the agriculture sector, Trade, Domestic savings and Fiscal discipline can jointly cause the growth of the agriculture sector at a probability value of 0.051 (10% significance level).

5.7.2 Foreign aid and granger causality in the education sector

Table 5.16: VAR Granger Causality/Block Exogeneity Wald Tests for Education

Null hypothesis	Chi-sq	df	Prob.
Educaid does not Granger Cause Educg	12.62887	1	0.0004*
Educg does not Granger Cause Educaid	1.766253	1	0.1838
Educaidsq does not Granger Cause Educg	12.02306	1	0.0005*
Educg does not Granger Cause Educaidsq	1.197990	1	0.2737
Trade does not Granger Cause Educg	8.482130	1	0.0036*
Educg does not Granger cause Trade	1.756633	1	0.1850
Sav does not Granger Cause Educg	7.758924	1	0.0053*
Educg does not Granger Cause Sav	0.026057	1	0.8718
Fiscdisc does not Granger cause Educg	3.802853	1	0.0512
Educg does not Granger Cause Fiscdisc	1.180310	1	0.2773
Educaid, Educaidsq, Trade, Sav, and Fiscdisc jointly do not Granger cause Educg	29.70269	5	0.0000*

(*) indicates significant at 5 % level. Source: Author's computations using Eviews 7

The Granger Causality test in table 5.16 above shows that, at 5% level of significance, we reject the null hypothesis that aid to the education sector does not Granger cause the growth of the sector, but fail to reject the second null hypothesis which says that the growth of the education sector does not granger cause aid to the education sector. This implies that there is a one way causal relationship that flows from aid received in the education sector to the growth of the sector. Similarly, we reject the null hypothesis that the squared term of aid to the education does not Granger cause the growth of the education sector, but fail to reject the null hypothesis that the growth of the education sector does not Granger cause the squared term of aid received in the education sector. It is shown that at 5% level of significance, the study rejects the null hypothesis that Trade and Domestic savings individually do not Granger cause the growth of the education sector, indicating a one way causal relationship that flows from Trade to the growth of the sector and from Domestic savings to growth of the education sector. The study also reveals that, there is no granger causality between Fiscal discipline and the growth of the education sector. However, the test result shows that aid to education, the squared term of aid to education, Trade, Domestic savings, and Fiscal discipline jointly cause growth in the education sector at 1% level of significance.

Table 5.17: VAR Granger Causality/Block Exogeneity Wald Test for Health

Null hypothesis	Chi-sq	Df	Prob.
Healthaid does not Granger Cause Healthg	164.4795	1	0.0000*
Healthg does not Granger cause Healthaid	1.706812	1	0.1914
Healthaidsq does not Granger cause Healthg	15.71440	1	0.0001*
Healthg does not Granger Cause Healthaidsq	38.46003	1	0.0000*
Trade does not Granger Cause Healthg	0.315566	1	0.5743
Healthg does not Granger Cause Trade	2.458132	1	0.1169
Sav does not Granger Cause Healthg	0.058790	1	0.8084
Healthg does not Granger Cause Sav	2.167345	1	0.1410
Fiscdisc does not Granger cause Healthg	0.003707	1	0.9515
Healthg does not Granger Cause Fiscdisc	1.285348	1	0.2569
Healthaid, Healthaidsq, Trade, Sav, and Fiscdisc jointly do not Granger Cause Healthg	248.4752	5	0.0000*

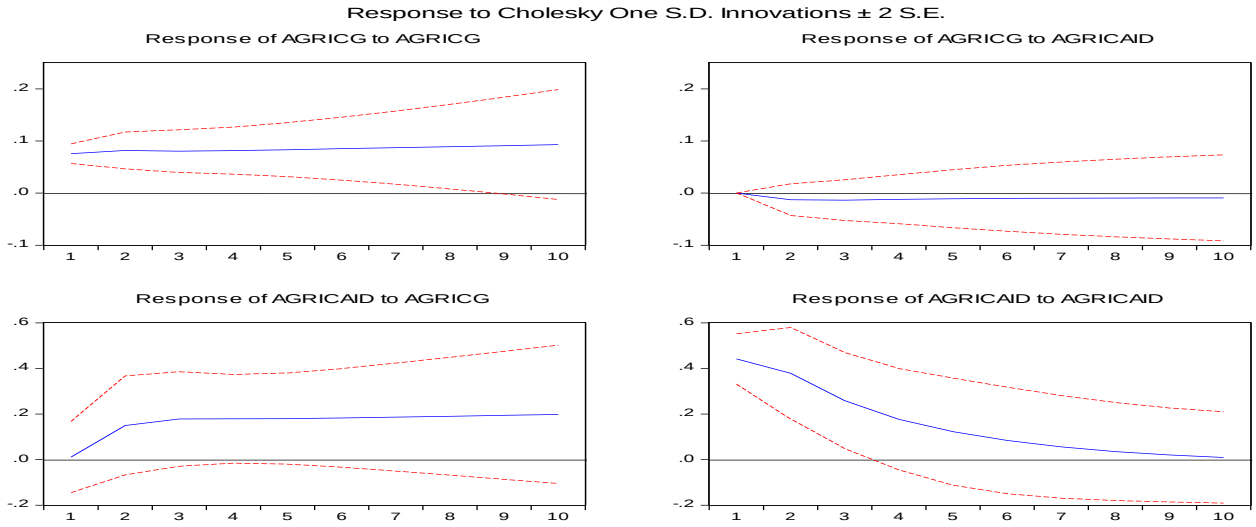
(*) indicates significant at 5 % level. Source: Author's computations using Eviews 7

