A Sectoral Analysis of the Impact of Foreign Aid on Public Investment and Economic Growth in Kenya

Mochoge Duke Nyagaka
072732

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School of Finance and Applied Economics
Strathmore University
Nairobi, Kenya

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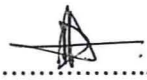
DECLARATION

I declare that this work has not been previously submitted and approved for the award of a degree by this or any other University. To the best of my knowledge and belief, the Research Project contains no material previously published or written by another person except where due reference is made in the Research Project itself.

Duke Mochoge, 072732



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This Research Project has been submitted for examination with my approval as the Supervisor.

William Ng'ang'a

20/11/2015

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School of Finance and Applied Economics

Strathmore University

ABSTRACT

The purpose of this study was to find out the effectiveness of foreign aid in boosting economic growth in Kenya and its impact on public investment. This paper uses an Autoregressive Distributed Lag (ARDL) Model to estimate the short run and long run impact of foreign aid on economic growth and public investment both on an aggregate level and a sectoral level. Time series data was used for the period 1980-2014. The study finds a significant positive relationship between aggregate aid and growth as well as public investment in the long run. The sectoral analysis shows that aid to the production, energy and tourism sectors is ineffective while aid to economic infrastructure and education is effective. An important finding of this study is that it is necessary to have a stable macroeconomic environment for aid to be effective.

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1 INTRODUCTION

1.1 Background of the Study

Foreign aid forms one of the largest components of foreign capital flows to low-income countries. Over the last half-century, these foreign capital flows have been thought of as a dominant strategy for alleviating poverty in the third world and therefore contributing to growth. Yet it still seems that the growth achieved by many Sub Saharan countries has not been satisfactory. (Girma, 2015)

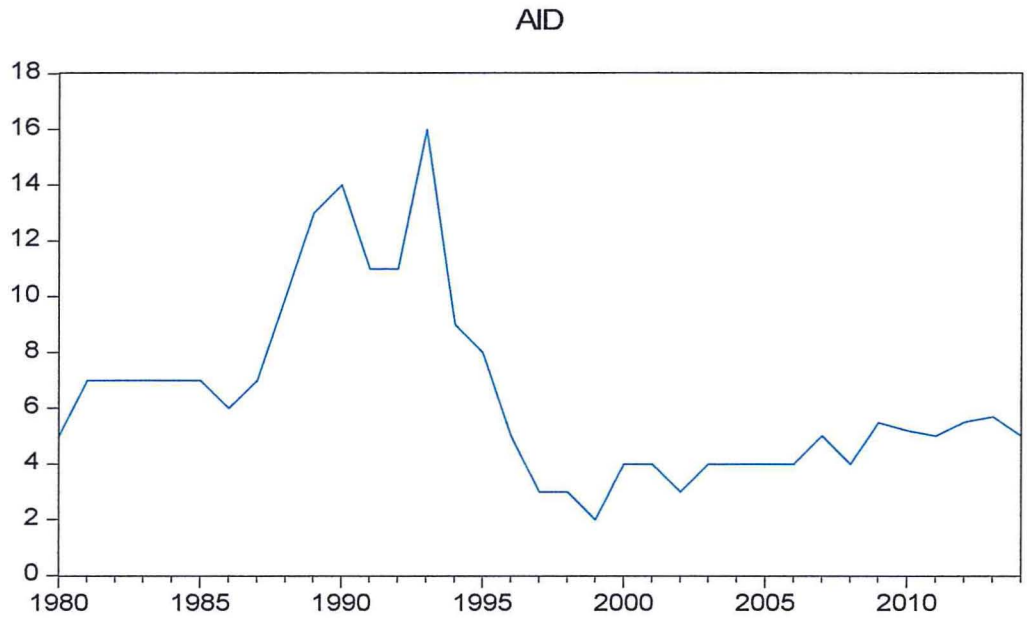
The effectiveness of foreign aid in developing countries has therefore been of particular interest to many scholars in the recent past. Papanek (1973) found that aid had a positive effect on economic growth. Popular aid specialist Jeffrey Sachs (2005) is also of the opinion that aid works. Burnside & Dollar (2000) emphasize that good fiscal, monetary and trade policies are key for there to be a positive relationship between aid and growth. Other studies, however, have found that there is a negative relationship between foreign aid and economic growth in developing countries. Feyzioglu (1998) concludes that foreign aid does not work and that it seems to be fungible in most developing countries. Mallik (2008) finds that there is a negative long run effect of aid on economic growth. Dambisa Moyo (2009) is also a well-known critic of foreign aid to developing countries.

With regard to the impact of foreign aid on public investment, Papanek (1973) finds that foreign aid does not have a positive impact on public investment as he has found evidence of considerable leakage out of aid to consumption or non-investment purposes. In contrast however, Gang & Khan (1991) find that there is a positive relationship between aid and public investment. To add to the controversy, White (1991) says that Gang & Khan (1991) misinterpreted their own results and that their results actually show that foreign aid had no impact on public expenditure.

Net Official Development Assistance (aid) statistics in Kenya have been consistently growing over the last few years from about 1.3 billion US dollars in 2007 to about 3.2 billion US dollars in 2013. However, when analysed as a share of GDP, average aid levels have significantly reduced since the 1990s as shown in Figure 1 below.

Kenya's GDP on the other hand has grown from 31 billion US dollars to 55 billion US dollars in the same period of time. In addition, the statistics on Gross Domestic Investment have also been on the rise over the past few years from 8.12 billion US dollars in 2009 to about 13.79 billion US dollars in 2014. These basic statistics show that aid has been on an upward trajectory just as GDP and Investment have. This could be a seen as either a positive or negative outcome depending on whether the growth in GDP and Investment have been at all due to the growth in aid.

Figure 1-Aid as a share of GDP (1980-2014)



By and large, the impact of foreign aid on economic growth as well as investment is still a contested issue and as such warrants more research from a specific developing country, in this case, Kenya, using disaggregated foreign aid statistics.

1.2 Statement of the Problem

According to Adelman & Chenery (1996), a transfer of external aid should enable recipients to raise their levels of investment and to increase the supply of commodities that are not domestically produced. Today, external resources constitute an integral part of development expenditure in the developing countries.

Despite the positive impact that aid is intended to have in developing countries, this is not always the case. There has been evidence that sometimes aid doesn't work in some developing countries. (Mallik, 2008) (Mosley, Hudson, & Horrell, 1987)

(Kodama, 2012). The reasons for this differ from scholar to scholar. However, many still believe that aid actually works and that; if anything, developing countries should receive more aid to continue to boost their economies. (Minoiu & Reddy, 2010) (Arndt, Jones, & Tarp, 2015) (Sachs, 2005).

The foregoing implies that there is a need for a closer look at foreign aid in Kenya and how effective it is in stimulating public investment and therefore economic growth. This study is also informed by the fact that most country specific studies done in Kenya in this area (Ojiambo, 2013; Njeru, 2003) focus on aggregate aid and its impact on growth and public investment as opposed to how aid channeled to different sectors impacts growth and public investment of these sectors.

1.3 Research Objectives

The following were the objectives of the study:

- To establish the overall effectiveness of foreign aid in boosting economic growth
- To establish which sector(s) specific aid contribute most to economic growth
- To determine the impact of aid on public investment

1.4 Research Hypotheses

The research hypotheses in this study were:

- Foreign aid has no impact on economic growth
- Aid is not more effective in some sectors than it is in others
- Foreign aid has no effect on public investment

1.5 Significance of the Research

The significance of this study is to inform the policy debate on the aid-growth relationship and also to contribute to the existing literature on the effectiveness of aid. This contribution is achieved by focusing on aid channeled to different sectors in Kenya and what the impact of the different sectoral aid is to the growth of these sectors. This study is therefore significant as it could inform the Government of Kenya on which sectors of the economy are properly utilizing the aid that is channeled to them and which ones are not. The study may also prove significant to aid donors as they make decisions on which sectors to donate to, based on how effective they are in utilizing the aid channeled to them.

2 LITERATURE REVIEW

2.1 Introduction

There has been a lot of literature in the field of knowledge of foreign aid and its impact on different macroeconomic factors. In this respect, this chapter shall analyze work done by a number of different authors on foreign aid, its impact on public investment and economic growth as well as models used to explain the aid growth nexus.

