EFFECTS OF FOREIGN AID ON ECONOMIC GROWTH IN KENYA

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ABSTRACT

This study sought to determine the effects of foreign aid on economic growth in Kenya by disaggregating foreign aid into three categories namely; net loans, grant aid and technical aid. The study adopted Samuelson's equilibrium analysis model that captures the need for government financing of public goods done through foreign aid and taxes and all foreign aid received is assumed to be used for financing public investments which ultimately influence economic growth by influencing private sector investments. The study used secondary data on all variables, sourced from credible government and international institutions, and time series data approach was employed. The time series data was investigated and any non-compliance corrected before investigation. Vector auto-regression (VAR) modeling technique and the error correction model (ECM) were employed to estimate the effects of the three components of foreign aid on economic growth in Kenya. Data was analyzed and presented in descriptive statistics using simple graphs and tables. The finding of this study revealed that net loans had a positive but an insignificant relationship with economic growth in Kenya. Similarly, the findings revealed that grant aid was positively and significantly related to economic growth such that an increase in grant aid by 1unit accounted for a 27.3 units increase in GDP. Finally, the study established that technical aid was negatively and significantly related to economic growth such that an increase in 1 unit of technical aid resulted to a decrease of 25.2 units in GDP. The study concluded that there exist a positive and significant relationship between foreign aid and economic growth in Kenya. The study recommends that the government of Kenya should cautiously use borrowing to supplement other revenue sources and the funds be directed to productive public investments. In addition, appropriate loan and aid funds management policies should be put in place to enhance both domestic and foreign private investments to increase economy's production, employment, stabilize exchange rate, interest rate and inflation rate. Stringent measures should also be adopted to curb wastage and embezzlements of aid funds.

Keywords*: Foreign aid, Economic growth, Net loans, Grand aid, Technical aid and Policy implications*

INTRODUCTION

Developing countries face various growth challenges emanating from investment and other constraints. These include; the saving constraint, foreign exchange constraints and the fiscal constraint. The saving constraints exist due to low incomes in developing countries and therefore domestic savings are insufficient to meet public investment demand.

Foreign exchange constraints occurs in most developing countries, as the foreign exchange from export earnings are insufficient and low yet public investments require imported capital that require foreign currency. The fiscal constraint arises because government consumption and expenditure and public investments affect private savings and private investments respectively. In addition, the capacity constraint in developing countries arises due to lack of adequate human capital, appropriate technology and technical knowhow that are required for high capital investments. Such constraints hinder economic growth aspirations of a country and therefore the need to seek and mobilize capital resources in the form of donor aid and foreign direct investments to help in economic expansion (Glenday and Ryan, 2003).There is therefore need for extra resources if developing countries are to achieve their development aspirations.

Foreign aid plays an important role in bridging the investment gap and therefore promoting economic development of LDCs and developing countries by relaxing these constraints through injection of extra funds and foreign currency to cater for capital imports required for investments and also reduces the possibility of raising funds through debt financing of government expenditure and investment (Ojiambo, 2013). For sustainable economic growth, technological advancement and technical knowhow are critical. Foreign aid through technical cooperation helps fill the technological and technical knowledge gap and consequently increases productivity of an economy. The topic on relationship between economic growth and foreign in Kenya has been inconclusive with various studies reaching different conclusions. To understand the trends of economic growth and foreign aid in Kenya, it is important to look at historical trend of aid in Kenya different periods. This would be helpful in examining the relationship that exists between foreign aid and economic growth in Kenya.

STATEMENT OF THE PROBLEM

To support the economic growth, Kenya has been dependent on aid country in financing its infrastructure and social investments. Evidence deduced from analysis of data from OECD-DAC statistical database (As shown in figure 1.3 above) shows that aid inflow in Kenya, yearly or five year period average, has generally been inconsistent with increase recorded in some periods especially after 2002 and decline recorded in others especially from 1990 to 2000 (Figure 1.3). Foreign aid to Kenya has been highly volatile depending on the funding agenda of the donor and also erratic in terms of commitments and unpredictable in terms of timing and volume (Mweiga, 2009). Analysis of data on aid to Kenya also shows a general increasing trend of aid flow to Kenya. Kenya has also been lauded for taking positive policy reforms, which according to World Bank are prerequisite for positive effects of aid on economic growth. With these policy reforms

being judged as positive, it has been unclear whether they have positively influenced the effect of aid on economic growth (Ojiambo 2013).

The above-mentioned, together with the fact that aid is a crucial source of funding for development projects in Kenya, leads to the question of how this affects economic growth in Kenya. It is also unclear how different components of total aid affect economic growth in Kenya. Various studies conducted have sought to investigate the effects of aid on economic growth with mainly focusing on cross country situation with few focusing on effects of different categories of aid on economic growth in Kenya with most studies not covering up to the most recent data on the variables. (M'Amanja and Morrisey, 2006; Malik, 2008; Martin, 2010; among others).

In these studies, the findings and conclusions defer depending on the variables being investigated with some studies establishing a positive relationships while others found a negative relationship between aid and economic growth.

This study seeks to fill this gap by exploring the effects that different categories of foreign aid have on economic growth in Kenya. More specifically, it seeks to do this by uncovering the empirical relationship that exists between three categories of aid namely; grant aid, external net loans and technical aid and economic growth in Kenya.

RESEARCH OBJECTIVES

1. To examine the relationship between net loans and economic growth in Kenya
2. To establish the relationship between grant aid and economic growth in Kenya
3. To assess the relationship between technical aid and economic growth in Kenya

LITERATURE REVIEW

Theoretical Framework

The Harrod Domar Model

Harrod Domar model gives insight into dynamics of growth and helps determine the economic growth of an economy. According to this model, the output of an economy depends on the investment rate and the productivity of that investment. Investments are financed by savings. In an open economy total savings is equal to sum of domestic and foreign savings.

The model assumes an exogenous rate of labour force growth (n), constant capital labor-ratio (K/L)-a fixed technology exhibiting fixed factor proportions-and a fixed capital-output ratio.

The model gives a simple national income equation as

$$Y_t = C_t + S_t \quad (2.1)$$

Where Y_t= GDP, C_t = Consumption and S_t= Savings.

In the model, investments are financed by savings.

$$(I_t) = (S_t) \quad (2.2)$$

Substituting equation (2.2) into equation (2.1) yields,

$$Y_t = C_t + I_t \quad (2.3)$$

The Harrod Domar model assumes that GDP is proportional to the share of investment spending (*I*) and for economic growth to occur, additions to capital stock are required.