Table 5.17 above indicates that, at 5% level of significance, we reject the null hypothesis that aid to the health sector does not granger cause growth of the sector, but fail to reject the second null hypothesis that the growth of the health sector does not granger cause aid to the health sector. This implies a one way causal relationship that flows from aid to the health received in the health sector to the growth of the sector. The results also show a two way causal relationship between the squared term of aid to the health sector and the growth of the sector, implying that the squared term aid in the health sector granger causes the growth of the sector and vice versa. Trade, Domestic savings and Fiscal discipline individually, do not granger cause the growth of the health sector 5% level of significance. However, the test shows that, aid to health, the squared term of aid to health, Trade, Domestic savings and Fiscal discipline jointly cause the growth of the health sector at 1% level of significance.

5.8 Impulse response function

The impulse response function serves as an addition to the explanation of the short run analysis since it gives information on the dynamic behavior of each of the variables in the model as a result of one standard deviation (impulse) generated from any of the variables in a previous time period and how that effect may be replicated. The Vector Error Correction Model (VECM) will be restricted to include only coefficients that are of vital relevance to the study (growth of the agriculture sector, aid to the agriculture sector, growth of the education sector, aid to the education sector, growth of the health sector, and aid to the health sector). The rationale for this restriction is to reduce the sum of squared residuals that affect the standard errors. The result of the impulse response functions is shown in Figures 5.2, 5.3, and 5.4 below:

Figure 5.2: Impulse response function 10 year period for Agriculture

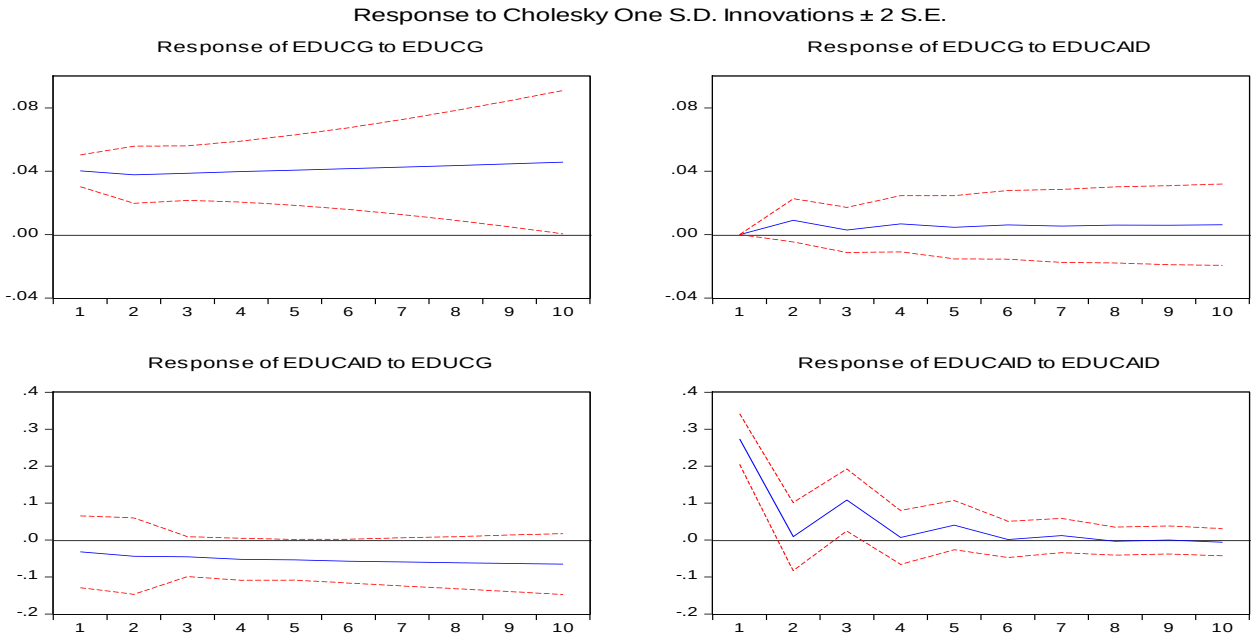


Source: Author's computations using Eviews 7

The result of the impulse response function was done for a scope of ten periods using the Cholesky-dof adjusted method of ordering the variables. It can be seen from Figure 5.2

