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## **MACROECONOMIC DETERMINANTS OF ECONOMIC GROWTH IN BOTSWANA: THE KEYNESIAN APPROACH**

### **Abstract:**

The interest of this study is to examine the macroeconomic determinants of economic growth in Botswana. The paper is motivated by poverty and unemployment figures rampaging the economy of Botswana, therefore, it is necessary to investigate its growth empirics. The study adopted the Keynesian expenditure approach to identify the factors influencing Botswana's economic growth. The study used the time series data spanning from 1966 to 2014. The paper applied a robust Engle-Granger approach to examine the long run equilibrium between Keynesian macroeconomic factors and economic growth. In an attempt to examine the long run equilibrium, the results of the study revealed that all the variables performed according to Keynesian theory expectation. Furthermore, although imports impact negatively to economic growth according to Keynes theory and it is empirically proven. The study recommends that economic policy makers in Botswana should reconsider the import structure of the economy in such a way that they promote import of capital goods that will impact positively to economic growth in the long run that will translate to eradicate poverty and reduce unemployment.

### **Keywords:**

economic growth, Keynesian theory, cointegration

**JEL Classification:** B41, C01, E20

## 1. Introduction

According to Mallick (2002) there has been a trending research work with the theoretical and empirical analysis on economic growth especially for developing economies. The growing concern for such studies it emanates from the fact that most developing economies are faced with huge income inequality and poverty levels are also immense. For most policy makers around the world it is believed that policies directed to boost economic growth is the center for every dialogue for civil servants. Botswana as one of the developing economy in Africa which is faced with such challenges of high poverty levels. Despite that, the report of UNRISD<sup>1</sup> authored by Maipose (2008) it was indicated that Botswana is one of the economy in the past 40 years with an impressive macroeconomic policies and good governance. The country recorded the remarkable 9% of real growth rate between 1965 and 2006. The economy of Botswana was mainly supported by mining sector, of which diamond industry is the pillar of the strength. The country is an inland located in the center of Southern Africa and shares the borders with countries such as Zambia, South Africa, Namibia and Zimbabwe. The development indicators shown that for the years 1980 and 2013, Human Development Index (HDI) value for Botswana improved from 0.47 to 0.68, which is an average of 1.14% per year.

However, like it is mentioned earlier that the country it is not without socio-economic problems. The issue of unemployment is among the concerns that leads the society into poverty trap. The unemployment rate for Botswana has been fluctuating over the years, which currently in 2013 it stood at 18.4%. The country also recorded 47% of the population between 1993 and 1994 were living below the poverty line, where in 2011 it was estimated that 20% they live below poverty line. Despite this significant decline in poverty levels, the hardship of poverty are felt especially in rural areas. Among other things was the stand by the government of Botswana by developing a program of poverty reduction in 2001, called Botswana Poverty Reduction Strategy (BPRS).

Against all the background on Botswana living standards and unemployment it is thus imperative to investigate the macroeconomic factors in determining economic growth. The aim of this is to: (1) to determine the long run relationship between economic growth and macroeconomic factors using Keynesian perspective. (2) to estimate the short run error correction model between economic growth and macroeconomic factors. The study is structured as follows: Section 2 discusses research methods of the study, section 3 presents data and source of variables. Section 4 present the empirical results and Section 5 is the conclusion of the study.

## 2. Research methods of the study

The study follows the standard Keynesian model to estimate the aggregate real sector for the economy of Botswana. According to Keynes (1939) the fundamental idea in

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<sup>1</sup>United Nations Research Institute for Social Development

understanding of AE model is the theory of planned aggregate expenditure. The basic equation to Keynes expenditure method is as follows:

$$AE_t = C_t + I_t + G_t + (X_t - Z_t) \quad (1)$$

Where  $AE_t$  denotes aggregate expenditure,  $C_t$  household consumption,  $G_t$  total government expenditure,  $(X_t - Z_t)$  to cater for foreign sector impact.  $X_t$  denotes exports and  $Z_t$  imports. From equation 1, the current study develops the empirical model for the study as follows:

$$\ln GDP_t = \pi_0 + \beta_1 \ln HHC_t + \beta_2 \ln GDF_t + \beta_3 \ln GVEX_t + \beta_4 \ln EGS_t + \beta_5 \ln MGS_t + \Omega_t \quad (2)$$