The evolution of capital stock over time is given by;

$$K_{t+1} = (1-\delta)K_t + I_t \quad (2.4)$$

Whereδ; is the rate of depreciation of capital stock,

The relationship between capital stock size (*K*) and GDP, also known as capital-output ratio, is assumed to be fixed is expressed as $\frac{K}{Y} = v$. (2.5)

Therefore, *v* can also be defined as $\frac{\Delta K}{\Delta Y}$ which is equal to incremental capital output-ratio (ICOR).

Since total investments is a function of total saving, total savings can be defined as a proportion of GDP and expressed as,

$$S_t = sY_t \quad (2.6)$$

Since $\frac{K}{Y} = v$, then, $= vY$, then equation (2.7) derived from equation (2.4) can be written as

$$vY_{t+1} = (1-\delta)vY_t + sY_t \quad (2.7)$$

Simplifying further (by dividing by *v*, then subtracting Y_t from both sides of the equation)

$$Y_{t+1} - Y_t = \{\frac{s}{v} - \delta\}Y_t \quad (2.8)$$

Simplifying further (dividing through by Y_t) yields;

$$\frac{[Y_{t+1} - Y_t]}{Y_t} = [\frac{s}{v} - \delta] \quad (2.9)$$

From equation (2.9), the right hand side of the equation gives the GDP growth rate.

The model equation can therefore be re-written as;

$$\text{GDP Growth rate} = [\frac{s}{v} - \delta] \quad (2.10)$$

From equation (2.9), the Harod-Domar model equation, the GDP growth rate of an economy is jointly determined by the savings ratio (*s*) and the capital-output ratio (*v*). Therefore, the higher the saving ratio and the lower the capital output ratio, the faster will the GDP growth rate. This is however on the assumption that depreciation rate (δ) is zero, which reduces equation (2.9) to;

$$\text{GDP growth rate} = \frac{s}{v} \quad (2.11)$$

Foreign aid therefore plays a crucial role in supplementing a country's saving and therefore boosting its GDP growth.

The Solow Growth Model

The Solow Growth Model is a model of capital accumulation in a pure production economy. It captures the impact of pure savings, which is equal to investment, on the long run standard of living (per capita income). It also captures the impact of population growth, savings and technological progress on growth of an economy. It captures the production function relationship, the saving function relationship and the consumption function relationship.

The model assumes a closed economy and allows for substitution between capital and labor.

The model is based on neo-classical aggregate production function; $Y = A_t F\{K, L\}$ (2.2.1)

Where Y= real output, K is capital, L is labor input and A_t is the measure of technology which is time dependent.

Equation (2.2.1) can be written as $Y = F\{K, L\}$ (2.2.2)

For $y=f(k)$, $\frac{\partial y}{\partial k} > 0$, $\frac{\partial^2 y}{\partial k^2} < 0$ for all k (2.2.3)

Equation (2.2.3) implies that output per worker exhibits diminishing returns and is a positive function of capital labour ratio.

Income is assumed to equal to output and income consists of consumption and investments and investments are equal to savings, that is,

$$Y = C + I = C + S \quad (2.2.4)$$

A saving function can be written as $S = sY$, where s, $0 < s > 1$, is a fraction of income that is saved and since it is a closed economy sY is the private savings and is equal to domestic investments.

Therefore, $Y = C + sY$ (2.2.5)

Capital stock of the economy consists of plants, machinery and infrastructure. At a point t in time

$$K_{t+1} = I_t + (1 - \delta)K_t = sY_t + K_t - \delta K_t \quad (2.2.6)$$

Where δ is the depreciation, I is investments and t the period under consinderation.

Equation (2.2.6) can be rewritten as

$$\frac{K_{t+1}}{L} = \frac{sY_t}{L} + \frac{K_t}{L} - \frac{\delta K_t}{L} \equiv \frac{K_{t+1}}{L} - \frac{K_t}{L} = \left\{\frac{sY_t}{L} - \frac{K_t}{L}\right\} - \left\{\frac{\delta K_t}{L} - \frac{K_t}{L}\right\} \quad (2.2.8)$$

According to the neoclassical theory of growth, the accumulation of capital evolves according to the following equation. $k = sf(k) - \delta k$ (2.2.9)

Equation (2.2.9) is the differential equation of the Solow model.

Where; $k = \frac{K_{t+1}}{L} - \frac{K_t}{L}$, which is the change in capital output per worker.

$sf(k) = \frac{sY_t}{L}$, which is the saving (and equal to investment) per worker.

$\delta K = \frac{\delta K_t}{L}$, is the 'compensation' required per worker to keep the capital labour ratio constant.

By setting $k^* = 0$ Solow model steady state is given by;

$$sf(k^*) - \delta k^* = 0 \qquad (2.2.10)$$

This implies that, capital per worker is constant.

If population growth is factored then the differential equation becomes;

$$k = sf(k) - (n + \delta)k \qquad (2.2.11)$$

Where, $(n + \delta)k$ is the necessary investment to keep the capital stock per unit labour (k) in the.

Equation (2.2.10) implies that the economy approaches the steady state in which the economy's saving are balanced by the need for investment to maintain a constant capital labour ratio. Thus according to this model the steady state growth rate is the rate of population growth and rate of technical change. When the savings in an economy expressed in equation (2.2.11) are not sufficient, foreign aid comes in hand to offset depreciation of capital, prevent capital from falling and to match the growth of labour quantity. According to the model the flow of aid does not affect the economy's growth once it reaches the steady state but a growth rate is achieved at a higher level of GDP therefore the need for foreign aid.

According to Ojiambo (2013), if GDP is less than absorption, the difference is financed by capital inflow (or foreign aid) which is measured by the difference between the absorption and saving capacity of the aid recipient country.

The Solow-Swan Model

This model shifts from Solow Growth model by factoring the subsistence consumption needs and assuming that savings are equal to zero whenever the per capita income does not exceed this level of subsistence consumption, the saving function is expressed as;

$$s = \begin{cases} s[Y - \hat{C}L & \text{if } Y > \hat{C}L \\ 0 & \text{if } Y \leq \hat{C}L \end{cases} \qquad (2.3.1)$$

Where s is savings, $0 < s < 1$, $\hat{C}$ is per capita subsistence consumption needs and Y is per capita income.

