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EFFECT OF EXTERNAL PUBLIC DEBT ON ECONOMIC GROWTH IN KENYA

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ABSTRACT

The purpose of this study was to assess the effect of external public debt on economic growth in Kenya. The specific objectives were to determine the effect of external public debt stock on the economic growth and to establish the effect of debt service payment on economic growth. The study will adopted a causal research design. The study targeted a population data of 53 years for the period 1963 - 2014. Ordinary Least Squares approach was used to analyze data retrieved from the World Bank and Kenya National Bureau of Statistics from 1980 to 2014. An Error Correction Model that flexibly combines the short run and long run dynamic models in a single system was adopted by the study. Inferential statistics were obtained by applying the PcGive Ox-metrics and E-views while prior tests on unit root, co integration and granger causality were done before estimation. Vector Autoregression Diagnostics and tests were applied in the lag order selection, detection of autocorrelation in the residuals and to test for the normality of the residuals.

KEYWORDS: Public Debt, External and Domestic Debt

INTRODUCTION

Background of the Study

Public debt can be defined as the entire stock of direct government fixed term contractual obligations (Mukui, 2013). It is composed of both the external and domestic debt. External public debt is that debt that is owed to external creditors who include bilateral creditors, multilateral creditors and private institutions. Domestic public debt on the other hand is the debt owed to holders of government securities such as treasury bonds, bills and non- interest bearing stock (Kamundia, 2015). Debt service payments refer to the funds committed to the repayment of debt. It is composed of the repayments and interest earned by the debt. Debt financing occurs when a country is running on a deficit budget. A deficit budget arises when the public expenditure exceeds public revenue in a given financial year. According to Sobel, Stroup, Macpherson and Gwartney (2006), when an economy is operating below its potential capacity, the government should come up with expansionary fiscal and the budget deficit financed either by borrowing from the domestic market or foreign borrowing. Much of Kenya's borrowing is made externally. By the end of 2014, external public debt was 51.3% of the total debt. Kenya prefers external borrowing for its friendlier terms than domestic borrowing which are lower repayment interest rates and longer repayment period. In addition to the friendlier terms the country is able to cushion its economy from the risk of crowding out private investments arising from high interest rates resulting from domestic borrowing (Panizza, 2008). Kenya's external debt structure is composed of multilateral creditors, bilateral creditors, supplier creditors and foreign commercial banks.

External public debt has been changing over the years in different countries. In the developed countries, external public debt has been on an increase. According to IMF (2010), between 2007 and 2011 net government debt rose from 51% to 70% of the GDP in the Euro area, 42% to 73% in the USA, 38% to 74% in the UK and 82% to 130% in Japan. The

increase in external public debt was mainly due to 2008 financial crisis. The increase in the developed countries' external public debt as a result of global economic and financial crisis has led to a serious concern of debt sustainability and the economic effect Mukui (2013).

Economic growth has also experienced changes over the same period. During the first decade of independence, the country recorded great economic growth represented by a steadily increasing GDP to highest levels ever of 22.18% in 1971. The period was characterized by high levels of development, investment and production. However, the oil crisis of 1973/74 brought down the rate as it created BOP deficits. Economic growth improved in the rest part of the decade but was down again between 1980 and 1982 due to drought conditions that led to reduction in capital formation and decline value added agriculture (Kamundia, 2015).

HYPOTHESES OF THE STUDY

H_{O_1} : External public debt stock has no significant effect on economic growth in Kenya

H_{O_2} : Debt service payment has no significant effect on economic growth in Kenya

Theoretical Review

This section covers Classical theory of public debt, Neo-Classical theory of public debt, endogenous growth theory.

Classical Theory of Public Debt

According to the classical economists, public debt withdraws capital from productive private investments. This is in agreement with Say (1880) who asserted that government debt is disadvantageous for it diverts capital away from productive employment to unproductive consumption. Countries with low levels of credit are likely to have more negative effects of debt emanating from high interest rates for the governments are willing to pay higher rates than individuals will be willing to pay. However Say (1880) held that moderate levels of debt are beneficial for when employed in productive ventures for it puts capital in good use as opposed to it being in the hands of individuals who will put it into consumption or leave it idle. The classicals therefore view that unless public debt is employed into productive investments, the government would better not borrow or capital to remain idle in the hands of the public for the government would not incur interest payments (Kamundia, 2015).