that, the growth of the agriculture sector did not respond to positive shocks in aid to the agriculture sector during the first period. This result confirms earlier report that aid to the agriculture sector in the first lag period was not significant in explaining the short run growth in agriculture. Thus, the growth of agriculture responded very strongly to its own shock during the first period. During the second period, it showed a weak negative response (-0.009368) to shocks in aid to the agriculture sector. There was a fairly mild negative response, however, from the third period and onwards. Aid to the agriculture sector responded negatively to shocks in the growth of the agriculture sector during the first period, but positively from the second period and onwards. The intensity of the response increased with time with a relatively strong and positive response (0.185344) being recorded in the tenth period. The table is presented in Appendix XIII.

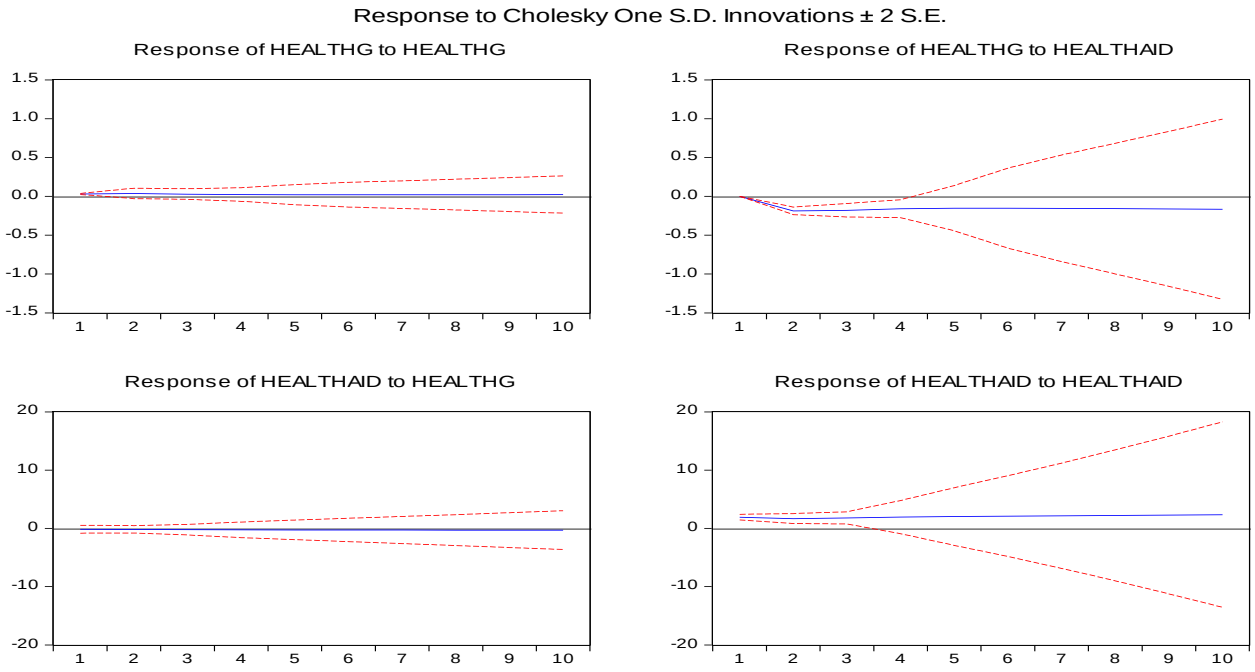
Figure 5.3: Impulse response function 10 year period for education



Source: Author's computations using Eviews 7

From Figure 5.3 above, it can be seen that, the growth of the education sector did not respond to positive shocks in aid to education during the first period, but responded strongly to its own shocks during the first period. However, it showed a weak positive response (0.009190) to shocks in aid to education during the second period. The weak positive response persisted into the future with the tenth period recording a response of 0.007117 to shocks in aid to the education sector. Aid to education on the other hand, reacted very strongly (0.268528) to its own shock in the first period and continued to experience both positive and negative fluctuations which showed a decreasing trend into the end of the period. The initial reaction of aid received in the education sector to shocks in the growth of the education sector was strong and negative and the intensity increased gradually through to the end of the period. The table is presented in Appendix XIV.