2.2 What is Foreign Aid and what is its purpose?

What is foreign aid? This question has yielded three basic answers in international relations theory. (Hattori, 2001). According to political realism, it is a policy tool that originated in the Cold War to influence the political judgments of recipient countries in a bipolar struggle. (Liska, 1960). Another school of thought says that it is a set of programmatic measures designed to enhance the socio-economic and political development of recipient countries. (Chenery & Strout, 1966). Finally, aid is seen as a means of constraining the development path of recipient countries promoting the unequal accumulation of capital in the world. (Wood, 1986).

According to Hattori (2001), aid can be seen as: (1) A type of resource allocation (2) a form of giving or (3) symbolic domination. According to Riddell (2007), foreign aid consists of all resources- physical goods; skills and technical know how, financial grants or loans given at concessionary rates transferred from donors to recipients. The Development Assistance Committee (DAC) of the Organization for Economic Cooperation and Development (OECD) defines aid as Official Development Assistance. According to the DAC, aid qualifies as ODA on three criteria: (1) it has to be undertaken by official agencies (2) it has to have the promotion of economic development and welfare as its main objectives and (3) it has to have a grant element of 25% or more.

2.3 Theoretical Literature

This section provides a literature review of some of the theories that have been brought forward to explain the aid-growth nexus.

2.3.1 Harrod-Domar Model

The Harrod-Domar model, asserts that output or growth is dependent on the rate of investment and the productivity of that investment. In an open economy, savings finances investment, which is a sum of domestic and foreign savings. This model explains economic growth in terms of a savings ratio and capital-output coefficient. The model is expressed as follows (Easterly, 2003):

$$g = {}^{(I/Y)}/_{\mu} \tag{1}$$

and:

$$I/Y = A/Y + S/Y \tag{2}$$

where I is required investments, Y is output, g is target GDP growth, A is aid, S is domestic saving and μ the incremental capital-output ratio (ICOR).

According the Harrod Domar model, the ICOR gives how many units of additional capital are required to yield a unit of additional output, thus the ICOR is the ratio of investment ratio to the growth rate.

In the study by Kabete (2008), savings, more so domestic savings plays a major role in providing resources for investment and thus boosting growth. Thus the suggestion is that, for developing countries to minimize their dependence on foreign aid, they need to increase their saving propensities, which will increase funds required for investments.

2.3.2 The Two Gap Model

The Two Gap Model was suggested by, among others, Chenery and Strout (1966). In this model, the first gap is between the amount of investment necessary to attain a certain rate of growth and the available domestic savings (the saving gap). The second gap is the trade gap or foreign exchange gap. This occurs when there is a gap between import requirements for a given level of production and foreign

exchange earnings. Even though the saving investment gap would be small, a larger trade gap would undermine productive investment due to limited imports of capital goods needed for investment. Chenery and Strout (1996) argue that at any moment in time, one gap is binding in aid recipient countries thus foreign aid is required to fill that gap. The 'two gap model' supports the hypothesis of investment-limited growth based on the Harrod- Domar model, which assumes a specific amount of investment to increase growth.

However, the assumption that foreign fills these gaps will hold true only if investment is constrained by liquidity but the incentives to invest are favorable. If the cause of low investment is the poor incentives to invest, then aid will not increase investments, as it will finance consumption rather than investment. Furthermore, according to White (1992), the effectiveness of foreign aid in filling these gaps will depend on the productivity of the investments made.

2.3.3 The Three Gap Model

The three-gap model was suggested by Bacha (1990). This model refers to the saving- investment gap, the trade gap and the fiscal gap. The fiscal gap refers to a gap between government revenues and expenditures although the fiscal gap is a subset of the saving gap. Due to this fiscal gap, government efforts to stimulate private investment may be restrained when government resources for investment and imports are insufficient, among other things, as a result of debt service. (Bacha, 1990). According to Kabete (2008), there is enough evidence showing that government expenditures in Sub-Saharan African countries have been curtailed by foreign debt service despite the Heavily Indebted Poor Countries (HIPC) initiatives. Thus, external resources directed to the government budget may facilitate the closing of this fiscal gap.

In contrast, if aid is in form of a loan and not a grant, it may have adverse implications for the savings, foreign exchange and fiscal gaps in the long run and for the macroeconomic performance in general. Also debt service can result in the reduction of import capacity of the government thus reducing government investment, particularly in infrastructure, education and health facilities, a factor that is likely to affect negatively private investments.

2.4 Empirical Literature

The following section provides a review of some of the empirical literature that has been done in the areas of foreign aid, growth and public investment.

2.4.1 The Aid-Growth Nexus

As mentioned in the background of this study, there are a number of schools of thought when it comes to the aid-growth debate. One school of thought asserts that there is a positive impact of foreign aid on economic growth. The other school of thought says that foreign aid has a negative impact on growth. Yet another school of thought assets that the aid-growth relationship is a contingent one, that is, the impact of aid is positive in the presence of certain factors such as good policy structures, and negative otherwise.

One of the first studies on aid-growth relationship was by Papanek (1972). This study focuses on the relationship between aid and growth in what were developing countries at the time e.g. Argentina, Japan, Thailand and Zambia. The author challenges the naïve assumption that had been widely accepted that a dollar increase in foreign resources directly results in a dollar increase in imports and investments. He therefore welcomes the idea that some foreign resources are in part used to increase consumption and in part to augment investment. It is with this argument that he tries to look at the impact of aid on savings and growth on developing countries. Papanek (1972) argues that previous literature that criticizes the effectiveness of aid simply say that, for example, aid has a negative impact on savings, but do not specify which savings function underlies that relationship. The conclusion by Papanek (1972) is that foreign aid has a positive impact on growth but that it has a negative impact on savings. The author tries to take into account the exogenous factors such as civil war and weather, and external shocks that could affect the relationship between foreign aid, savings and growth. However, he fails to critically analyze this on a country specific basis and he states that only careful analysis of individual countries can really shed any light on the impact of foreign inflows on savings, export or growth, and that even such analyses will be subject to dispute. Papanek (1972) therefore points out himself that his study is at best a study of relationships that have to be studied further in the future.

Fayissa and El-Kaissy (1999) also provide a view of the impact of foreign aid and growth for eighty less developed countries between the period 1971-1990. The authors adopt a growth model that is informed by the extended production function of Lucas (1998) and the endogenous growth model of Romer (1990). Running an OLS on the growth model using different specifications, the authors find that: (1) domestic savings, export sector growth and labor force growth have a positive impact on growth and (2) there is a positive impact of foreign aid on economic growth. However, the authors note that lack of political and civil liberties may impact economic growth negatively. The paper also notes that while foreign aid has played an important role in developing countries, savings remains crucial for economic growth in developing countries. This study however, uses a simplistic approach to the aid-growth relationship, as it takes into account very few variables and does not seem to tackle the problem of endogeneity that could exist between aid and economic growth.

A political approach to analyzing the aid-growth relationship was introduced by Boone (1995). The author begins by that acknowledging the fact that, while foreign aid programs were launched to alleviate poverty, they were basically an unprecedented economic experiment. In addition, aid is highly variable, fungible and politically motivated. In his study, Boone (1995) tries to find out how different political regimes would utilize aid. The author separates the economies intro three different regimes, i.e. egalitarian, elitist and laissez faire and studies how these three different regimes would use foreign aid. He takes data from 96 countries and tests the data on reduced form equations of non-military aid. He finds that elitist political regimes best predict the impact of aid. However, he finds that in general, aid does not significantly increase investment and growth nor does it benefit the poor by improving human development indicators. One important caveat that the author notes is that in small countries, where the aid/GNP ratio is large, aid leads to higher investment probably because aid is not fungible in these countries. A possible shortcoming of the study by Boone (1995) could be that the author focuses on three distinct regimes and assumes that all the economies fall in one of the three regimes. However, it could be that there are more regimes than those mentioned by the author. In addition, it could be that a certain country is not purely defined by one regime.

Arguably one of the most influential studies on the aid-growth nexus was by Burnside & Dollar (2000). The paper uses a new database of foreign aid developed by the World Bank to examine the relationships among foreign aid, economic policies and growth per capita GDP. The new database includes the grant components of concessional loans to provide a truer estimate of foreign aid. Using a panel of 56 countries in six four-year time periods, the study seeks to answer two fundamental questions: (1) is the effect of aid on growth conditional on economic policies? And (2) do donor governments and agencies allocate more to countries with good policies? The authors come up with a growth equation, and aid equation as well as a policy index and conclude that on average aid had little impact on economic growth. However, in the presence of good policy environments, aid had a significant positive impact on growth. With regard to the authors' second question, they find that there is no significant tendency for aid to favor good policy. His suggestion therefore was that donors should focus more on recipients that are efficient and have good policies in place to make use of the aid as effectively as possible. The authors, at the end of the paper, note that there is a marked trend towards better policy among poor countries, signifying that the climate for effective aid is improving. However, when estimating and explaining the allocation of aid, the authors use standard OLS and as such assume that policy as well as all other variables used in the equation is exogenous which may be inaccurate.