From the Solow's model in equation (2.2.2) $Y = F\{K, L\}$ and $K = I - \delta K$. Then combining equation (2.2.2) equation (2.3.1) yields;

$$k = s[f(k) - \hat{C}] - k \qquad (2.3.2)$$

This is a modified Solow equation.

From above Solow-Swan model equation (2.3.2) it implies that with low income, especially in developing countries, consumption hinders investment and maintenance of capital stock thereby affecting growth and contributing to poverty cycle. This model therefore also captures the issue of poverty traps whereby if an economy's capital stock is below certain level, say $\hat{k}$, then the dynamic forces of the model will drive it even to a further lower level. The existence of multiple steady states and the possibility that countries with a low per capita income have a possibility to find themselves in a vicious circle with poverty and low-growth reinforce each other.

A temporary injection of foreign capital could help the economy to take off and to permanently reach a higher level of per-capita income. (Ojiambo, 2013)

Foreign aid therefore plays an important role in increasing capital stock in an economy and a onetime increase in capital stock through foreign aid can lift an economy out of poverty trap without need for continuous aid inflows in future. Since a one-time increase of the capital stock can propel a country out of the poverty and permanent inflows of aid are not required in lifting developing countries to higher levels of income and growth

Though this model is used for its simplicity, it has two main limitations: First, the assumption that poverty exists due to some initial unfavorable conditions might not be correct and it ignores the current policies and institutions. Secondly, it emphasizes on aid as the only way to alleviate shortage of capital but this has been surpassed by huge private foreign investments and remittances in developing countries, (Ojiambo, 2013).

Conceptual Framework

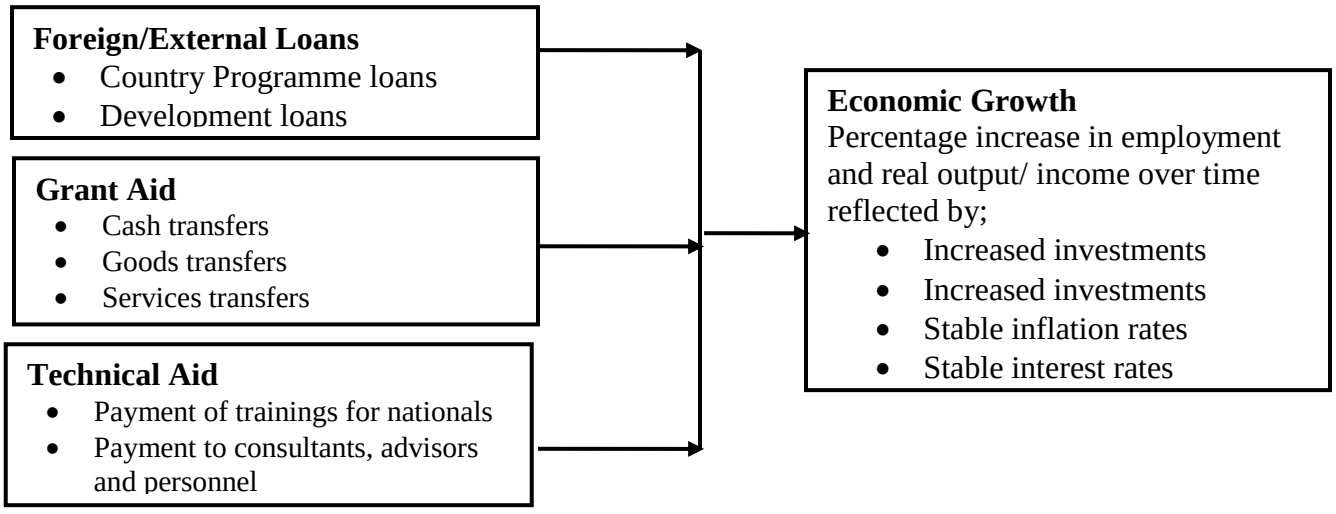

Figure 1: Conceptual Framework

Empirical Review

Knack (2000) while investigating the effect of aid on governance and economic growth conducted a cross country empirical analysis using both OLS and Two Stage Least Squares

estimation technique. The study measured quality of governance by subjective indices from the International Country Risk Guide (ICRG) and an 18-point scale created by summing the following three six-point scales: the rule of law, corruption in government and bureaucratic quality. Some of the other variables used in the study included ODA as a percentage of GNP and as a percentage of government expenditures, in addition to population change. The study found that "aid contributed to eroding of quality of governance indexes and undermined institutional quality by encouraging corruption and rent seeking and formenting conflict over control of aid funds. The study also found that large aid inflows did not necessarily result in improved general welfare gains.

Mavrotas (2003) did a study the impact of different types of aid on the fiscal sector in Uganda. Using time-series data from 1980 to 1999 and disaggregating aid into different types (food aid, programme aid, project aid and technical aid), he estimated a model of fiscal response in the presence of aid, which combined aid disaggregation and endogenous aid. Data on the foreign aid variables used in the study were obtained from the OECD-DAC. Other variables in the study included the public investment (Ig), government consumption (G), and tax and non-tax revenue (T) and a Non-Linear Three Stage Least Squares (N3SLS) estimation technique was employed for the estimation of the structural equations. Disaggregation approach was adopted to look deeper into aid effectiveness since different types of aid affected fiscal variables differently. According to the study, food aid and project aid appeared to cause a reduction in public investment. Programme aid and technical aid were found to be positively related to public investment. Government consumption also had a similar effect. The impact on government tax and non-tax revenues were negligible, while strong displacement of government borrowing was also found.

Gomanee, Girma and Morrissey (2005) conducted a study to investigate the effect of aid on economic growth. They used data from 25 aid receiving African (sub-Saharan) countries for the period 1970 to 1997 and used the Harrod Domar growth model framework. The study used the variables; real per capita GDP, percentage of population aged 15 and above (who have completed primary school) and investment as indicators of human and physical capital. In their findings, they concluded a positive relationship between aid and economic growth. The study found that for each percentage increase in aid/GNP ratio, there is a corresponding 0.25 percent increase in the rate of growth.