Figure 5.4: Impulse response function 10 year period for education



Source: Author's computations using Eviews 7

From figure 5.4 above, it is clear that, the growth of the health sector did not respond to positive shocks in aid to the health sector during the first period, but responded strongly to its own shock during the first period. It showed a negative response (-0.183388) to shocks in aid to the health sector during the second period. The intensity though strong, decreased slightly into the future. Aid to health on the other hand, responded very strongly (1.882730) to its own shock in the first period and persisted into the future except during the second period, where it recorded a slight decrease. The initial response of aid received in the health sector to shocks in the growth of the health sector was strong and negative, and the intensity grew in the future period.

5.9 Analysis of variance decomposition

The same approach as used in the impulse response concerning the restriction was applied also in the calculation of the variance decomposition. Therefore, the result of the variance decomposition for the growth of the agriculture, education and health sectors; and aid to agriculture, education, and health are presented in Tables 5.18, 5.19 and 5.20 below:

Table 5.18: Variance Decomposition Test Results for Agriculture

Periods	Variance decomposition of Agricg			Variance decomposition of Agricaid		
	Standard deviation	Agricg	Agricaid	Standard deviation	Agricg	Agricaid
1	0.074383	100.0000	0.000000	0.433865	0.062013	99.93799
2	0.110499	98.63063	1.369370	0.590199	6.250179	93.74982
3	0.135789	98.06785	1.932145	0.665881	11.91722	88.08278
4	0.156385	97.98706	2.012943	0.709528	16.51715	83.48285
5	0.174449	98.04986	1.950138	0.739720	20.56828	79.43172
6	0.190783	98.14511	1.854888	0.763653	24.29340	75.70660
7	0.205804	98.24194	1.758055	0.784431	27.74260	72.25740
8	0.219783	98.33161	1.668394	0.803515	30.92867	69.07133
9	0.232915	98.41183	1.588167	0.821622	33.86570	66.13430
10	0.245337	98.48262	1.517383	0.839107	36.57222	63.42778

Source: Author's computations using Eviews 7

The result in Table 5.18 indicates that, in the first period, aid to the agriculture sector did not account for variations in the growth of the sector; all variations in the growth of the agriculture sector were as a result of its own innovation. However, in the second period, 98.63% of it was explained by a shock in its own innovation and 1.37% by a shock in aid to the agriculture sector. The own shock effect was overwhelming throughout the period and aid to agriculture did not appear to have much significant influence. This finding supports the Granger causality which indicates that there is no causal relationship from aid received in the agriculture sector to the growth of the agriculture sector. 99.94% of the forecast error variance of aid to agriculture was explained by its own shock and 0.06% was explained by the growth of the agriculture sector. The impact of own effect continued to decrease while the impact of agricultural growth was on the increase to the extent that, during the 10^{th} period, 63.43% of aid to the agriculture sector was accounted

for by its own fluctuations while the growth of the agriculture sector accounted for 36.57%.

Table 5.19: Variance Decomposition Test Results for Education

Periods	Variance decomposition of Educg			Variance decomposition of Educaid		
	Standard deviation	Educg	Educaid	Standard deviation	Educg	Educaid
1	0.039629	100.0000	0.000000	0.270314	1.317197	98.68280
2	0.055222	97.23033	2.769667	0.273874	3.745270	96.25473
3	0.066835	97.75996	2.240039	0.297257	5.467120	94.53288
4	0.077068	97.29814	2.701859	0.301630	8.149794	91.85021
5	0.085931	97.36325	2.636746	0.308539	10.63168	89.36832
6	0.094088	97.19907	2.800928	0.313323	13.33947	86.66053
7	0.101542	97.17214	2.827861	0.318321	15.93220	84.06780
8	0.108529	97.08998	2.910022	0.323301	18.47777	81.52223
9	0.115077	97.05150	2.948496	0.328232	20.90626	79.09374
10	0.121287	97.00145	2.998551	0.333260	23.21934	76.78066

Source: Author's computations using Eviews 7

Table 5.19 indicates that during the first period, aid to the education sector did not account for variations in the growth of the education sector; all variations were as a result of its own innovation. However, in the second period, 97.23% of it was explained by a shock in its own innovation and 2.77% by a shock in aid to education. The own shock effect was great throughout the period and aid to education seem to have some but little significant influence; 98.68% of the forecast error variance of aid to the education sector was explained by its own shock and 1.32% was explained by the growth of the education sector. The impact of own effect continued to decrease while the impact of Educational growth, increased till the 10th period where, 76.78% of aid to education was accounted

for by its own fluctuations while the growth of the education sector accounted for 23.22%.