However, a study done by Easterly & Roodman (2004) reassesses the links between aid, policy and growth using more data than Burnside and Dollar (2000). Easterly and Rodman (2004) therefore add more countries to the database and extend the time period for the data as well. The study reduces the confidence that one can have in the conclusions that aid promotes growth in countries with good policy and cautions against relying on the conclusions made by Burnside & Dollar (2000). The authors do not argue that aid is ineffective. All they do is make a limited claim. This is because they found that adding additional data to the Burnside & Dollar (2000) study raises new doubts about the effectiveness of aid even in the presence of good policies. The suggestion therefore is that more studies should be done on various macroeconomic questions surrounding foreign aid and trying to find out if certain foreign aid delivery mechanisms work better than others. However, this study,

aside from the fact that additional data was used seems to follow the same methods as those used by Burnside and Dollar (2000) and as such may have failed to take into account that not all the variables in the regression are necessarily exogenous.

Hansen and Tarp (2000) in a paper dubbed "Aid Effectiveness Disputed" contribute to the debate generated by Burnside & Dollar (2000) by reevaluating the literature on the aid-growth as well as the aid-investment relationships. He separates the aid-growth literature into three distinct generations i.e. the first, second and third generations. The first generation of studies focuses on aid, savings and growth. The second generation of studies focus on aid, investment and growth while the third generation studies focus on aid, policy and growth. The authors goes further and uses an analytical framework to try and find out the impact of aid on growth taking into account the policies of the different countries in the sample. Hansen and Tarp (2000) find that aid has a robust positive impact on growth even in countries hampered by unfavorable policy environment. This conclusion contradicts the conclusions made by Burnside & Dollar (2000) as the latter assume that there can only be a positive impact of aid on economic growth and investment if there is a good policy structure. Hansen and Tarp (2000) however note that while they do not find evidence that presence of sound policy is crucial for aid to be effective, sound policy may have a positive impact on the marginal productivity of aid. In my opinion, however, it could be that the conclusions of Hansen and Tarp (2000) only differed from those of Burnside and Dollar (2000) due to the sample of countries chosen.

Minoiu & Reddy (2010) performed a cross-country analysis on the impact of aid on growth between 1960 and 2000 where they disentangle aid into two different components i.e. development and non-development aid. They account for the common problem of endogeneity in the aid growth nexus by using lagged values of aid. The study also makes use of control variables such as initial per capita income and initial level of life expectancy to avoid bias due to omitted variables. Minoiu and Reddy (2010) find that development aid has a robust positive impact on economic growth but that non-development aid has no impact on economic growth. The policy implication therefore is that an increase in aid and a change in the composition of aid to favor development aid is likely to lead to sizeable returns in

the long run. This study however uses a proxy for development aid donors due to data limitations. This proxy estimation could have been a cause of errors that ultimately could have led to spurious conclusions.

In a sample splitting study done by Kourtellos, Tan & Zhang (2007) the authors find that there is a non linear relationship between aid and growth and if anything, the relationship could be weakly negative. However, the authors use two controversial methods i.e. the Bayesian Tree Regression and the threshold regression. There is a possibility that the results of their study suffer from endogeneity bias because sample-splitting methods do not allow for the use of instrumental variables in the regression. Mallik (2008) says that aid has a long-term negative impact on economic growth but that, in the short run, aid has no impact on growth. However, the author does not analyze the reasons for the negative impact of aid on growth.

Kodama (2012) goes further in the contribution to the aid-growth debate by focusing, not only on the impact of aid on growth, but also on the impact of aid unpredictability on economic growth. The author finds that aid has a positive impact on economic growth. However, he finds that aid unpredictability has a negative impact on growth. In his study he finds that due to the unpredictability of aid in most developing countries, about one fifth of aid goes to waste. He says this waste is due to the extent of assymetricity in the investment responses to shortfalls and windfalls of aid.

Askarov & Coucouliagos (2015) use two different models to analyze the impact of aid on growth i.e. The Burnside & Dollar (2000) model and the Barro Type Model (1996) in transitioning countries. The BD approach uses the reasoning applied by Burnside and Dollar (2000) where they create a policy index. The Barro model relates the real per capita growth rate to two categories of variables i.e. state variables and policy and institutional variables. The authors chose to focus on transitioning countries to avoid the heterogeneity that is involved in cross country studies. In order to address endogeneity in the BD model, the study employs time fixed effects, includes country-specific recession indicators, adopt instrumental variables and lag aid using time-averaged data. The results differ when the same analysis is done using the two different models. When the Barro model is used,

there seems to be robust positive impact of aid on economic growth. However, when the Burnside & Dollar model was used the results suggested that aid has a negative impact on growth. This could have been as a result of endogeneity bias, which was accounted for only in the Barro Type Model.

Arndt, Jones & Tarp (2015) sought to find out the long run contribution of foreign aid to growth and development. The study focuses on the period between 1970 and 2007. This study contributes to literature by widening the scope of evaluation by including proximate sources of growth such as human capital and indicators of social welfare such as poverty and infant mortality rate. The authors find a robust positive impact of aid on economic growth. However, the authors note that while this is the case, aid does not have an effect on reducing the inequality in developing economies. Unlike the Burnside and Dollar model used by Askarov & Coucouliagos (2015), the Structural Causal Model used by Arndt et all (2015) corrects for endogeneity. The main conclusion of the study is that the magnitude of the estimated effects of aid is generally moderate but become more material over the long run. The author therefore states that aid should not be considered as a panacea for stimulating growth and development. However, the authors include certain variables that may be difficult to measure and quantify such as economic transformation.

A study done by Heckleman & Knack (2009) looks at the effectiveness of aid from a different perspective. Their objective is to find out how effective foreign aid is in boosting economic freedom. However, he notes that economic freedom indirectly implies that there is development as well as economic growth. The conclusion of the study is that donor aid programs appear to be ineffective in encouraging general market oriented institutional and policy reforms. However, using what he termed as a hedonic index, he finds that aid levels are positively related to improvements in such an index, where more weight is given to those areas of economic freedom that are linked to economic growth.

In addition to looking at economic freedom as was done by Heckelman & Knack (2009), some studies in the aid growth debate choose to focus on aid proliferation and how this proliferation affects economic growth. Aid proliferation is a situation

whereby the efficiency of capital inflows can be undermined significantly due to aid bombardment. This bombardment occurs where large numbers of donors and projects overwhelm the recipient government's capacity to manage and administer aid. (Kimura, Mori, & Sawada, 2012). Kimura et al. find that aid proliferation has a negative effect on the economic growth of recipient countries. Reasons such as increased transaction costs and increased administrative burdens are given to explain the conclusions given.

Yet another angle of looking at the aid growth nexus has been discussed by Lessmann & Markwardt (2012). The authors chose to look at the impact of aid on growth focusing on the level of devolution in the recipient countries. They therefore seek to establish if the level of decentralization in recipient economies helps to boost aid effectiveness. Their findings however, show that aid is more effective in centralized economies rather than in decentralized ones. This study has policy implications such that donor countries should carefully consider how aid and decentralization interact to ensure that they give aid to countries where it will be effective.

Closer to home, a study done by Fasanya & Onakoya (2012) seeks to establish whether foreign aid accelerates economic growth in Nigeria. The authors use data during the period 1970-2010. The authors employ neoclassical modeling techniques where the main variables are output, capital, labour, knowledge and effectiveness of labour and use this neoclassical technique to come up with a growth equation. The analysis finds that aid has a significant impact on economic growth. Fasanya and Onakoya (2012) also find that domestic investment increased in response to the aid flows. They also agree with the conclusions of Burnside & Dollar (2000) that aid works better in a good policy environment and as such donors should be aware of the political situations in recipient countries.