$\ln GDP_t$  explains the endogenous variable,  $\ln HHC_t$  household final consumption,  $\ln GDF_t$  defines gross capital formation.  $\beta_4 \ln EGS_t$  captures the impact of export of goods and services.  $\beta_5 \ln MGS_t$  is imports of goods and services. Lastly,  $\pi_0$  and  $\Omega_t$  represents intercept and white noise term respectively. All the parameters in the aggregate expenditure model are expected to have a positive impact on domestic production except for imports of goods and service. In order for the current study to estimate the equation 2, the econometric technique of Engle-Granger is used. In most of the existing literature on macroeconomic modeling, the method of Engle-Granger two step method it is widely accepted.

Since Engle-Granger (1987) published their paper on cointegration, the method most among the economist has taken the world by storm. The techniques it is well known as two step method in the literature because at first: the study determines the univariate characteristics of the variables involved to see if series contain unit root. Then after estimate the long run equation, which is normally called the static modelling. The long run equation can be simulated as the following:

$$y_t = \pi_0 + \beta x_{1t} + \Omega_t \quad (3)$$

Then residuals will be produced as:

$$\Omega_t = y_t - (\pi_0 + \beta x_{1t}) \quad (4)$$

Where  $\Omega_t$  denotes residuals from long run equation (3), which are subject to unit root test to determine if they stationary at levels. If so, this implies that there is a long run equilibrium between the variables of interest. In the second step: the study after confirming cointegration existence in the long run it applies short run error correction model. In the second step differences in  $y_t$  are regressed on differences in  $x_t$  and add the residual from long run equation by lagging it once. Then the short run error correction model is expressed as follows:

$$\Delta y_t = \gamma_1 + \gamma_2 \Delta x_{1t} - \gamma \Omega_{t-1} + \mu_t \quad (5)$$

Equation (5) is described as the short run error correction model, on the term  $\gamma \Omega_{t-1}$  captures the speed of adjustment. The sign of the term must be negative and statistically significant to resemble the deviation from the long run.

Before an estimation of the long run equation (1), the variables in the system must be subject to unit root testing. The study applies the Augmented Dicker-Fuller (ADF) unit root to investigate the stationarity of variables. The test was pioneered by Dickey and Fuller (1979). The ADF test it is based on three following regressions, in other to test for unit root in variables.

$$\Delta y_t = \phi y_{t-1} + \vartheta_t \quad (6)$$

$$\Delta y_t = \phi y_{t-1} + \gamma_0 + \vartheta_t \quad (7)$$

$$\Delta y_t = \phi y_{t-1} + \beta t_i + \gamma_0 + \vartheta_t \quad (8)$$

The equation (6) is the random walk model, equation (7) is the random walk model with intercept only. The last equation (8) is the random walk model with intercept and time trend, (Gujarati, 2004).

### 3. Data and source

To carry out this study, an annual time series data for the period 1966-2014 is collected. Data for this study is obtained from World Bank Development Indicators. The study applies macroeconomic data to estimate aggregate expenditure in Botswana. The variables used in this study are: gross domestic product (lnGDP), household final consumption (lnHHC), gross capital formation (lnGDFF), exports of goods and service (lnEGS) and lastly imports of goods and service (lnMGS).

### 4. Empirical results

The table 1 below presents the results for ADF test for unit root. The results shows two instance of variables at levels and first difference. From the P-P test results the evidence indicates that variable lnGDP, lnHHC, lnGDFF, lnGVEX, lnMGS and lnEGS they are all non-stationary at levels. In contrast after taking the first difference of each variable they all became stationary, it also be observed that the variables are statistically significant at 1% except for variable lnHHC.