Table 5.20: Variance Decomposition Test Results for Health

Periods	Variance decomposition of Healthg			Variance decomposition of Healthaid		
	Standard deviation	Healthg	Healthaid	Standard deviation	Healthg	Healthaid
1	0.029437	100.0000	0.000000	1.888946	0.657156	99.34284
2	0.189349	6.196553	93.80345	2.506518	0.852179	99.14782
3	0.260511	4.416721	95.58328	3.068938	1.009049	98.99095
4	0.304961	3.704544	96.29546	3.573454	1.115080	98.88492
5	0.336913	3.310277	96.68972	4.029253	1.183920	98.81608
6	0.363202	3.048947	96.95105	4.443341	1.229652	98.77035
7	0.386693	2.857265	97.14273	4.823289	1.261461	98.73854
8	0.408553	2.708164	97.29184	5.175588	1.284701	98.71530
9	0.429257	2.587942	97.41206	5.505314	1.302422	98.69758
10	0.449021	2.488636	97.51136	5.816302	1.316407	98.68359

Source: Author's computations using Eviews 7

It is seen from Table 5.20 that, aid to the health sector did not account for variations in the growth of the health sector; all variations were as a result of its own shock. The second period recorded 93.80% of its own shock and 6.20% by a shock in aid to the health sector. The own shock effect for the subsequent periods, though decreasing, was strong and that of the shock by aid received in the health sector kept reducing. 99.34% of the forecast error variance of aid to the health sector was explained by its own shock and 0.66% was explained by the growth of the health sector. The impact of own effect remained great while the impact of the growth of the health sector did not appear to have any significant influence over the period.

In summary, the results showed that, during the first periods, each variable explained most of its forecast error variance. However, the influence in own shocks decreased with time, even though the changes were not severe.

5.10 Summary

The regression results indicate that, in the short run foreign aid exerts positive and statistically significant impact on the growth of the Agriculture and Health sectors. The effect of aid on the Education sector, however, reported a negative and significant impact. The long run estimates showed a positive impact of foreign aid on the Health sector, but a negative impact on both the Agriculture and Education sectors. The granger causality test result revealed that there is no causal relationship between Agriculture aid and Agriculture growth, but there is a one way direction causal relationship that flows from Education aid to Education growth; and from Health aid to Health growth.

CHAPTER SIX

SUMMARY, CONCLUSION AND RECOMMENDATIONS

6.1 Introduction

The purpose of this chapter is to provide a general summary and conclusion of the study, as well as recommendations for policies and further studies. The purpose of the study is to establish whether there is a causal relationship between foreign aid to the sectors and the growth of the respective sectors in Ghana; and also to determine the impact of foreign aid to the sectors on the growth of the respective sectors using the VAR approach. In carrying out the investigation, the use of cointegration technique was employed since the variables included in the model were found to be stationary in their first differences and not levels. The cointegration test assisted in finding the long run relationship among the variables and a vector error correction analysis was carried out to capture the short run movements of the variables. Also, impulse response functions were run to determine the responses of each variable to one time shock in the other variables; and variance decomposition to make inferences about causal relationships beyond the sample period.

6.2 Summary of Main Findings

The theoretical literature has shown that economic growth is a function of capital input, labour input and technical progress which are incorporated in foreign aid that flows into the country. This is seen in the Harrod Domar growth model, which implies that, foreign aid into the country helps to promote the growth of the country. However, the results of the empirical studies produce unclear conclusions as far as growth effects of foreign aid

to developing countries are concerned. In the quest for ensuring the effectiveness of aid in reducing poverty and achieving the MDGs, the Paris Declaration was made with the view to change the ways in which foreign aid is delivered and managed. Literature showed that significant amounts of agricultural finance in the form of Official Development Assistance (ODA), private capital flows, private philanthropy and assistance from the domestic money bank have been received in the sector; yet not sufficient in transforming the sector into a modern and highly productive sector. With regards to the health sector, the limited supply of the necessary drugs and other resources in attaining the target of health delivery to meet the MDGs has been a major challenge of the health sector. Also, according to the literature, the education sector has recorded a decline in the proportional participation of children in primary schooling, despite the increase in primary school enrollment in absolute terms in the 1990s.

Agriculture is so far not considered as the main contributor to the nation's Gross Domestic Product since the rebasing in 2006. The services sector, which contains both the health and education sectors, contributed about 49.8% to the GDP whilst that of Agriculture contributed about 22.4% to GDP in the year 2013. Thus the Services sector experienced a growth rate of 10.0% in 2013 whilst the agriculture sector recorded a 5.7% growth rate.

The overview of foreign aid to the Ghanaian economy and to the sectors, generally show that foreign aid into the country has been sporadic over the years. In the 1970s, foreign aid into the country was low, but the flows increased dramatically during the 1980s, when

Ghana started the implementation of the World Bank and International Monetary Fund (IMF) policies. The health sector was noted to have received most of the inflows of Official Development Assistance over the years. On average, the Agricultural sector had the highest inflows ($134.84 million) among the other sectors (Education: $59.50 million; and Health: 125.01 million) only from 2006 to 2010.