In the Kenyan context, one prominent study is the one carried out by Ojiambo (2013). The aim of the study was to find out: (1) the effect of foreign aid on economic growth, (2) the effect of foreign aid on public investment, (3) the effects of foreign aid predictability on investment and economic growth and (4) the fungibility of foreign aid in Kenya between 1966 and 2010. With regards to the impact of foreign

aid on economic growth, the author defines economic growth as the growth in the GDP levels of the country. The author employs an Error Correction Model (ECM) to estimate the short run impact of foreign aid on growth and investment. For the long run impact, Ojiambo (2013) uses an autoregressive distributed lag model (ARDL). The author finds that aid has a positive impact on aid and growth both in the long run. As would be expected, the author finds that aid unpredictability makes aid less effective in boosting growth and investment. However, Ojiambo (2013) focuses on aid on an aggregate level. My study aims to perform the study on a sectoral level, which will give a more precise analysis on how effective foreign aid to each sector is instead of coming to a generalized conclusion.

In another Kenyan study carried out by M'Amanja & Morrisey (2002) disagree with the findings of Ojiambo (2013). The authors seek to find out the link between foreign aid, investment and economic growth. One of their main objectives was to find out the drivers of economic growth and as such find out if foreign aid has a positive impact on economic growth. They also sought to establish if foreign and has a positive impact on public investment and further, to find out if public investment has an effect on economic growth. The authors employ a time series approach employing a Vector Error Correction Model (VECM), which differs from the model used by Ojiambo (2013). The authors find that aid in the form of external loans is found to have a significant negative impact on long run growth. The author makes a makes the conclusion that in order for Kenya to foster and sustain growth, closer attention should be given to factors that promote private investment. Just like the study done by Ojiambo (2013) this study only focuses on aggregate aid.

2.4.2 Foreign Aid and Public Investment

Foreign aid is intended to boost public investment and as such most aid is earmarked for specific investment purposes. Just like the aid-growth debate, there are divergent opinions on what the impact of aid on public investment is. Some authors think that aid is fungible in nature. Fungible aid refers to aid that is used for purposes other than the purposes it was invented to. This means that there is a possibility that the aid could be used for consumption rather than investment purposes. Other authors however, have found that aid has a positive impact on

public investment. However, less literature is available on the impact of foreign aid on public investment than there is on the aid-growth debate.

Heller (1975) performed a cross-country time series analysis of eleven African countries' public sectors in the post independence period. The author distinguishes between alternative types of aid (grants vs. loans) and also between alternative sources of aid (bilateral vs. multilateral). Heller (1975) finds that there is a positive impact of aid on public investment. In addition, it is found that foreign aid facilitates a reduction in the level of domestic taxes as well as borrowing. However, he finds that these responses vary according to the type of aid. He finds that grants have a stronger pro-consumption bias whereas loans are more pro-investment. Finally, the author does not find the assertion that multilateral aid has a stronger impact on investment than bilateral aid to hold. The model used by Heller (1975) makes use of utility functions and as such assumes that all the countries, and by extension, all the inhabitants of these countries follow the same utility function. In addition, the utility function is relatively simple because it is additive and highly aggregative and as such could have led misleading results.

Chatterjee, Sakoulis & Turnovsky (2003) contrast the effects of a transfer tied to investment in public infrastructure from a traditional pure transfer in a small economy. The authors considered both permanent and temporary transfers for purposes of the research. The main conclusion of the paper is that there is a sharp contrast in the effects of pure transfers and the tied transfers program. The authors state that tied or earmarked aid has a positive impact on public investment. Traditional pure transfers have no effect on growth neither do they have any other dynamic consequences. The implication of this study, therefore, is that aid should be tied and that the donor economy should be careful to ensure that it has accurate information on the recipient economy. This study however, only focuses on a small economy and as such there is no feedback from the recipient to the donor economy. There is therefore need to analyze the impact of a larger economy to establish the validity of the authors' findings.

Gang & Khan (1991) performed a similar study to the one by Heller (1975) only this time in India. The authors make use of behavioral equations derived from a

maximizing framework and correct for econometric and data inadequacies of earlier models. The authors use a two-step procedure that involves: (1) determining the effect of aid on public investment, taxation and government consumption; and (2) estimating the impact of public investment on development variables such as growth. Gang and Khan (1991) partly agree with Heller (1975) in concluding that there is a positive relationship between bilateral aid and public investment. The authors find no evidence of leakage into consumption. The study go further to assert that bilateral aid even pulls resources out of consumption and puts them into development projects. In contrast to previous studies, Gang and Khan (1991) find that grants, loans and multilateral aid have no significant effect on government consumption items. However, as the study warns, India had had an unusual emphasis on public investment and as such we should not be quick to generalize based on their findings.

White (1992) writes a paper commenting on the paper by Gang and Khan (1991). The author begins by stating that the model used by Gang and Khan is an incorrect statement of the fungibility problem. The author goes further to state that Gang and Khan misinterpreted their own results and that they ignored the reduced form equations and reduced the implicit dynamic element. White (1992) therefore concludes that aid has no effect on investment at all unlike Gang and Khan (1991) who find that the Indian government channels all the aid to investment. White therefore proposes that, among other things, there should be development of a theoretical model that accurately captures the relationship between fungibility and tying.

Feeny & McGillivray (2010) also find contradicting result find that the public sector is poorly performing and that aid is allocated to consumption expenditure and financing shortfalls in the recurrent expenditure. They also find that aid is displacing other current revenue. The study focuses on countries considered to be fragile or failing more so Papua New Guinea between 1962-2000. An important contribution that the paper makes is to allow for asymmetric preferences. Even though the authors state that there were some pleasing results when it came to the impact of aid on fixed investment, the overall picture was that of aid ineffectiveness in Papua New Guinea.

Mosley, Hudson & Horrell (1987) carry out a study on foreign aid, the public sector and the market in less developed countries. The study finds that there is a negative relationship between aid and public investment. He says that there is a high possibility of leakages into non-productive expenditure in the public sector. The authors go ahead to suggest that donors should only give aid to countries where aid effectiveness is high in terms of boosting public investment.

A study done by Museru, Oerien &.Gossel (2014) focuses on the impact of foreign aid on economic growth, and how public investment affects the effectiveness of this foreign aid in boosting economic growth. Using data from 26 countries in Sub Saharan Africa, the authors found that aid has a positive impact on economic growth but that volatility in public investment eroded the impact of foreign aid on growth. They go further to conclude that the negative impact caused by public investment volatility in turn may be linked to volatility in government revenues and aid itself. However, the authors fail to disaggregate the public investment into their respective sources such that we can easily see what the impact of specific public investment volatility is on aid effectiveness.

2.4.3 Aid Fungibility, Public Expenditure and Economic Growth

Development assistance targeted to specific sectors is not always used as intended i.e. aid is fungible. (Petterson, 2004)

Pack & Pack (1990) did one of most influential studies on the effectiveness of aid on public expenditure with a focus on fungibility. According to Bauer (1972) aid is fungible when governments are able to subvert the sectoral distributions of expenditure desired by foreign donors. Pack and Pack focused on the economy of Indonesia and aimed to find out: (1) the impact of changes in total foreign aid on total public expenditure; (2) the effects of aid given for specific categories of public expenditure on those types of expenditure; (3) the fungibility of categorical foreign aid among public expenditure categories and (4) the effect of aid on revenue-raising efforts. The study involved a high level of disaggregation as opposed to many previous studies on the fungibility of foreign aid. The authors separated their models into non-development current expenditure, development expenditure and

government revenues. The conclusion was that most of the sectoral foreign aid was used for the right purposes and that it had a strong positive relationship with development expenditure in their respective sectors.

Feyzioglu, Swaroop & Zhu (1998) made contradicting conclusions to those of Pack & Pack (1990). Feyzioglu et al performed a cross-country study between 1971 and 1990 and state that the link between public expenditure and foreign aid is not a straightforward one because in most developing countries, aid is fungible in nature. However, he notes that public expenditure is one of the main channels through which aid influences development outcomes. The conclusion is that most sectoral aid in developing countries is fungible and therefore it doesn't have a direct impact on public investment. One assumption that the authors of this paper make is that there is a constant fungibility factor that is the same for all the development aid. This may not very accurately reflect the market because while aid might be fungible, the factor may not necessarily be the same for all the aid received by the country.