M'Amanja and Morrissey (2005) investigated the effect of foreign aid on investment and economic growth in Kenya from 1964 to 2002 by specifically identifying aspects of the determinants of growth in Kenya, and in particular if aid played a role. This focus on specific country was due to the fact that cross-country studies were not easy to translate into country studies, data on many of the variables were not available annually, and it was not feasible to include all potential determinants. Using a Vector Autoregressive (VAR) model and basing their study on endogenous growth theory and using a multivariate approach on time series data, they examined effects of foreign aid, investment and imports on economic growth in Kenya. The variables used were: real per capita income, private investment, government investment, foreign aid, and imports of goods and services. A Vector was used for estimation. The study found that the shares of private and public investment, and imports in GDP had strong beneficial effects on per capita income in Kenya. The study, however, found out that aid in the form of net external

loans had a significant negative impact on long-run growth. Private investment had a negative effect on public investment and imports but positive effect on foreign aid.

Mallik (2008) sought to examine the effectiveness of foreign aid on economic growth in six poorest and highly aid dependent African countries, namely the Togo, Malawi, Mali, Central African Republic, Sierra Leone and Niger over the period 1965-2005. The study's underlying econometric model was: f (ln *RGDPPCt* , ln *AIDY*, ln *IY*, ln *OPENt*) = 0 where, ln *RGDPPCt* = Natural log of real gross domestic product per capita time t (in United States Dollars (USD); ln *AIDYt* = Nominal Aid (official development aid) as a percentage of nominal gross domestic product at time t; ln *IYt* = Natural log of investment as a percentage of gross domestic product (GDP) at time t; ln *OPENt* = Natural log of openness (exports plus imports as a percentage of gross domestic product at time t). Using co-integration analysis, the study found that a long-run relationship existed between per-capita real GDP, investment as a percentage of GDP, aid as a percentage of GDP and degree of openness. The study found a negative long-run effect of aid on growth for most of these countries. A study was also conducted by Ojiambo (2013) to investigate the effects of foreign aid predictability on investment and economic growth in Kenya. The study found that foreign aid had a positive effect on Kenya's economic growth and public investment. The lagged effects of foreign debt positively affected economic growth and public investment after one year and negatively thereafter. These findings supported other studies such as M'Amanja and Morrissey (2005), Bhattarai (2009) and Kargbo (2012).

RESEARCH METHODOLOGY

This study is aimed at establishing the effects of foreign aid on economic growth in Kenya. Quantitative data was used in answering research questions of this study. The study used descriptive research design using time series data from the period 1963 to 2014. The data analysis employed a Vector Autoregressive (VAR) modeling technique. The error-correction (ECM) model was also generated after undergoing time series properties tests. This study focused on the entire Kenyan population since it used aggregated macro variables on GDP growth rates, foreign loans, grants and technical aid. All data relating to GDP and foreign aid disaggregated into foreign loans, foreign grants and technical aid since 1963-2013 represented the population. The study adopted time series data from consecutive years which was used for analysis. The sample frame consisted of all the data present on the variables from 1963 to 2014. Data collection was preceded by the identification of a reliable official secondary data sources and designing of suitable raw data collection template. Secondary data was collected from various credible government and international organizations sources. During analysis foreign aid was disaggregated into three categories of aid namely foreign loans, grants aid and technical aid then analyzed separately and their effects on economic growth determined. The research process used *Eviews* 7 for all its descriptive statistical and econometric analysis.

Due to the nature of interrelations between different components of foreign aid and economic growth in Kenya, VAR approach was used. VAR as a method of time series analysis does not assume any structural relationships between variables. VAR was very appropriate in analyzing cases in which theoretical relationships are weak and endogeneity between variables are expected (Oduor, 2008). The reduced VAR was adopted for use in this study thereby sidestepping the need for structural modeling, by modeling every endogenous variable as a function of the lagged values of itself and of all the endogenous variables in the system

(Muthoni, 2009). The reduced form model utilizes no economic structure beyond the choice of variable (Wawire, 2014).

The VAR model is presented as

$$X_t = \beta_0 + \beta_1 X_{t-1} + \beta_2 X_{t-2} \dots\dots\dots \beta_p X_{t-p} + \varepsilon_t$$

Where β_0 is n x 1 vector of constant terms β_1, β_2, ……β_0, β_0 are n x n matrices of coefficients, X_t is n x 1 vector of endogenous variables and ε_t is a vector of serially uncorrelated error terms that have a mean of zero and a covariance of matrix Ø.

In the VAR model, each variable is regressed on a constant variableβ_{ij} , p lags of itself and p lags of each of the other variables in the model and the disturbance term ε_t.

Longer lag lengths are most appropriate as they fully capture the dynamics of the system being modeled and increase the parameter. The model to be estimated is expressed as:

$$Growth = f(FL, Gr, TA,)$$

Where *Growth* is the economic (GDP) growth, FL represents foreign (net) loans, *Gr* represents grant aid and *TA* denotes technical aid.

Various tests were employed to test the credibility of the data to be used which includes; Pre-estimation tests for multicolinearity and unit root test using Augmented Dickey-Fuller (ADF). ADF tests have the advantage over Dickey Fuller (DF) test since the ADF tests accounts for higher auto correlations in the residuals (Kigume 2005). The ADF procedure is also used to avoid spurious regression results (Njuru 2012). The study also used co-integration test to capture the equilibrium relationship between non-stationary series within a stationary model. According to Gujarati, 2004, co-integration is the existence of long-run equilibrium relationship between variables which implies that two or more variables may wander away from each other but move together in the long run.

Regression analysis was conducted by using the Ordinary Least squared (OLS) method and the Error Correction Model (ECM). The error correction model (ECM), which estimates the model in stationary form of the variables and includes an error correction term as another explanatory variable, was useful in determining short-run relationship between the various components of foreign aid being investigated and economic growth in Kenya.

RESULTS

Descriptive statistics

Descriptive analysis was conducted to compare the mean, median, maximum, minimum and distribution of the variables.

Table 1: Descriptive Statistics of the Variables

	TECHNICAL_AID	NET_LOANS	GRANT_AID	GDP_AT_MARKET_PRICES
Mean	122.0642	653.8515	492.8135	12391.99
Median	125.5200	442.9600	340.7100	7239.127
Maximum	280.7400	3311.620	2138.840	60936.51
Minimum	0.290000	21.11000	4.430000	791.2655

Std. Dev.	79.87769	737.7400	549.5959	14642.71
Skewness	-0.008126	1.885147	1.590870	1.825128
Observations	55	55	55	55

Trend Analysis

Trend Analysis of Grant Aid

The figure 2 contains the trend showing the variability of grant aid for the period of between 1963 and 2014.