The Johansen cointegration test results indicated the existence of a significant long run relationship among the variables. The negative sign and statistical significance of the error term also confirmed the existence of a long run equilibrium relationship, which recommended that the study must estimate coefficients for both the short run and long run.

The regression results of the short run estimates indicate that the coefficients of the variables of interest were statistically significant with aid to Agriculture and Health having a positive impact on the growth of the sectors; and growth of the education sector experiencing a negative impact from education aid. The other variables included in the model however, individually appeared mostly to have an insignificant effect on the growth of the sectors, but jointly significant with the inclusion of the variables of interest. Thus, during the period under consideration, Trade had a statistically significant negative effect on the agriculture sector; but was positively and negatively insignificant on the education and health sectors respectively. Savings on the other hand, recorded insignificant impacts on all the three sectors. Fiscal discipline had a statistically positive impact on agriculture growth at 5% significance level while it affected education growth

negatively at 10% significance level. However, health recorded no significant impact in both the first and second time lag period of fiscal discipline on the growth of the sector. It was seen from the results that, agriculture aid and Health aid positively and significantly impact on the growth of the agriculture and the health sectors respectively. Education aid, however, is reported to have a negative, but significant impact on the growth of the education sector.

The long run estimates showed that the squared term of aid to agriculture and Savings responded positively to changes in the growth of the agricultural sector, but aid to agriculture, trade and fiscal discipline contributed negatively. With regards to the education sector, aid to education, domestic savings, and fiscal discipline contributed negatively to changes in the growth of the sector; but the squared term of aid to education and trade responded positively. The growth of the health sector is influenced positively by aid to Health and trade; whilst the squared term of aid to Health, savings and fiscal discipline contributed negatively.

The granger causality test result revealed that there is no causal relationship between Agriculture aid and Agriculture growth, but there is a one way direction causal relationship that flows from Education aid to Education growth; and from Health aid to Health growth. The impulse response test showed a negative response of Agriculture growth to Agriculture aid, but Agriculture aid responded negatively to shocks in Agriculture growth only during the first period, and positively from the second period and onwards. Education growth responded weakly positively to Education aid, whereas

Education aid experienced both positive and negative fluctuations to shocks in Education growth. The response of Health growth to Health aid was negative and the intensity though strong, decreased slightly into the future. The initial response of Health aid to shocks in Health growth was strong and negative, and the intensity grew in the future period. The variance decomposition test also indicated that, during the first periods, each variable explained most of its forecast error variance. However, the influence in own shocks decreased with time, even though the changes were not severe. The model was proved to be desirable as the Jaque-Bera and heteroscedasticity test results confirmed the absence of serial correlation and heteroscedasticity respectively. Also, the Breusch-Godfrey test result showed that the residuals were normally distributed.

6.3 Conclusion

The question of whether foreign aid can bring about economic growth creates many conflicting answers. What is obvious is that, the relationship may be significant or insignificant, negative, positive or neutral; depending on the country under study, type of aid flows, objectives of the donors, implementation policy of the recipient country, the methodology used, the sector receiving aid and the period of study. In a country where the effectiveness of foreign aid on the sectors is yet to be given a detailed assessment, this study serves only to fill the gap by providing empirical evidence as a basis for policy consideration and for further research. Using the VAR estimation approach for the period 1980-2013, estimates were obtained for the impact on the growth of the sectors of foreign aid.

6.4 Policy Recommendations

The findings disclosed that aid to Agriculture and Health were growth enhancing in the respective sectors in the short run, but aid to Education was found to be negatively related to growth. As discussed earlier, the negative effect of aid to Education could possibly imply that only a little share of foreign aid given to the education sector is made use of effectively and efficiently, while most of it is wasted. Therefore, the task for better utilization and effectiveness of foreign aid in the education sector depends on both donors and the recipient country (Ghana). Thus, more resources should be directed to the stipulation of primary education and funds should be made available for advancing the learning environment in the country involving infrastructure building, supply of learning materials, reduction of school fees and the provision of good management. By this, an arrangement of accountability and transparency should be devised to reduce any possibility of aid fungibility. With respect to the agriculture sector, it will be essential to increase foreign aid to the sector in order to improve the impact on agricultural productivity and its contribution to the country. Priority should also be given to factors that will help augment growth in agricultural productivity. In the same effect, the fact that foreign aid to the health sector is relevant in enhancing growth in the sector suggests that efforts need to be taken in order to derive maximum benefits from the aid that goes to the sector.