A study done in Kenya by Njeru (2003) also focuses on fungibility as was done by Pack & Pack (1990) and Feyzioglu (1998). This was a country specific study that was done using data between 1970 and 1999. The model implemented by the author is a variant of the one used by Pack and Pack (1990). Njeru (2003) finds that there is a positive and statistically significant relationship between GDP and net overseas development assistance. However, the author finds that foreign aid finances general government spending and not the targeted development activities and as such concurs with Feyzioglu et al. (1998). Njeru (2003) finds that at the aggregate level, aid is more fungible in the short run than in the long run. However, this study mostly focuses on aggregate sources of revenue and expenditure as opposed to the sectoral level.

Devarajan, Rajkumar & Swaroop (1991) set out to find out: (1) the extent of aid fungibility in Sub-Saharan Africa; and (2) reasons why aid is fungible or not. The authors find that the broad pattern of aid fungibility in cross-country and country-specific studies is reflected in the authors' analysis of Sub-Saharan Africa. They find that some aid goes towards repaying the principal on past loans. They also find that as the number of donors to a country increases, aid is more likely to be fungible.

Petterson (2004) contributes to the debate on aid effectiveness by stating that fungibility of aid is not a central concern in the aid debate and practice because it is too narrow. The author begins by arguing that fungible aid should be less productive than non-fungible aid. The author assesses the impact that both non-fungible and fungible aid has on public expenditure as well as economic growth. The conclusion is that there is no evidence that non-fungible aid works better than fungible aid and that the results are very dependent on the specifications made.

3 METHODOLOGY

3.1 Introduction

This chapter presents the methodology for this study. The purpose of this study was to find out: (1) the overall impact of foreign aid on economic growth; (2) the impact of sectoral aid on sectoral growth and (3) the impact of aggregate aid on public investment. This methodology followed the structure of the study by Ojiambo (2013) with the most significant difference being that the part of the analysis is done on a sectoral level as opposed to an aggregate level.

3.2 Research Design

This research employs a quantitative approach to test the research hypotheses. The study used time series data covering the period between 1980 and 2014 for the following variables: GDP Growth, Public Investment, Private Investment, Foreign aid (commitments and disbursements), and a composite Policy variable as a proxy for macroeconomic policy environment (inflation, final government consumption and degree of openness). Data collected from secondary sources including OECD and World Bank. An ARDL model was employed to test the long run and short run impact of aid on economic growth and public investment both on an aggregate and sectoral level after undertaking time series property tests on all the data collected.

3.3 Model Specification and Estimation

3.3.1 Theoretical Underpinning

The variables for the growth equation were inferred from the Solow- Swan Cobb-Douglas growth model of the form: $Y = AK^{\alpha}L^{1-\alpha}$ where Y is output, A is total factor productivity, K is capital and L is labour. This is an advancement of the Harrod Domar model.

In the percapita form, the model can be shown to be: $= AK^{\alpha}/L^{\alpha} = A(K/L)^{\alpha}$which leads to a growth function of the form: $\frac{dY}{Y} - \frac{dL}{L} = \frac{dA}{A} + a(\frac{dK}{K} - \frac{dL}{L})$. The above model will thus be modified to include Aid, as well as other variables that explain growth such as Policy and Foreign Debt.

The policy variable and an interaction between Aid and Policy were included in light of the conclusion by Burnside and Dollar (2000) that foreign aid is efficient only in the presence of a good policy environment.

3.3.2 Variables

The independent variables used in this research are: Private Investment $(Capital\ Formation - Public\ Investment)$, Foreign Debt, Policy, Foreign Aid (aggregate and sectoral), Interaction between Foreign Aid and Policy, and Tax while the dependent variables are: Real GDP growth (aggregate and sectoral) and Public Investment (aggregate).

The growth behavioral equation and the investment equations to be adopted were of the form:

$$Yp = y[Pinv, Aid, Fdebt, Policy, Aid * Policy] \quad (3)$$

$$Pubinv = p[Pinv, Aid, Tax, Fdebt, Policy, Aid * Policy] \quad (4)$$

Where Labour is the total number of people either working or looking for jobs, Pubinv is public investment, Pinv is private investment, Fdebt is foreign debt, Policy is the macroeconomic policy index proxy, Aid is foreign aid including commitments and disbursements, and Aid*Policy is the interaction between foreign aid and policy. Pinv is the Private Investment variable which will be calculated as $Gross\ Captial\ Formation - Public\ Investment$. The Gross Capital Formation was decomposed and only the Private Investment part of the Capital Formation was used in the growth behavioral equation. This is because it has been found that including public investment in the growth behavioral equation leads to a problem of double counting because public investment has been found to be financed largely by other variables such as foreign aid and foreign debt. (Ojiambo, 2013).

The sectors that were analyzed in this study were: Tourism, Economic Infrastructure, Production, Transport and Communication, Energy and Education. These sectors were chosen based on the availability of data on sectoral GDP contribution as well as sectoral aid.

3.3.3 Constructing the Macroeconomic Policy Index

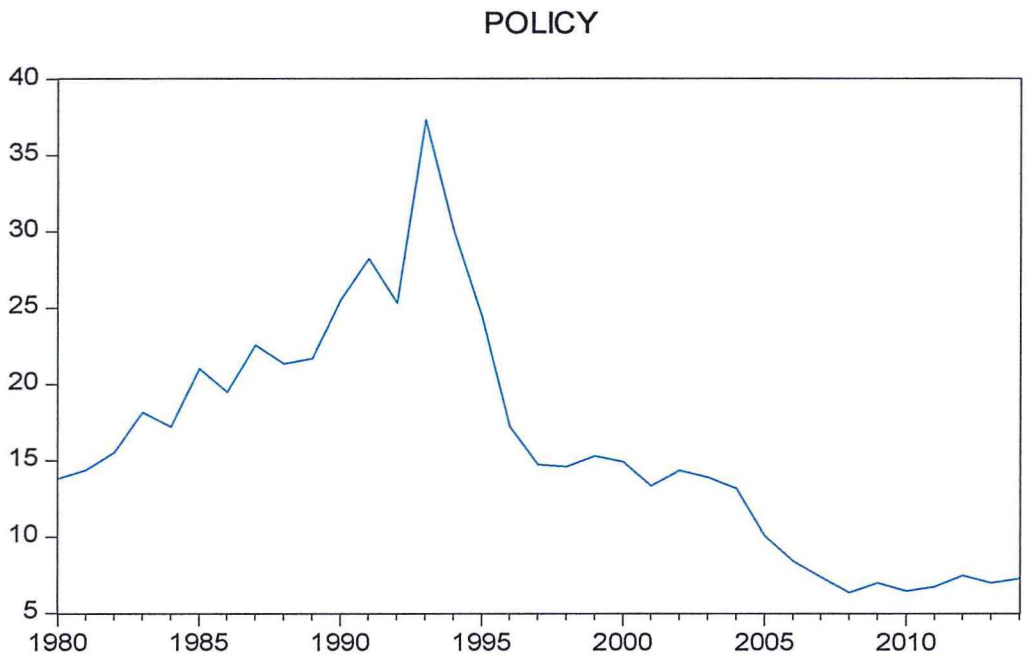
According to Burnside and Dollar (2000), a good policy and macroeconomic environment is necessary for aid effectiveness. As such, the study used a regression involving final government consumption which proxied fiscal policy and inflation which proxied monetary policy. The trade policy was proxied by trade openness

measure which is given by $\frac{imports+exports}{GDP}$. The policy index was therefore based on the equation:

$$PolicyIndex = \alpha_1 INF + \alpha_2 FCG + \alpha_3 OPEN \quad (5)$$

Where INF is inflation, FCG is final government consumption and OPEN is the degree of openness measure. Figure 2 below shows the evolution of the macroeconomic policy.

Figure 2- Macroeconomic Policy Index (1980-2014)



3.3.4 Empirical Model

The long run equation was estimated using the Autoregressive Distributed Lag model (ARDL) suggested by Pesaran (2000). This was done using two equations, one for each of the dependent variables:

$$lnYp_t = \beta_0 + \sum_{i=o}^{p} \beta_1 ln\, Yp_{t-i} + \sum_{i=0}^{q_6} \beta_2\, lnPinv_{t-i} + \sum_{i=0}^{q_2} \beta_3 ln\, Aid_{t-i} + \sum_{i=0}^{q_3} \beta_4 ln\, Policy_{t-i} + \sum_{i=0}^{q_4} \beta_5\, lnAid_{t-i} * Policy_{t-i} + \sum_{i=0}^{q_5} \beta_6 ln\, Fdebt + \varepsilon_t \quad (6)$$

$$lnPubinv_t = \beta_0 + \sum_{i=0}^{s_2} \beta_1 ln\, Aid_{t-i} + \sum_{i=0}^{s_3} \beta_2 ln\, Policy_{t-i} + \sum_{i=0}^{s_4} \beta_3\, lnAid_{t-i} * Policy_{t-i} + \sum_{i=0}^{s_5} \beta_4 ln\, Fdebt + \varepsilon_t \quad (7)$$

Where q and s represent the lag lengths for each of the variables.