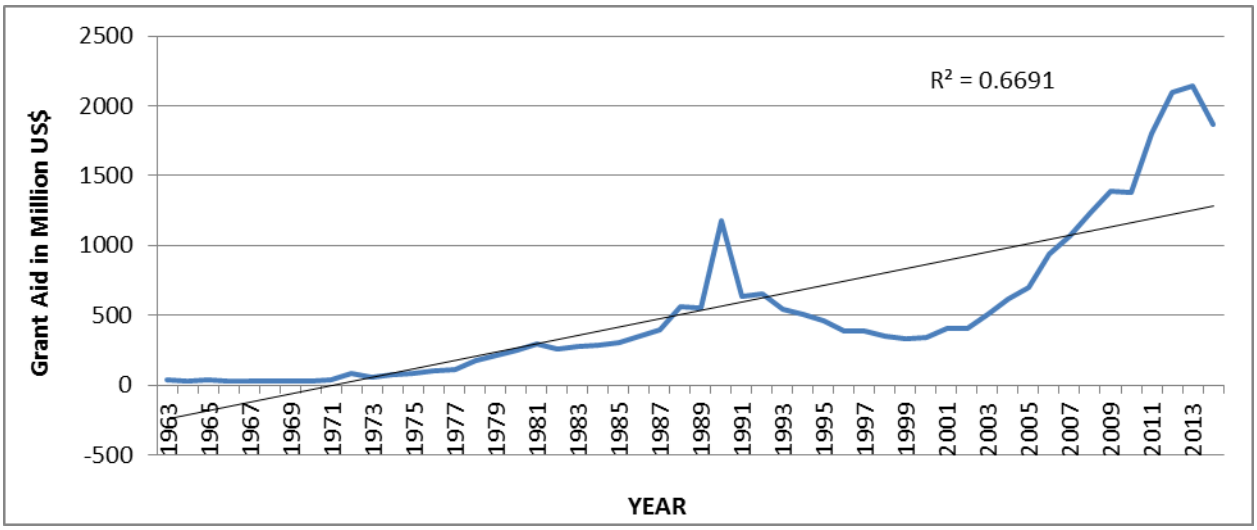

Figure 2 Trend of Grant Aid between 1963-2014

The trend analysis clearly indicates that there has been an increasing trend in the grant aid in Kenya.

Trend Analysis for Net Loans

The trend analysis of the net loans revealed an increasing trend in the amount of net loans in Kenya between 1963 and 2014.

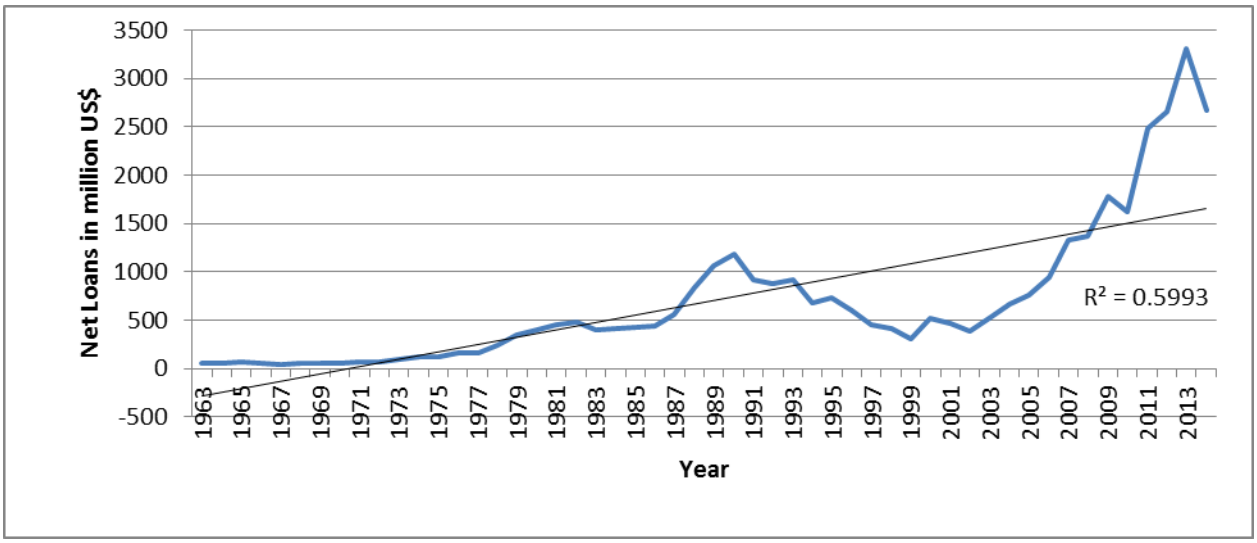

Figure 3 Trend of Net Loans between 1963-2014

The result showed that net loans inflows were low in the 1960s and early 1970s.

Trend Analysis for Technical Aid

The results in the figure below show the trend for technical aid in the Kenya for the period of between 1963 and 2014. The results show that technical aid increased steadily since 1963 to 1992.

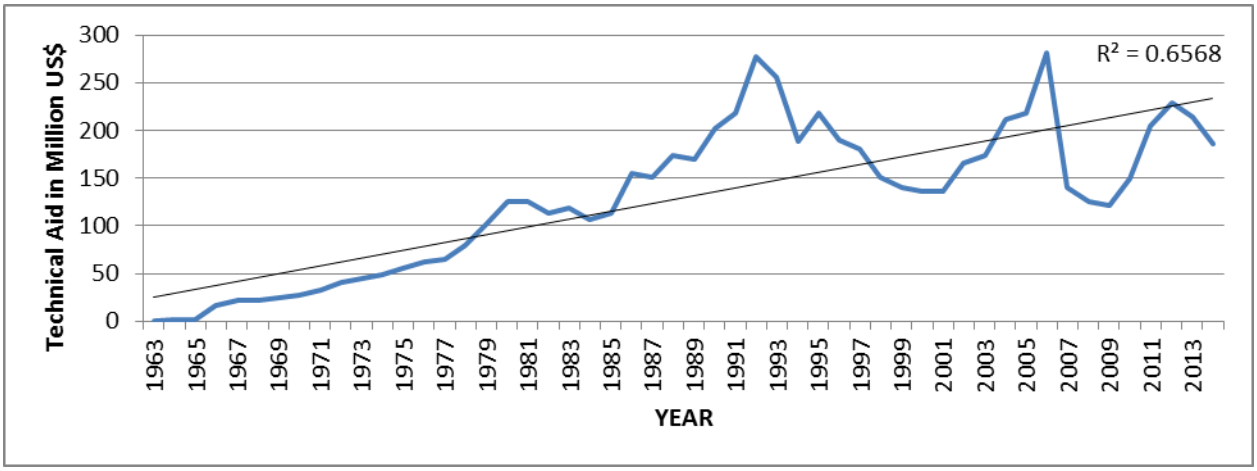

Figure 4: Trend of Technical Aid between 1963-2014

Trend Analysis for GDP (at Current Market Prices, Millions US$)

Trend analysis for GDP was conducted find out how GDP has varied from 1963 to 2014. The graphical representation of the GDP variability is given below.