The negative impact on the degree of openness of Ghana's economy on the growth of the agriculture sector necessitates a review of its trade policies. There is the need for Ghana's trade liberalization policy to be re-examined such that, policies will be geared towards

introducing some selective controls on imports to prevent "dumping" so as to create a market for locally produced goods. This is recommended notwithstanding the fact that trade liberalization enforces discipline on the domestic economy through international competition and market forces. Also, export diversification and other measures to add value to Ghanaian exports should be encouraged so that the sector will benefit from trade openness. This can be made possible by enlarging the manufacturing base for non-traditional exports, providing incentives to exporters in the form of exemption schemes and a reduction in corporate tax for exporters of locally manufactured goods. Moreover, there should be a review of the land tenure system to avoid the burdensome process of acquiring land in order to help attract investors into the agriculture sector. The long run positive impact of Trade on the growth of the health and education sectors suggest that, Ghana needs to strengthen trade and investment reforms to encourage long run growth in those sectors. Also, policy objectives must be engaged towards making domestic firms more competitive to be able to reap from the benefit from trade openness.

With regards to fiscal discipline on the part of government, the need for the formulation and implementation of transparency in periodic budgetary reporting and the setting of strategic public expenditure priorities should be be embarked upon in order to attain government fiscal discipline. In this view, government's annual allocations in the budget should declare only as many projects as can be meaningfully implemented; only projects in the approved budgets should qualify for implementation and costs of the projects should be kept within estimated limits. Also, there should be greater efficiency in public expenditure management; and this can be achieved through proper programming of

payment of public funds, accurate organization of activities of government agencies, and effectual supervision of projects and programmes.

The insignificant impact of domestic savings on the growth of the agriculture, education and health sectors suggest that, domestic savings should be strongly mobilized in that, the formulation and implementation of policies aimed at reducing the widespread between lending and borrowing rates should be encouraged. Holders of savings accounts also, should be motivated with rational interest rates.

6.5 Recommendations for further research

Some limitations of this study suggest the need for further studies. Low sample size may restrict the ability of the methodology used to show the dynamic effects of these variables. Also, certain variables that have been used in literature could not be included due to lack of data. Therefore, as data becomes more available, it will be essential to use a larger sample size.

The wide range of proxies for trade openness indicates that the result obtained from the variable could largely depend on the proxy used. Further research into this area, therefore, could use other proxies rather than trade volume as a share of GDP, to see if the result will vary.

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APPENDICES

I: Wald lag exclusion test for Agriculture

Lags	Agricg	Agricaid	Agricaidsq	Trade	Sav	Fiscdisc	Joint
Lag 1	18.120	16.069	17.169	19.140	15.042	25.177	177.472
	[0.0059]	[0.0133]	[0.0086]	[0.0039]	[0.0199]	[0.0003]	[0.0000]
Lag 2	7.142	13.640	13.755	4.296	2.849	6.299	65.848
	[0.3079]	[0.0339]	[0.0324]	[0.6367]	[0.8275]	[0.3905]	[0.0017]
df	6	6	6	6	6	6	36

Source: Author's computations using Eviews 7

II: Wald lag exclusion test for Education

Lags	Educg	Educaid	Educaidsq	Trade	Sav	Fiscdiisc	Joint
Lag 1	14.642	5.531	10.754	17.125	18.391	13.830	133.488
	[0.0232]	[0.4777]	[0.0963]	[0.0088]	[0.0053]	[0.0316]	[4.00e-1]
Lag 2	4.486	5.434	3.143	5.664	11.889	2.799	48.259
	[0.6112]	[0.4894]	[0.7907]	[0.4618]	[0.0645]	[0.8336]	[0.0832]
df	6	6	6	6	6	6	36

Source: Author's computations using Eviews 7

III: Wald lag exclusion test for Education

Lags	Healthg	Healthaid	Healthaidsq	Trade	Sav	Fiscdisc	Joint
Lag 1	14769.42	19.224	1027.586	18.768	19.572	51.573	68642.19
	[0.0000]	[0.0038]	[0.0000]	[0.0046]	[0.0033]	[2.27e-0]	[0.0000]
Lag 2	995.382	12.438	87.073	14.65780	2.486	19.889	4618.838
	[0.0000]	[0.0529]	[1.11e-16]	[0.0231]	[0.8701]	[0.0029]	[0.0000]
df	6	6	6	6	6	6	36

Source: Author's computations using Eviews 7

IV: Wald Coefficient Test for Agricaid

Hypotheses	Test statistic	Value	Df	Probability
H_0: Agricaid(-1)=Agricaid(-2)=0	F-statistic	4.387394	(2, 15)	0.0316
H_1: Agricaid(-1)=Agricaid(-2)≠0	Chi-square	8.774788	2	0.0124

Source: Author's computations using Eviews 7

V: Wald Coefficient Test for Agricaidsq

Hypotheses	Test statistic	Value	Df	Probability
H_0=Agricaidsq(-1)=Agricaidsq(-2)=0	F-statistic	4.354128	(2, 15)	0.0323
H_1=Agricaidsq(-1)=Agricaidsq(-2)≠0	Chi-square	8.708257	2	0.0129