Research Design

The study aimed at assessing the effect of external public debt on economic growth in Kenya. This study used a causal research design.

Research Instruments

A checklist was employed as a research instrument to collect data on external public debt, debt service payment, economic growth rate, foreign direct investment, gross fixed capital formation and population growth rate.

Data Collection

The study employed secondary data. Data was extracted from the World Bank reports and the Kenya National Bureau of Statistics for 35 years spanning from 1980 to 2014.

Model Specification

The model can be specified as follows following a linear relationship assumption:

$$\Delta ECG_t = \alpha_0 + \alpha_1 \Delta Log(K)_{t-1} + \alpha_2 \Delta Log(l)_{t-1} + \alpha_3 \Delta Log(EXD)_{t-1} + \alpha_4 \Delta Log + \alpha_5 \Delta Log(FDI)_{t-1} + D07 + \varepsilon_t$$

Where

Log ECG: Logarithm of Economic Growth rate measured as the growth rate in GDP

Log EXD: Logarithm of External Public Debt stock measured as a percentage of GDP

Log DSP: Logarithm of Debt Service Payment measured as a percentage of GDP

Log FDI: Logarithm of Foreign Direct Investment measured as a percentage of GDP

Log K: Logarithm of Gross Capital Formation measured as a percentage of GDP

Log L: Logarithm of Population Growth Rate

α_0: Constant term

D07: Dummy for year 2007

ε_t: Error term

$\alpha_1, \alpha_2, \alpha_3, \alpha_4, \alpha_5$ are coefficients of the independent variables

Data Analysis Procedure

Inferential analysis was adopted in this study. Once data was collected, it was edited, organized and cleaned and then entered in Microsoft excel for importation to Eviews, Pcgive OxMetrics and Stata for analysis. The data was then log transformed to linearize it. Diagnostic checks that include: linearity, normality, homoscedasticity and collinearity were done to ensure that the assumptions of the Classical linear Regression Model (CLRM) hold. The assumptions were held and thus the Ordinary Least Square estimators were found to be Based Linear Unbiased Estimators (BLUE) after which estimation techniques were then applied. The estimation techniques are: unit root test for testing stationarity, cointegration test to distinguish between long-run and short-run estimation and granger causality test to examine causal relationship among variables.

Estimation Techniques

Error Correction Model (ECM)

The Error Correction Model is the best appropriate model for estimating economic variables that are individually cointegrated which means that there is meaningful long-run relationship between them and are non-stationary as shown by empirical studies (Otieno, Korir & Mudaski, 2011). Error-correction methodology is suitable for it is able to induce

flexibility by combining both the long-run and short-run dynamic equilibrium models in a uniform system. The methodology also ensures data coherence, consistency and theoretical rigour. The Error- Correction methodology was carried out in the following steps:

Test for Stationarity / Unit Root Test

The Ordinary Least Square (OLS) assumes that the variables under consideration be stationary. This means that the mean, variance and covariance of the variables are time invariant. However, almost all macroeconomic variables are found to be non-stationary. According to Gujarat (2003), carrying out regression using the non-stationary variables yields spurious results and is referred to as spurious or non-sense regression. Similarly, a series is said to be stationary if its mean and variance are constant over time no matter the point at which they are measured, otherwise it is a non-stationary series. A non - stationary series is said to be containing a unit root and in this case, the series may require do be differenced to make it stationary. If a series has no unit root, then it is said to be integrated of order zero, $I(0)$. The Augmented Dickey Fuller (ADF) test and Phillips Perron (PP) test will be used to test for stationarity after the data has been log transformed. Mackinnon critical values for rejection of null hypothesis of unit root at 1%, 5% 10% were compared with the test results. The variables are stationary if the test results are found to be less than the MacKinnon critical values.

Cointegration Test

Cointegration analysis provides a platform for explicitly distinguishing between short-run and long-run estimations through the error correction formulation.