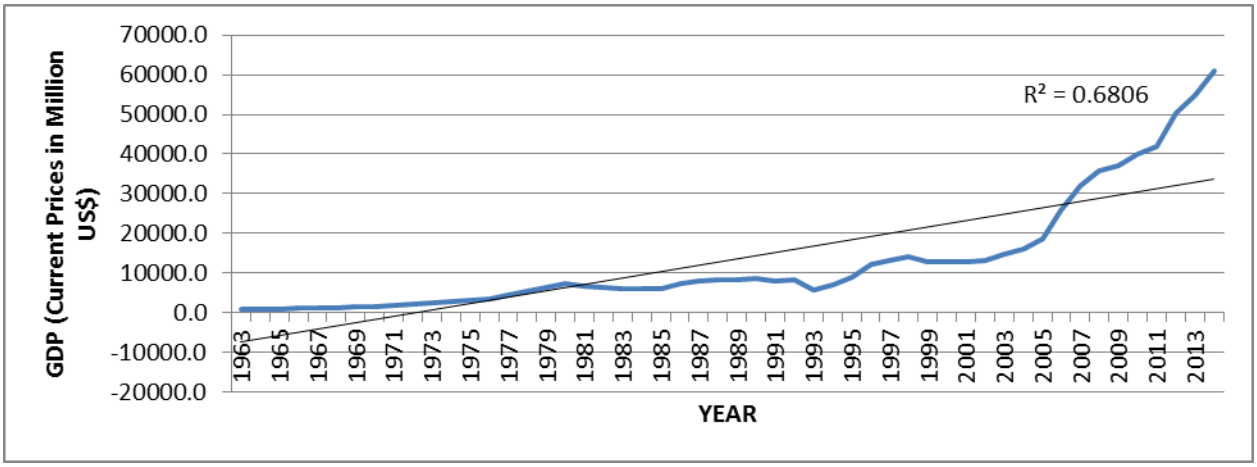

Figure 5: Trend of GDP between 1963-2014

The trend analysis showed that GDP has increased since 1960 though the rate of increase has been slower in some periods as compared to others.

Pre-Estimation Tests

Prior to running a regression model pre-estimation tests were conducted. The pre-estimation tests conducted in this case were the unit root tests and multicollinearity. This is usually performed to avoid spurious regression results from being obtained.

Test for Multicollinearity

According to William *et al.* (2013), multicollinearity refers to the presence of correlations between the predictor variables. In severe cases of perfect correlations between predictor variables, multicollinearity can imply that a unique least squares solution to a regression analysis cannot be computed (Field, 2009). Multicollinearity inflates the standard errors and confidence intervals leading to unstable estimates of the coefficients for individual predictors. The results in Table 4.3 present a correlation matrix results and were established, according to Field (2009), that there is no Multicollinearity.

Table 2 Correlation Results

	GDP At Market Prices	Grant Aid	Net Loans	Technical Aid
GDP At Market Prices	1	0.64	0.53	0.53
Grant Aid	0.64	1	0.68	0.64
Net Loans	0.53	0.68	1	0.62
Technical Aid	0.53	0.64	0.62	1

Unit Root Tests

Most economic variables are usually non-stationary in nature and prior to running a regression analysis. Unit root tests were thus conducted using the ADF test to establish whether the variables were stationary or non-stationary. The purpose of this is to avoid spurious regression results being obtained by using non-stationary series. Results in Table 4.3 indicated that all variables are non-stationary (i.e. presence of unit roots) at 1%, 5% and 10% levels of significance. This called for first differencing of the non-stationary variables to make them stationary.

Table 3 Unit Root Test at Level

Variable name	**ADF test**	**1% Level**	**5% Level**	**10% Level**	**Comment**
Grand Aid	1.433374	-2.60849	-1.947	-1.61293	Non Stationary
Net Loans	1.161466	-2.61109	-1.94738	-1.61273	Non Stationary
Technical Aid	-0.21857	-2.60849	-1.947	-1.61293	Non Stationary
GDP	4.596891	-2.61109	-1.94738	-1.61273	Non Stationary

Table 4 Unit Root Test at First Difference

Variable name	ADF test	1% Level	5% Level	10% Level	Comment
Grand Aid	-7.64982	-2.60932	-1.94712	-1.61287	Stationary
Net Loans	-2.67194	-2.61019	-1.94725	-1.6128	Stationary
Technical Aid	-7.48899	-2.60932	-1.94712	-1.61287	Stationary
GDP	-6.74128	-2.61203	-1.94752	-1.61265	Stationary

It is clear from the results in table 4 that all the variables become stationary (unit root disappears) on first differencing

Post-Estimation Tests

After running the specified regression model the test for normality, Heteroskedasticity and autocorrelation were conducted so as to ensure all the Ordinary Least Squares assumptions are not violated.

Test for normality

The test for normality was examined using the graphical method approach as shown in the Figure 6 below. The results in the figure indicate that the residuals are normally distributed.