Source: Author's computations using Eviews 7

VI: Wald Coefficient Test for Trade

Hypothesis	Test statistic	Value	Df	Probability
H_0: Trade(-1)=Trade(-2)=0	F-statistic	4.065491	(2, 15)	0.0388
H_0: Trade(-1)=Trade(-2)=0	Chi-square	8.130982	2	0.0172

Source: Author's computations using Eviews 7

VII: Wald Coefficient Test for Sav

Hypotheses	Test statistic	Value	Df	Probability
H_0: Sav(-1)=Sav(-2)=0	F-statistic	1.905210	(2, 15)	0.1831
H_1: Sav(-1)=Sav(-2)≠0	Chi-square	3.810419	2	0.1488

Source: Author's computations using Eviews 7

VIII: Wald Coefficient Test for Fiscdisc

Hypotheses	Test statistic	Value	df	probability
H_0: Fiscdisc(-1)=Fiscdisc(-2)=0	F-statistic	3.988447	(2, 15)	0.0408
H_0: Fiscdisc(-1)=Fiscdisc(-2)=0	Chi-square	7.976894	2	0.0185

Source: Author's computations using Eviews 7

IX: Wald Coefficient Test for the Independent variables in Health

Hypotheses	Test statistic	Value	Df	Probability
H_0: C(1)=C(2)=….=C(16)=0	F-statistic	11.44134	(10, 14)	0.0000
H_1: C(1)=C(2)=…=C(16)≠0	Chi-square	114.4134	10	0.0000

Source: Author's computations using Eviews 7

X: Residual Diagnostic Results for Agriculture

Class of test	Obs*R-squared	P-value Chi—Square (2)
Serial correlation	0.931504	0.3345
Normality	0.924100	0.629991
Heteroscedasticity	3.342581	0.1880

Source: Author's computations using Eviews 7

XI: Residual Diagnostic Results for education

Class of test	Obs*R-squared	P-value Chi—Square (1)
Serial correlation	0.243935	0.6214
Normality	3.415188	0.181301
Heteroscedasticity	0.002493	0.9602

Source: Author's computations using Eviews 7

XII: Residual Diagnostic Results for health

Class of test	Obs*R-squared	P-value Chi—Square (2)
Serial correlation	0.587929	0.7453
Normality	2.106976	0.348719
Heteroscedasticity	2.569300	0.2767

Source: Author's computations using Eviews 7

XIII: Impulse response function 10 year period for Agriculture

Periods	Response of Agricg		Response of Agricaid	
	Agricg	Agricaid	Agricg	Agriciad
1	0.070956	0.000000	-0.037835	0.435812
2	0.080746	-0.009368	0.118821	0.400524
3	0.058641	-0.020942	0.085691	0.335008
4	0.053103	-0.023515	0.094858	0.185197
5	0.061198	-0.021596	0.136748	0.069107
6	0.063908	-0.019878	0.180284	-0.026182
7	0.060683	-0.018801	0.191536	-0.084473
8	0.058685	-0.017346	0.189900	-0.110237
9	0.059191	-0.015878	0.187885	-0.109284
10	0.059697	-0.015054	0.185344	-0.094573

Source: Author's computations using Eviews 7

XIV: Impulse response function 10 year period for Education

Periods	Response of Educg		Response of Educaid	
	Educg	Educaid	Educg	Educaid
1	0.039629	0.000000	-0.031024	0.268528
2	0.037344	0.009190	-0.042974	0.009530
3	0.037440	0.003949	-0.044963	0.106457
4	0.037579	0.007773	-0.050832	0.005896
5	0.037557	0.005850	-0.052022	0.038854
6	0.037617	0.007297	-0.054539	-0.000415
7	0.037612	0.006605	-0.055211	0.010422
8	0.037637	0.007154	-0.056301	-0.005056
9	0.037636	0.006907	-0.056657	-0.001676
10	0.037647	0.007117	-0.057133	-0.007841

Source: Author's computations using Eviews 7

XV: Impulse response function 10 year period for Health

Periods	Response of Healthg		Response of Healthaid	
	Healthg	Healthaid	Healthg	Healthaid
1	0.029437	0.000000	-0.153128	1.882730
2	0.036812	-0.183388	-0.173468	1.638420
3	0.027853	-0.176741	-0.203708	1.759049
4	0.021162	-0.157122	-0.217612	1.817646
5	0.017670	-0.142115	-0.223197	1.848104
6	0.016265	-0.134688	-0.224868	1.859525
7	0.015826	-0.131776	-0.225154	1.862833
8	0.015743	-0.130906	-0.225080	1.863311
9	0.015756	-0.130761	-0.224979	1.863105
10	0.015780	-0.130801	-0.224917	1.862874

Source: Author's computations using Eviews 7