Granger Causality Test

After the long-run relationship between external public debt and the macroeconomic variables has been established, the next step was to examine the Granger causal relationship among the variables.

Vector Auto Regression (VAR)

Vector Autoregression (VAR) is a way to summarize the dynamics of macroeconomic data. The VAR models provide empirical evidence on the response of macroeconomic variables to exogenous impulses.

Vector Diagnostics and Tests

This study employed Lag selection test, LM Multiplier test and Normality test as the vector diagnostics and tests.

Lag Order Selection

The Akaike Information Criteria (AIC), Hannan-Quinn Information Criterion (HQIC) and the Schwarz Bayesian Criteria (SBC) were used to select the number of lags for each of the models. According to Gujarat (2003), the model with the least value of the AIC and SBC is preferred. Models with different lags were run and the model with least values of the AIC and SBC was selected.

LM Multiplier Test

An LM Multiplier test was conducted on the data to ascertain the existence autocorrelation in the residuals. Null hypothesis for absence of autocorrelation in the residuals is accepted if the obtained critical value is more than 0.05.

Normality Test

Ordinary Least Squares (OLS) assumes that the error term is normally distributed. Jarque Bera test, Skewness test Kurtosis test statistics were used to test for normality. Residuals are said to be normally distributed if the null hypothesis for the test statistics being statistically different from zero is accepted.

Diagnostic Tests

Diagnostic checks to be carried out are multicollinearity test, autocorrelation test and heteroscedasticity test

Multicollinearity Test

Multicollinearity is said to occur when there is inter-correlation among the explanatory variables. Though multicollinearity is not a problem, the degree of collinearity is of primary concern since explanatory variables that are highly correlated present difficulties for it makes it difficult to isolate the effect of each explanatory variable on the explained variable. In this study, the researcher detected the presence of multicollinearity using the coefficient of determination (R^2). Multicollinearity is detected when there is a high coefficient of determination but few significant t-ratios.

Autocorrelation

The problem of autocorrelation exists when variances of the error terms are serially interdependent. The values of the stochastic term should be serially independent according to the Classical Linear Regression Model assumption of non-autocorrelation. This means that the disturbance occurring at one point of a set of observation should not be related with another disturbance occurring at another point of the set of observation. Autocorrelation can be caused by a faulty functional form of the model, omission of explanatory variables from the model, effects of shocks over time on time series data and sluggishness of economic time series. The result of autocorrelation will be inefficient and inconsistent parameter estimates and biasness of estimator variances. The researcher used the Durbin Watson (d-test) to detect autocorrelation. Autocorrelation is present if the d-test assumes values close to or exact values of 0 and 4. A value of 0 shows evidence of perfect positive autocorrelation while 4 shows evidence of perfect negative autocorrelation. Values ranging from 2 to 2.5 show evidence of no autocorrelation.

Heteroscedasticity

Heteroscedasticity occurs when the assumption of homoscedasticity is violated. The assumption requires that the variances of the residuals should be constant. Presence of heteroscedasticity means that the results will have statistically insignificant coefficients as well as misleading statistical inferences. Heteroscedasticity occurs as a result of presence of outlier observations, omission of some important variables in the model, incorrect transformation of the model or incorrect functional form of the model. The researcher used Breusch-Pagan test for Heteroscedasticity where the null hypothesis is that for a constant variance. Heteroscedasticity will be absent if the null hypothesis for constant variance is accepted but a rejection of the null hypothesis will imply the presence of heteroscedasticity.

RESULTS

Unit Root Test

Unit root test was carried out to establish whether the variables were stationary.

Table 1: Unit Root Test for Economic Growth Model Variables

Variable	Lag	ADF	Integration Order
Log ECG	1	-3.73233	I(1)
ΔLog ECG_{t-1}	1	-5.82285	I(0)
Log K	1	-1.683870	I(1)
ΔLog K_{t-1}	1	-5.510094	I(0)
Log L	1	-1.521679	I(1)
ΔLog L_{t-1}	1	-4.075261	I(1)
ΔΔLog L_{t-1}	1	-6.717510	I(0)
Log EXD	1	-2.085666	I(1)
ΔLog EXD_{t-1}	1	-2.428809	I(1)
ΔΔLog EXD_{t-1}	1	-5.082428	I(0)
Log DSP	1	-0.908628	I(1)
ΔLog DSP_{t-1}	1	-2.455392	I(1)
ΔΔLog DSP_{t-1}	1	-6.288117	I(0)
Log FDI	1	-6.013339	I(0)