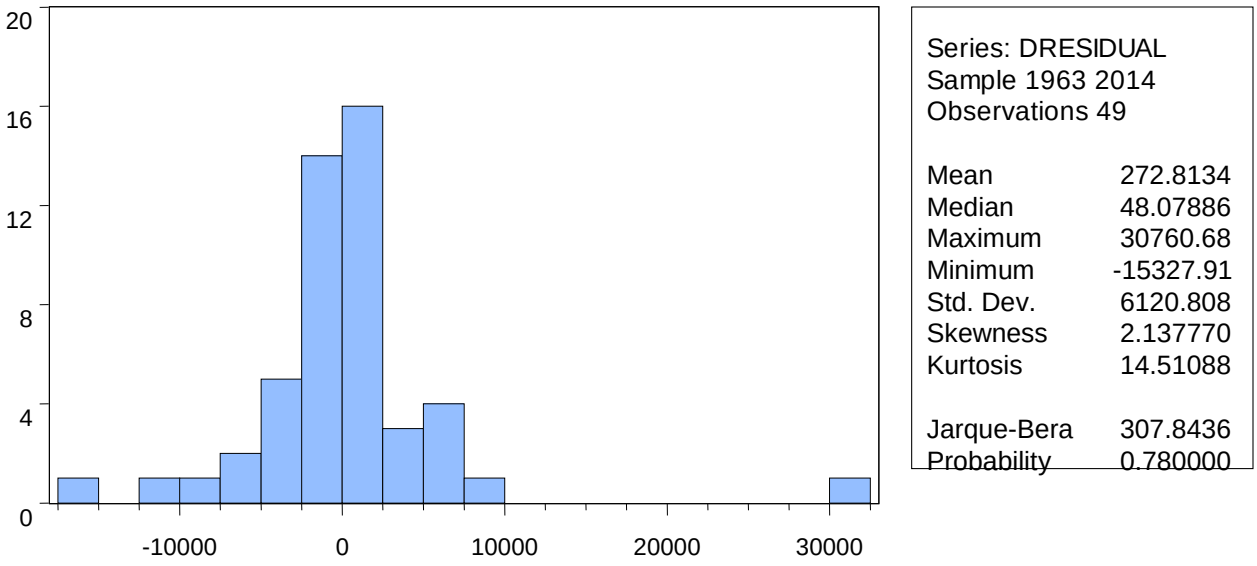

Figure 6 Histogram of Residuals

To further establish whether the residuals are normally distributed the study adopted the Jarque-Bera test which is a more conclusive test than the graphical inspection approach of testing for normality. The results of the Jarque-Bera test are shown above. The null hypothesis under this test is that the residuals are not significantly different from a normal distribution. Given that the

p-value is greater than 5% for the residual, the null hypothesis is accepted and thus the conclusion that the residuals are normally distributed.

Test for Heteroskedasticity

Ordinary least squares (OLS) assumption requires that the residuals should have a constant variance (i.e. they should be Homoskedastic). The Breusch-Pagan-Godfrey test was used to test for the same where the null hypothesis of the test is that error terms have a constant variance (i.e. should be Homoskedastic).

Table 5 Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	4.565858	Prob. F(3,51)	0.1666
Obs*R-squared	11.64443	Prob. Chi-Square(3)	0.2487
Scaled explained SS	49.33309	Prob. Chi-Square(3)	0.0820

The null hypothesis is accepted given that the reported p-value 0.2487 in table 5 above was greater than the critical value of 0.05 and thus concluded that the residuals have constant variance or do not have the problem of Heteroskedasticity.

Test for Serial Autocorrelation

The test for autocorrelation was performed to establish whether residual are correlated across time. OLS assumptions require that residuals should not be correlated across time and thus the Breusch–Godfrey test which is also an LM test was adopted in this study. The null hypothesis is that no first order serial /auto correlation exists. The results in table 6 below indicated that the null hypothesis of no autocorrelation is rejected and that residuals are not auto correlated (p-value=0.0531). The null hypothesis is that there is no serial correlation of any order.

Table 6 Breusch-Godfrey Serial Correlation LM Test

F-statistic	2.186675	Prob. F(2,22)	0.1361
Obs*R-squared	4.974739	Prob. Chi-Square(2)	0.0531

Co-integration Test

In testing for co-integration two methods are usually used; two step Engle granger test and Johansen co integration test. In the two step Engle granger test, residual of the long run model are generated (step one). In the second step the residuals are converted in their first lag and unit root test is conducted on the lag residuals. Results of Engle granger presented in table 7 reveals that the lag residual is stationary at level this is evidence of co-integration relationship between the long run and short run.

Table 7 Co integration test

Null Hypothesis: D(LAGRESID) has a unit root

Exogenous: None

Lag Length: 1 (Automatic - based on SIC, maxlag=6)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-8.208718	0.0000
Test critical values:	1% level	-2.656915	
	5% level	-1.954414	
	10% level	-1.609329	

Table 8 Johansen Test for Co-integration

Hypothesized No. of CE(s)	Eigen value	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.741541	121.8842	103.8473	0.0019
At most 1 *	0.657405	82.64677	76.97277	0.0173
At most 2	0.568050	51.58177	54.07904	0.0820
At most 3	0.342970	27.23785	35.19275	0.2770
At most 4	0.282128	15.05710	20.26184	0.2231
At most 5	0.171175	5.444638	9.164546	0.2382

The Johansen co integration test was also conducted since it's more accurate and superior to Engel granger test of co-integration. Johansen results indicate that the null hypothesis of at most 2 co-integration equations for the model linking GDP growth to its determinants was rejected at 5% significance level. The trace statistic for the null hypothesis for the existence of at most 2 co-integration equations was larger than the set critical value at 5%. This implies that more than 2 co-integrating equations existed. This further implies that all the variables in the model converge to an equilibrium in the long run (i.e. are co integrated) as shown in Table 8

Long Run Regression Results on the Foreign Aid on Economic Growth

The long run results are presented in table 9. The long R-squared of 0.90 indicates a good goodness of fit. The model implies that 90% of the variation in GDP is explained by the independent variables. The overall model was significant as demonstrated by an F statistic of 171.6 (p-value= 0.000). This further implied that the independent variables had good joint explanatory power on GDP. The results further indicate that in the long run, grant aid has a positive significant relationship with the GDP (B=27.36 p=0.0001). The results further indicate that net loan has a positive insignificant relationship with the GDP (B=0.2084, p=0.9636). Finally, the results indicated that technical aid has a negative significant relationship with the GDP (B=-25.26, p=0.0160).

Table 9 Long Run Regression Results on the Effects of Foreign Aid

Variable	Coefficient	Std. Error	t-Statistic	Prob.

GRANT AID	27.36390	6.242618	4.383402	0.0001
NET LOANS	0.208435	4.546373	0.045846	0.9636
TECHNICAL AID	-25.26376	10.14252	-2.490877	0.0160
C	1854.206	1125.693	1.647168	0.1057

R-squared	0.909907	Mean dependent var	12391.99
Adjusted R-squared	0.904607	S.D. dependent var	14642.71
S.E. of regression	4522.512	Akaike info criterion	19.74147
Sum squared resid	1.04E+09	Schwarz criterion	19.88746
Log likelihood	-538.8904	Hannan-Quinn criter.	19.79792
F-statistic	171.6931	Durbin-Watson stat	0.799206
Prob(F-statistic)	0.000000		

Error Correction Model

The error correction model is a model consisting of stationary variables. It is applicable only when co integration is found to exist among long run/non stationary variables. Since the variables in the model linking GDP to the foreign aid are co-integrated, then an error-correction model can be specified to link the short-run and the long-run relationships. Residuals from the co-integrating regression are used to generate an error correction term (lagged residuals) which is then inserted into the short-run model. The estimates of the error-correction model are given below. The short run model results indicated that the goodness of fit (R-squared) for the short run models was 10.3%. The results in the short run model revealed that the short run relationship between grant aid, technical aid, net loans and GDP was statistically insignificant.