Regressions (6) and (7) above were run for both the aggregate analyses. The sectoral models included the log of GDP for each of the sectors as the the dependent variables while the independent variables were the values of aid channeled to the different sectors, policy and the interaction between aid and policy:

$$lnYp_t = \beta_0 + \sum_{i=0}^{q_2} \beta_1 ln\, Aid_{t-i} + \sum_{i=0}^{q_3} \beta_2 ln\, Policy_{t-i} + \sum_{i=0}^{q_4} \beta_3\, lnAid_{t-i} * Policy_{t-i} + \varepsilon_t$$

3.3.5 Justification of the ARDL Approach

The ARDL model was chosen for this study for a number of reasons. First, the ARDL model employs a single reduced form equation as opposed to the conventional cointegration approach, which estimates long term relationships using a system of equations. The approach also yields precise estimated of both short and long run parameters and valid statistics even in the presence of endogenous variables. This was particularly helpful in this study. Finally, the ARDL model allowed us to use different optimal lags that could be used with limited data, making it quite suitable for this study as well.

3.4 Definition and Measurement of Variables

Table 1-Variable Definition

VARIABLE	DEFINITION, MEASUREMENT & A PRIORI EXPECTATIONS
Per capita GDP (Yp)	Real income per sector divided by the population. This is the measure of economic growth. It is expected that per capita GDP should increase with increase in Foreign Aid.
Private Investment (Pinv)	An injection of capital into a business from a private investor. It was proxied by the gross capital formation less public investment. It is expected that an increase in private investment leads to an increase in per capita output.
Public Investment (Pubinv)	Development Expenditure per sector. It is expected that an increase in foreign aid will increase public investment in the given sectors given that there is no fungibility.
Foreign Aid (Disbursements and Commitments) (FAid)	Official Development Assistance (ODA), which included all loans with a grant component above 25 per cent, collected per sector. This variable could either have a positive or negative impact on economic growth and

	public investment.
Foreign Debt (FDebt)	The stock of resources borrowed externally by the Government. This variable, just like aid, could either have a positive or negative impact on foreign aid and public investment.
Policy Index	This was constructed from selected macroeconomic trends i.e. inflation (monetary policy), degree of openness (trade policy) and final government consumption (fiscal policy). It is expected that a good macroeconomic policy will have a positive impact on economic growth and public investment and that an unstable environment will have the positive effect.
Policy interacted with Foreign Aid (Policy*Aid)	This was constructed through interacting the foreign aid variable (Aid) with the policy Index (POLICY). This was computed as (Aid*Policy). It is expected that the interaction between Aid and Policy will yield a positive effect on both economic growth and public investment.
Inflation (INF)	A rise in the general prices of goods and services in the economy. It was measured as the change in the Consumer Price Index. It will be used to construct the policy index.
Openness (OPEN)	The extent to which countries permit trade with other countries. It was measured as the summation of exports and imports as a share of GDP. It will be used to construct the policy index.
Final Government Consumption (FCG)	A transaction of the national account's use of income account representing government expenditure on goods and services that are used for the direct satisfaction of individual needs or collective needs of members of the community. It was also used to construct the policy index.

3.5 Data Types and Choice of Sources

The study made use of secondary sources of data for the analysis covering the period 1980 - 2014.

The data on real GDP, degree of openness (a function of imports and exports), final government consumption expenditure and private investment was retrieved from

the World Bank, Africa Development Indicators database. Data on the aforementioned variables was taken from the World Bank, Africa Development Indicators database because it includes data on all these different variables for the specified time period. This reduced the probability of estimation errors that come with acquiring data from many different sources. The World Bank can also be seen as a relatively reliable source.

Data on inflation was also retrieved from the World Bank database. This is because the site gives annual inflation statistics using the Laspeyres Inflation formula, as opposed to other sources such as KNBS, which give month-by-month statistics, which then have to be averaged on an annual basis for this study.

The study also made use of the Economic Surveys. Data on sectoral growth was retrieved from this source particularly because the Economic Surveys disaggregate the data into the growth contributions by each sector in the economy. Data on gross capital formation was also retrieved from this source.

Finally, sectoral foreign aid data was acquired from the United Nations Conference on Trade and Development (UNCTAD) online database. The UNCTAD database disaggregates foreign aid per sector and as such was very helpful for the purpose of this study.

4 DATA ANALYSIS AND PRESENTATION OF RESULTS

4.1 Introduction

This chapter presents the empirical findings of this study. The sections in this chapter have been divided based on the different empirical tests and models that were carried out towards achieiving the research objectives of this study.

Due to limited data points, lags were restricted to between 2 and 3 depending on the regression.

4.2 Stationarity Tests

Each of the variables in the study was tested for stationarity using the Augumented Dickey Fuller test (ADF) using the Schwarz Information Criterion (SIC) incorporating a trend.

According to the ADF tests carried out, all the variables were found to be I (1) in their natural logarithm form except the log of Private Investment, the log of Aid to the Education sector and the log of Aid to the Production sector which were found to be I (0). This implies that an ARDL could be used to estimate the model as all the dependent variables were (1) and all independent variables were either I (0) or I (1). The results of this analysis are shown in Appendix 2.

4.3 The Long Run and Short Run Dynamics - Aggregate Analysis

Table 2 and 3 show the short run and long run dynamics of the growth equation using aggregate aid while Table 4 and 5 show the short run and long run dynamics of the investment equation. In the error correction model tables, the changes in the different variables were used to capture the short run dynamics.

Table 2-Growth Error Correction

Variable	Coefficient	P-Value
DLOG(YPC(-1))	0.703607	0.0049
DLOG(AID)	0.075762	0.0025
DLOG(AID(-1))	0.022535	0.2819
DLOG(AID(-2))	-0.041874	0.0262
DLOG(FDEBT)	0.039931	0.8060
DLOG(FDEBT(-1))	0.015992	0.7759
DLOG(FDEBT(-2))	-0.062292	0.1169

DLOG(PINV)	0.023346	0.2770
DLOG(POLICY)	0.009748	0.9443
D(AID * POLICY)	-0.000213	0.0568
D(AID(-1) * POLICY(-1))	0.000031	0.7558
D(AID(-2) * POLICY(-2))	0.000154	0.0601
D(@TREND())	0.001722	0.1433
CointEq(-1)	-0.532332	0.0023

In the short run, the independent variables have an insignificant impact on the per capita GDP except Aid interacted with Policy, which is negative and significant at a 10% significance level. According to Granger (1988) a significant coefficient of the error correction term indicates long run Granger causality running from the explanatory to the dependent variables. The coefficient of ECM (-1) in the model was found to be -0.532, which implies that the deviation from the long-term in economic growth is corrected by 53 per cent in the coming year. This figure is higher than that found by Ojiambo (2013) of 0.39, which the author deemed to be relatively slow as a result of structural rigidities.

Table 3-Growth Long Run Coefficients

Variable	**Coefficient**	**P-Value**
LOG(AID)	0.222939	0.0020
LOG(FDEBT)	0.499852	0.2274
LOG(PINV)	0.043857	0.3270
LOG(POLICY)	-0.392469	0.1850
AID*POLICY	-0.000862	0.0732
C	4.534055	0.0003

According to the results in Table 3 above, aid has a positive and significant impact on growth in the long run. A 1% increase in foreign aid increased GDP by 0.22%. Foreign debt is found to not be significant in boosting economic growth although its impact is positive. Additionally, the results show that Private Investment also has a postive impact on growth although the relationship is not significant. When aid is interacted with policy, its impact on economic growth becomes negative at a 10%

significance level implying that the macroeconomic policy environment in Kenya is unstable. This is further proven by the negative coefficient of the policy variable.