All the variables were found to contain a unit root I (1) in their level form except for FDI at Mackinnon critical values of -4.2605, -3.5514 and -3.2081 at 1%, 5% and 10% level of significance. After the first difference, economic growth and gross fixed capital formation (K) were found to contain a zero unit root I (0) at Mackinnon critical values of -4.2712, -3.5562 and -3.2109 at 1%, 5% and 10% level of significance. Population growth rate (L) contained a unit root at 1%, while external debt and external debt service payment contained the unit root at 5% and 10% level of significance. Second differencing was done for economic growth, population growth rate, external debt and external debt service payment and all the variables were found to be stationary at Mackinnon critical values of -4.2826, -3.5614 and -3.2138 at 1%, 5% and 10% level of significance. Foreign Direct Investments were stationary while on level at 1%, 5% and 10% level of significance

Cointegration Test

This test was performed to explicitly distinguishing between short-run and long-run estimations through the error correction formulation. The tests are done in case the time series is non-stationary in order to ensure long-run relationships.

Table 2: Cointegration between Economic growth and the Explanatory Variables

ADF Test on Residuals - 4.197113	**PP** Test on Residuals -5.650534

The ADF and PP test results indicate presence of cointegration in the equation. Null hypothesis for non cointegration was rejected at Mackinnon critical values of -2.9558, -3.6496 and -2.6164 at 5%, 1% and 10% levels of significant respectively for the ADF test. The PP test also confirmed cointegration at -4.2605, -3.5514 and -3.2081 Mackinnon critical values at 5%, 1% and 10% levels of significance.

Granger Causality Test

Granger causality test was performed to establish whether the variables had causality and to determine the direction of the causality.

Results of granger causality between economic growth and external public debt, external public debt service

payment, gross capital formation and population growth and FDI are provided in Table 4. Bidirectional granger causality was observed between external public debt service payment and economic growth at 5% and 10% levels of significance. Unidirectional granger causality was observed between external public debt service payment and economic growth and between external public debt and economic growth at 5% and 10% levels of significance and between external public debt service payment and economic growth at 1% level of significance. No granger causality was present between gross capital formation and economic growth, population growth and economic growth and FDI and economic growth at 1%, 5% and 10% levels of significance.

VAR Diagnostics and Tests

Lag order selection test, LM test for the residuals and normality tests were carried out under VAR diagnostics and tests.

Lag Selection

Table 3: Lag Selection Results

Test	Lag 0	Lag 1	Lag 2	Lag 3	Lag 4
AIC	3.41411	3.18379	3.15565	3.16371	3.16804
HQIC	3.48951	3.27426	3.26121	3.28435	3.30375
SBC	3.6454	3.46133	3.47946	3.53378	3.58435

Lag selection was done using AIC, HQIC and SBC tests under Vector Autoregression. The model lags were selected based on the coefficients of AIC and SBC. Lag two which had the least value of the coefficients for AIC and HQIC was selected.

Normality Test

The results for Jarque Bera, Skewness and Kurtosis were 7.749910, -0.119785 and 5.292778 respectively with a probability of 0.1356. The null hypothesis for no normality in the residuals was rejected at 5% for the three tests and hence the residuals are normally distributed.

Estimation of the Empirical Model

Table 4: Economic Growth Model Estimation Results

	Coefficient	Std. Error	T-Value	T- Prob
Constant	-0.478505	0.1277	-3.75	0.0072
D2LNEXD	-3.54816	0.3314	-10.7	0.0000
D2LNEXD_1	3.16883	0.4673	6.78	0.0003
D2LNEXD_2	-0.317102	0.6064	-0.523	0.6172
D2lnDSP	0.649114	0.2315	2.80	0.0264
D2lnDSP_1	-0.424640	0.3102	-1.37	0.2134
D2lnDSP_2	0.095017	0.2758	0.345	0.7405
LNFDI	-0.004773	0.03768	-0.127	0.9028
LNFDI_1	-0.227406	0.04925	-4.62	0.0024
LNFDI_2	-0.083685	0.03653	-2.29	0.0558
D2LNK	4.53482	0.2808	16.2	0.0000
D2LNK_1	-0.209864	0.4253	-0.493	0.6368
D2LNK_2	0.411225	0.3234	1.27	0.2441