Table 10 Error Correction Model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DGRANT	4.316009	2.368499	1.822255	0.0744
DNETLOANS	-0.189860	1.659124	-0.114434	0.9094
DTECHNICAL	-13.49961	9.380936	-1.439047	0.1564
C	1020.566	280.6532	3.636396	0.0007

R-squared	0.103187	Mean dependent var	1113.801
Adjusted R-squared	0.049378	S.D. dependent var	2043.021
S.E. of regression	1991.943	Akaike info criterion	18.10280
Sum squared resid	1.98E+08	Schwarz criterion	18.25013
Log likelihood	-484.7755	Hannan-Quinn criter.	18.15962
F-statistic	1.917651	Durbin-Watson stat	0.886698
Prob(F-statistic)	0.138706		

VAR Model

To further support the finding of the long run model and error correction model above, the study conducted vector auto-regression estimation. This was intended to ascertain if there was a relationship between variables and their one and two year lagged values.

The finding of VAR estimation is shown in the table below. The findings established that grant aid, net loans, technical aid and all theirs two year lagged values were insignificantly related to GDP. The result also shows that Grant aid was significantly related to GDP and its two year lags. However, Grant aid had an insignificant relationship with net loans and technical aid and their two year lags. Similarly, net loans had a significant association with GDP and its two lags but

insignificantly related to grant aid and technical aid and their two year lags. Finally, the results of the VAR model established that technical aid had a significant relationship with GDP, net loans, grant aid and all their two year lags.

Table 11 Vector Auto regression Estimates

Vector Auto regression Estimates

	GDP_at_Market_Prices	Grant_Aid	Net_Loans	Technical_Aid
GDP_AT_MARKET_PRICES(-1)	1.424619	0.017941	0.039645	-0.008770
	(0.13191)	(0.01505)	(0.01776)	(0.00295)
	[10.8000]	[1.19189]	[2.23223]	[-2.97668]
GDP_AT_MARKET_PRICES(-2)	-0.399088	-0.004988	-0.029288	0.008084
	(0.14781)	(0.01687)	(0.01990)	(0.00330)
	[-2.70008]	[-0.29571]	[-1.47169]	[2.44870]
GRANT_AID(-1)	-0.312870	0.471941	0.429717	0.070768
	(2.33916)	(0.26693)	(0.31495)	(0.05225)
	[-0.13375]	[1.76804]	[1.36441]	[1.35449]
GRANT_AID(-2)	4.019179	0.363802	0.039081	0.075728
	(2.52399)	(0.28802)	(0.33983)	(0.05638)
	[1.59239]	[1.26311]	[0.11500]	[1.34328]
NET_LOANS(-1)	4.005245	0.135931	0.211091	-0.059177
	(1.58368)	(0.18072)	(0.21323)	(0.03537)
	[2.52907]	[0.75217]	[0.98998]	[-1.67295]
NET_LOANS(-2)	-7.173126	-0.276490	0.314182	-0.007914
	(1.98836)	(0.22690)	(0.26771)	(0.04441)
	[-3.60757]	[-1.21856]	[1.17358]	[-0.17819]
TECHNICAL_AID(-1)	8.394331	0.848891	1.822986	0.754484
	(6.64135)	(0.75787)	(0.89419)	(0.14834)
	[1.26395]	[1.12011]	[2.03869]	[5.08621]
TECHNICAL_AID(-2)	-4.180618	-0.573764	-2.118995	0.061689
	(6.28088)	(0.71673)	(0.84566)	(0.14029)
	[-0.66561]	[-0.80053]	[-2.50572]	[0.43973]
C	-166.2618	5.768829	21.89823	17.61626
	(349.364)	(39.8670)	(47.0385)	(7.80329)
	[-0.47590]	[0.14470]	[0.46554]	[2.25754]
R-squared	0.993802	0.942448	0.955632	0.888672
Adj. R-squared	0.992675	0.931984	0.947565	0.868431
S.E. equation	1261.572	143.9621	169.8587	28.17810
F-statistic	881.8992	90.06629	118.4629	43.90379
Log likelihood	-448.6981	-333.6582	-342.4253	-247.2149

Conclusion

The study was conducted with a view to analyze the effects of foreign aid on economic growth in Kenya over the period 1963-2013. To accomplish the task, a model for economic growth was been specified and estimated considering net loans, grant aid and technical aid as independent

variables. The empirical results discussed above show that there is a positive and significant relationship between foreign aid and economic growth. Foreign aid in form of net loans and grant aid can be used to spur economic growth by directing it to productive public investments which positively impacts on private investment. Increased private investment would help increase production, employment; stabilize exchange rate, interest rate and inflation rate. It should, however, be noted that mismanagement of foreign aid, especially loans has a negative relationship with economic growth. This is due to the fact that, regardless of the level and end utilization, all loans must be repaid.

Recommendations

Based on the findings of this study the following recommendation can be made for policymakers and relevant stakeholders. The study recommends that the government of Kenya should cautiously use borrowing to supplement other revenue sources in its budget to finance productive public investments which would spur private investments. In addition, relevant authorities should elect for appropriate loan funds management policies which will enhance both domestic and foreign private investments. Increased private investment would help increase employment; stabilize exchange rate, interest rate and inflation rate. The government should also adopt stringent measure to curb wastage and embezzlements of such funds. The study also recommends that the government of Kenya closely with development partners and all the stakeholders to ensure there is increased flow of grant aid is directed and used for the intended purpose only. According to the findings of this study, this will increase its economy's productivity and build confidence in donors for continued funding which would positively influence economic growth. The study recommends that policies that will improve on use and direction of technical aid and enhancement of local content and employees should be adopted to ensure productivity and positive impact of technical aid on GDP growth. This study also recommends further studies on related external resources inflow, like migrant remittances and aid, to investigate their combined effects on economic growth in Kenya.

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