Table 4- Public Investment Error Correction

Variable	Coefficient	P-Value
D(POLICY)	-0.337230	0.6610
D(POLICY(-1))	1.520037	0.1013
D(AID)	0.939197	0.0319
D(FDEBT)	0.110226	0.6837
D(FDEBT (-1))	-0.434692	0.1216
D(AID*POLICY)	-0.017771	0.3312
D(@TREND())	0.111826	0.0528
CointEq (-1)	-0.784203	0.0003

Similar to the growth equation, the error correction term in the above short run model is negative and significant which indicates that there is a steady long run relationship between the independent variables and public investment. In particular, it suggests that the deviation from the long term is corrected by 78% in the following year. This is much higher than the speed of adjustment in the growth model which was 53% which could mean that the long term relationship between the dependent variables and public investment is much stronger than that of the growth equation.

Foreign aid is found to have a positive and significant impact on public investment in the short run at a 5% significance level while all the other independent variables are insignificant.

Table 5- Public Investment Long Run Coefficients

Variable	Coefficient	P-Value
LOG(POLICY)	-2.891552	0.0004
LOG(AID)	1.197646	0.0099
LOG(FDEBT)	0.840483	0.0011
(AID*POLICY)	-0.022661	0.2973
C	-0.661975	0.8866
@TREND	0.142598	0.0319

The long run investment equation suggests that aid also has a positive and significant impact on public investment in the longer term. Particularly, a 1% increase in foreign aid has the potential to increase public investment by 1.19%. Additionally, foreign debt has a positive and significant impact on public investment. These findings could imply that public investment in the Kenyan economy is majorly funded by foreign aid as well as foreign debt. Similar to the growth equation, the coefficient of the policy variable is negative, further bringing out the instability of the macroeconomic policy environment in Kenya. Consequently, the interaction between aid and policy yields a negative albeit insignificant coefficient.

4.4 The Long Run and Short Run Dynamics – Sectoral Analysis

This section provides the results from the analysis of the impact of sectoral foreign aid on the growth of the respective sectors. The output is shown in Tables 6 through to 11.

The first section of each table represents the short run or cointegrating equation while the second section represents the long run coefficients in each of the models.

4.4.1 Transport & Communication Sector

Table 6- Long Run and Short Run Dyanamics- Transport Sector

Variable	Coefficient	P-Value
DLOG(GDP(-1))	0.528751	0.0025
DLOG(GDP(-1))	0.367930	0.0382
DLOG(AID)	-0.001247	0.0629
DLOG(POLICY)	0.256597	0.0038
DLOG(POLICY (-1))	-0.136327	0.0630
D(AID*POLICY)	0.000148	0.2552
D(@TREND())	0.003738	0.0076
CointEq (-1)	-0.232710	0.0054

Variable	Coefficient	P-Value
LOG(AID)	0.001882	0.5273
LOG(POLICY)	-0.092199	0.4415
AID*POLICY	0.000637	0.1437

C	4.335644	0.0000
@TREND	0.016061	0.0000

The short run dynamics in the transport sector suggest that in the short term, foreign aid has a negative and significant impact on the growth of the transport sector. However, policy has a positive and significant impact on growth and consequently, the interaction of policy and aid also yields a positive coefficient. This finding contradicts the findings in the aggregate analysis which show that policy has a negative impact on growth. This could be attributed to data constraints.

The ECM coefficient is -0.232 and significant. This implies that any deviations from the long term are corrected by 23% in the following year. This is a relatively slow speed of adjustment and could be attributed to the structural rigidities in the sector.

Contrasting results are however found in the long run. The output suggests that the impact of aid on growth of the transport sector becomes positive although the relationship is not significant.

4.4.2 Tourism Sector

Table 7- Long Run and Short Run Dynamics- Tourism Sector

Variable	Coefficient	P-Value
DLOG(AID)	-0.020098	0.0000
DLOG(AID(-1))	0.009076	0.0198
DLOG(AID(-2))	-0.008041	0.0105
DLOG(POLICY)	0.493753	0.0000
D(AID * POLICY)	-0.038909	0.0030
D(AID(-1) * POLICY(-1))	-0.008493	0.4975
D(AID(-2) * POLICY(-2))	0.024416	0.0157
D(@TREND())	0.010086	0.0107
CointEq(-1)	-0.336870	0.0113

Variable	Coefficient	P-Value
LOG(AID)	-0.035943	0.0014
LOG(POLICY)	0.443532	0.0013
AID*POLICY	-0.071388	0.0135

C	3.045754	0.0000
@TREND	0.029940	0.0000

Contrary to the findings in the transport sector, the study finds a significant relationship between the explanatory variables and growth in the tourism sector in the short run. Aid is found to have a negative impact as is the interaction between aid and policy. The speed of adjustment according to the short run model of the tourism sector is slightly higher than in the transport sector model at 33.6%. This could mean that the long term relationship between aid and growth in the tourism sector is marginally higher than in the transport sector.

The long run coefficients suggest that aid has a negative and significant impact on growth of the tourism sector. A 1% increase in foreign aid is likely to lead to a reduction in growth by 0.03%. This could possibly be because of misappropriation of donor funds in this sector, probably due to lack of monitoring.

4.4.3 Economic Infrastructure

Table 8- Long Run and Short Run Dynamics- Economic Infrastructure

Variable	Coefficient	P-Value
DLOG(GDP(-1))	0.525444	0.0011
DLOG(AID)	-0.008596	0.4379
DLOG(POLICY)	0.956878	0.0017
D(AID * POLICY)	-0.000221	0.0880
D(AID(-1) * POLICY(-1))	0.000220	0.0611
D(@TREND())	0.006925	0.0120
CointEq(-1)	-0.314616	0.0011

Variable	Coefficient	P-Value
LOG(AID)	0.111366	0.0313
LOG(POLICY)	-0.822999	0.0001
AID*POLICY	-0.000804	0.1559
C	4.847570	0.0000
@TREND	0.022010	0.0000

The short run dynamics of the economic infrastructure model suggest that aid is insignificant in boosting growth of the sector. The reason for this finding could be

that it takes time for the impact of aid to be realized in the economic infrastructure industry. In line with a priori expectations, the error correction term in the short run model in this sector is negative and significant suggesting a stable long run relationship. The study finds that deviations from the long term are corrected by 31% in the following year.

In the long run, the study finds that aid has a positive and significant impact on growth of economic infrastructure. However, in line with the aggregate findings, interacting aid with the policy variable negates the impact of aid on growth of the sector..

4.4.4 Energy Sector

Table 9- Long Run and Short Run Dynamics- Energy Sector

Variable	Coefficient	P-Value
DLOG(GDP(-1))	0.515939	0.0084
DLOG(GDP(-2))	0.240816	0.0449
DLOG(AID)	-0.006882	0.1193
DLOG(AID(-1))	0.012303	0.0186
DLOG(AID(-2))	0.017773	0.0050
DLOG(POLICY)	0.326633	0.6207
DLOG(POLICY(-1))	-1.664394	0.0127
D(AID * POLICY)	0.000846	0.0000
D(AID(-1) * POLICY(-1))	-0.000222	0.2065
D(@TREND())	0.014946	0.0005
CointEq(-1)	-0.723006	0.0004

Variable	Coefficient	P-Value
LOG(AID)	-0.060344	0.0000
LOG(POLICY)	0.805549	0.0002
AID*POLICY	0.000821	0.0000
C	0.518828	0.1720
@TREND	0.020673	0.0000

In the short run, the study finds that aid is significant in boosting growth of the energy sector. The short run model suggests that there is a significant long run

relationship between the dependent and independent variable with a speed of adjustment is 72%, which is much higher than the speeds of adjustment in both the tourism and transport sectors.

Surprisingly however, the long run model suggests that the impact of aid on growth of the sector becomes negative and significant. The interaction between aid and policy yields a positive coefficient which is different from the aggregate findings as well as the findings in the other sectors. This finding could probably be attributed to data shortcomings.

4.4.5 Education Sector

Table 10- Long Run and Short Run Dynamics- Education Sector

Variable	Coefficient	P-Value
DLOG(AID)	-0.042634	0.4157
DLOG(AID(-1))	0.112780	0.3487
DLOG(AID(-2))	-0.125870	0.0372
DLOG(POLICY)	-0.965696	0.0000
D(AID * POLICY)	0.002379	0.0127
D(AID(-1) * POLICY(-1))	-0.000626	0.7286
D(AID(-2) * POLICY(-2))	0.001998	0.0898
D(@TREND())	0.009695	0.0011
CointEq(-1)	-0.315044	0.0034

Variable	Coefficient	P-Value
LOG(AID)	0.535766	0.0055
LOG(POLICY)	-0.738427	0.0607
AID*POLICY	-0.009858	0.0023
C	4.463422	0.0000
@TREND	0.030772	0.0000

Similar to the findings in the transport sector, the speed of adjustment in the short run model for education sector is quite low at 31%. The cointegrating form of the model suggests that in the short run, aid is insignificant in boosting growth of the education sector.