DlnL	- 26.9012	16.15	-1.67	0.1396
DlnL_1	53.6672	25.84	2.08	0.0764
DlnL_2	-35.0344	12.92	-2.71	0.0301
D07	0.299905	0.2340	1.28	0.2408
D07_1	0.75742	0.4415	1.72	0.1300
D07_2	-0.150159	0.3593	-0.418	0.6974
ECT_{t-1}	-1.0756	0.1325	-0.812	0.0001

R-squared	0.995733	Adjusted R-squared
Durbin Watson statistic	2.08	F-Statistic 116.7(0.00)

Note: 'D' before the variable symbol implies first difference of the variable. 'D2' implies second difference.

Table 4 presents the OLS regression results for the economic growth model. The F statistic is 116.7 with a P value of 0.000 implying that the independent variables external public debt, debt service payment, foreign direct investment, gross fixed capital formation and population growth rate determine economic growth. The measure of goodness of fit given by R squared is 0.995733 implying that 99.57% of variations in economic growth are explained by independent variables external public debt, debt service payment, foreign direct investment, gross fixed capital formation and population growth rate.

The regression results show that external public debt, debt service payment and gross fixed capital formation are statistically insignificant. However, foreign direct investment is statistically significant at 10% while population growth rate is statistically significant at both 5% and 10% in explaining economic growth in Kenya. The results imply that holding other factors constant, a unit increase in external public debt as a percentage of GDP in Kenya would lead to about 0.3171 decreases in economic growth. A unit increase in debt service payment as a percentage of GDP would result to a 0.0950 increase in economic growth, a unit rise in foreign direct investment as a percentage of GDP would lead to a 0.0837 decrease in economic growth in Kenya. Similarly, a unit rise in gross fixed capital formation as a percentage of GDP would result to a 0.41123 increase in economic growth and a unit increase in population growth rate would imply a 35.0344 decline in economic growth in Kenya.

Diagnostic Tests

Multicollinearity Test

Multicollinearity test was carried out to establish whether the explanatory variables were correlated. A high value for R-squared but few significant t- ratios is an indication of presence of multicollinearity. The data analysed indicated that the model had a high R-squared of 0.995733. However, there were many significant t-ratios and hence this indicated the absence of multicollinearity.

Autocorrelation

Autocorrelation test was performed to establish whether the error terms were serially interdependent. A Durbin Watson statistic of 2.08 indicated the absence of autocorrelation in the error terms.

Heteroscedasticity

Heteroscedasticity test was performed to establish whether the residuals had a constant variance.

Table 5: Test for Heteroscedasticity Results

Obs*R-squared	17.05584	Probability chi-square	0.649344

The null hypothesis for constant variance was accepted at 1%, 5% and 10% levels of significance. This implies that the error terms have a constant variance.

Discussion of the Results

Results in Table 4 show that external public debt has a negative effect on economic growth. This is so because a high external public debt as a percentage of GDP leads to lowering of the economic growth rate. The results are a confirmation to the theoretical view that whenever the government is facing the problem of heavy debt burden, it has to increase taxes in the future in order to finance the high debt service payments.

Debt service payment was found to have a positive effect on economic growth. This was contrary what was expected.

The results indicated a negative relationship between foreign direct investment and economic growth. This was contrary to what was expected. Gross fixed capital formation was found to be positively related to economic growth. The theoretical view holds that capital is a major factor of production and thus positively related to economic growth. These findings support those of Onyango (2014) who studied the impact of external debt on economic growth in Kenya and found that capital formation is positively related to economic growth.

Population growth was found to negatively affect economic growth contrary to the expectation. It is expected that in an ordinary situation, as the population grows, the size of the labour force grows and hence resulting to economic growth.

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