However, the impact of aid on growth of the sector becomes positive and significant in the long run. The difference between the findings in the short run and the long run suggests that the impact of aid is not realised immediately, at least in the education sector. A 1% increase in foreign aid leads to a 0.53% increase in GDP of the education sector. However, when the aid variable is interacted with policy, its impact in the long run becomes negative which means that the policy environment makes aid to the education sector ineffective.

4.4.6 Production Sector

Table 11- Long Run and Short Run Dynamics- Production Sector

Variable	Coefficient	P-Value
DLOG(GDP(-1))	0.408017	0.0048
DLOG(GDP(-2))	0.380339	0.0232
DLOG(AID)	0.101901	0.0097
DLOG(POLICY)	-0.243313	0.0403
DLOG(POLICY(-1))	-0.006067	0.9714
DLOG(POLICY(-2))	0.183643	0.1051
D(AID * POLICY)	-0.003355	0.0078
D(@TREND())	0.006086	0.0192
CointEq(-1)	-0.321536	0.0203

Variable	Coefficient	P-Value
LOG(AID)	-0.290159	0.2196
LOG(POLICY)	-0.326069	0.1064
AID*POLICY	0.009166	0.2305
C	4.831638	0.0000
@TREND	0.018928	0.0000

Similar to the findings in most of the other sectors, the error correction term in the production sector model is relatively low at 32% and this could be due to the structural rigidites present in the economy. However, the short run results of this sector differ from other sectors such as education, economic infrastructure and energy in that aid is found to have a positive impact on growth in the short term. A

1% increase in foreign aid is shown to lead to a 0.1% increase in growth of the production sector. The interaction between aid and policy yields a negative and significant coefficient in the short run.

The study finds that in the long run, none of the explanatory variabes have a significant impact on growth of the sector.

5 CONCLUSION AND RECOMMENDATIONS

5.1 Summary

The purpose of this study was to examine the effect of aggregate foreign aid on investment and economic growth in Kenya; and to analyse the effect of sectoral aid on the growth of the respective sectors.

To address the above objectives, time series data was collected for the period 1980 to 2013. An ARDL model was used to specifiy the short run and long run dynamics of the investment equation as well as the aggregate and sectoral growth equations.

The study factored in the macroeconomic policy environment variable, which was composed of fiscal policy, monetary policy and trade policy. This was done in line with the findings on the importance of a good macroeconomic environment for aid effectiveness.

Overall, the study found that foreign aid had a positive effect on economic growth and public investment in Kenya in the long run. In the sectoral analysis, aid is found to have a positive impact in the education and economic infrastructure sectors in the long run.

Kenya's macroeconomic environment was found to have a negative effect on growth both on an aggregate and sectoral level. This implies that the macroeconomic policy environment in Kenya is unstable in nature. This finding could be attributed to the effects of the 2007-2008 post election violence, which have taken a while for the economy to recover from.

5.2 Conclusion

In conclusion, the study finds that foreign aid positively affects public investment and economic growth (both aggregate and sectoral) in Kenya. Kenya's macroeconomic policy environment has been found to be unstable thus negatively affecting economic growth and public investment. Aid was found to be effective in the long run in the education and economic infrastructure sectors. In the remaining sectors that were studied i.e. energy, tourism and production, aid was found to have a negative impact on the growth of the sectors. In line with the findings of Burnside and Dollar (2000), the study finds that stability of the macroeconomic policy environment is important in ensuring aid effectiveness.

5.3 Policy Implications

This study has shown that aid has had a positive impact on growth both on an aggregate and sectoral level. However, the impact of aid is reduced or negated by the macroeconomic policy in the country. The results of this study therefore suggest that it is important for the coutry to have a stable macroeconomic stability to ensure the effectiveness of foreign aid in boosting both economic growth and public investment. This means that there is a need for the country to improve its macroeconomic environment.

In addition, it has been found that aid to production, energy and tourism were ineffective in boosting growth of these sectors. It is therefore important that checks are put in place to ensure that aid channeled to these sectors is used more effectively. From a donor point of view, it is important that the donors monitor the aid that is channeled to the different sectors to ensure that it is used effectively.

5.4 Shortcomings and Areas of Further Research

One shortcoming of this study was the limited data points especially for the sectoral analysis. Only nine years of sectoral aid data was collected and therefore the data had to be convereted into quarterly data using the quadratic approach to get more data points. As a result, the sectoral results may not be fully reliable. Additionally, important sectors such as agriculture were excluded from the analysis because of incomplete data points for the sectoral aid variable.

Another shortcoming of this study could be the fact that the lags could have eaten up degrees of freedom thereby reducing the statistical power of the models run.

A potential area for further research could be to carry out a panel analysis based on the sectoral data and to therefore analyze the effectiveness of aid in each of the sectors. This may yield more robust results because a panel analysis would take into account the commonalities in the sectors as well as take care of any unobserved heterogeneity in these sectors.

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APPENDICES

Appendix 1: Deriving the Solow-Swan Growth Model

Basic Production Function

Consider a closed economy with a Cobb- Douglas function of the form:

$$Y = AK^{\alpha}L^{1-\alpha}$$

which can be represented in logs as:

$$logY = logA + \alpha logK + (1-\alpha)logL$$

where Y is income/output, A is total factor productivity, K is capital and L is labor.

The next step is to change the income Y into per capita income:

$$Y/L = (AK^{\alpha}L^{1-\alpha}/)L = AK^{\alpha}L^{1-\alpha-1}$$

$$= AK^{\alpha}L^{-\alpha}$$

$$= AK^{\alpha}/L^{\alpha} = A(K/L)^{\alpha}$$

Income per capita is therefore a function of capital intensity.

Let Savings $S = sY$ that is, a constant share of income is saved. In a simple economy, the only outlet for savings is investment. Therefore, $I = sY$. Assuming there is depreciation, net investment becomes: $(I - dK)/K = \frac{I}{K} - d = \frac{sY}{K} - d$ where d is the rate at which the capital stock disintegrates.

If the capital output ration is a constant $k = K/Y$. Since neither capital nor output change rapidly, this is a fair approximation of reality. The growth rate of K becomes:

$$g_k = \frac{1 - dK}{K} = \frac{sY - dK}{K} = \frac{sY}{K} - d$$

$$= \frac{s}{k} - d$$

For the overall growth rates, we first take the logs of the basic formula such that:

$$logY - logL = logA + a(logK - logL)$$

Differentiating, we have:

$$\frac{dY}{Y} - \frac{dL}{L} = \frac{dA}{A} + a(\frac{dK}{k} - \frac{dL}{L})$$

Rewriting the growth in terms of percentage we have:

$$g_Y - g_L = g_A + a(\frac{sY}{K} - d - g_L)$$

$$= a(\frac{s}{k} - d - g_L)$$

The original production function above can be written in an econometric linear form as:

$$\alpha_0 + \alpha_0 K + \alpha_2 L$$

Appendix 2: Results on Stationarity Tests

Table 12-ADF Test with Intercept and Trend

Variable	Level	First Difference	Order of Integration
Log Real per capita GDP	-1.636	-2.933	I (1)
Log Foreign Aid	-1.667	-6.252	I (1)
Log Private Investment	-4.954	-	I (0)
Log Public Investment	-0.753	-5.176	I (1)
Log Foreign Debt	-0.477	-5.023	I (1)
Log Tax	-1.918	-5.913	I (1)
Log Policy	-0.297	-5.039	I (1)
Log GDP Economic Infrastructure	-2.289	-3.371	I (1)
Log GDP Education	-3.106	-5.884	I (1)
Log GDP Energy	-3.594	-	I (0)
Log GDP Production	-1.239	-7.222	I (1)
Log GDP Trade & Tourism	-0.265	-2.911	I (1)
Log GDP Transport & Comm.	-1.255	-2.836	I (1)
Log Aid Economic Infrastructure	-1.948	-3.613	I (1)
Log Aid Education	-4.402	-	I (0)
Log Aid Energy	-2.113	-5.256	I (1)
Log Aid Production	-3.235	-	I (0)
Log Aid Trade & Tourism	-2.773	-4.051	I (1)
Log Aid Transport & Comm.	-1.307	-4.577	I (1)