Table 1: ADF unit root for variables at levels and first difference

variable	P-P test in levels	Test critical value	P-P test First difference	Test critical value
LnGDP	-1.427661	1% -4.161144 5% -3.506374 10% -3.183002	-4.885002 ***	-4.165756 -3.508508 -3.184230
LnHHC	-2.540047	1% -4.161144 5% -3.506374 10% -3.183002	-3.069865 *	-4.165756 -3.508508 -3.184230
LnGDFF	-3.143606	1% -4.161144 5% -3.506374 10% -3.183002	-6.181044 ***	-4.165756 -3.508508 -3.184230
LnGVEX	-1.765856	1% -4.161144 5% -3.506374 10% -3.183002	-4.240786 ***	-4.165756 -3.508508 -3.184230
LnMGS	-2.559000	1% -4.161144 5% -3.506374 10% -3.183002	-6.758139 ***	-4.165756 -3.508508 -3.184230
LnEGS	-1.679789	1% -4.161144 5% -3.506374 10% -3.183002	-6.421283 ***	-4.165756 -3.508508 -3.184230

Since this investigation have confirmed that all the variables are stationary at first difference, then the next step is apply cointegration test. In case of the current research paper, the test of cointegration is applied using the method Engle-Granger two step. The results of the first step on the method are provided on the following equation:

Table 2: long run estimation model

Variable	Coefficient	t-Statistic	Prob.
LnGHHC	1.095322	33.60540 ***	0.0000
LnGDFF	0.835189	6.468521 ***	0.0000
LnGVEX	0.546861	4.079614 ***	0.0002
LnMGS	-0.877347	-5.812713 ***	0.0000
LnXGS	1.636876	19.78021 ***	0.0000
C	-8.903843	-7.425151 ***	0.0000
R-squared 0.987901		Adjusted R-squared 0.986494	

From the above Table 2 it can be observed that all the variables in the long run performed according to expected theory. It shows that in the long run there is a positive relationship between household final consumption and domestic production. A 1% increase in household expenditure will increase domestic production by 1.09%. The study indicates that total investment for Botswana economy has a positive impact on domestic production in the long run. As for government expenditure and exports have a positive impact on domestic production. Lastly, imports also performed according to expected theory with a negative sign, it shows that 1% increase in imports will lead to a decrease in domestic production by 0.87%. The second step is to produce the residuals from the long run equation. The study used the ADF unit root test to test the residuals to determine if they are integrated at levels.

Table 3: ADF unit root for the residuals at levels

variable	ADF t-statistics	Engle-Granger critical values		
		1%	5%	10%
Ecm(-1)	-4.868570 **	-5.52	-4.71	-4.42

Table 3 above shows the results on the test of residuals from the long run, the ADF t-statistics is -4.868 of which it shows that the residuals are integrated of order zero. This results implies that in the long run variable  $\ln GDP$ ,  $\ln HHC$ ,  $\ln GDF$ ,  $\ln GVEX$ ,  $\ln MGS$  and  $\ln EGS$  they are cointegrated. Since the study have confirm the long run equilibrium, it possible that in the short run there are deviations from the equilibrium. The study applies the error correction model to determine the speed of adjustment from the long run equation. Table 4 below provides short run model results.

Table 4: short run estimation model

Variable	Coefficient	t-Statistic	Prob.
$\Delta \ln HHC$	0.043281	0.456897	0.6502
$\Delta \ln DFF$	0.222045	4.139785 ***	0.0002
$\Delta \ln GVEX$	0.057216	0.652652	0.5176
$\Delta \ln MGS$	-0.129912	-1.603272	0.1166
$\Delta \ln XGS$	0.516437	6.371512 ***	0.0000
ECM(-1)	-0.145055	-2.609214 **	0.0126
C	0.074381	9.527369 ***	0.0000
R-squared	0.544383		
Adjusted R-squared	0.477707		

The parameter for ECM(-1) is negative and statistically significant. The sign of the lagged residual shows that there is 14% speed of adjustment from the long run. The goodness of fit for the short run model indicates a 54% which seem to be satisfactory and dependable. For every model estimated in time series analysis there must be an interrogation of diagnostic test to determine if the assumptions of classical linear

regression are not violated. For that purpose the study applies the following tests: normality, Ramsey Rest and heteroscedasticity.

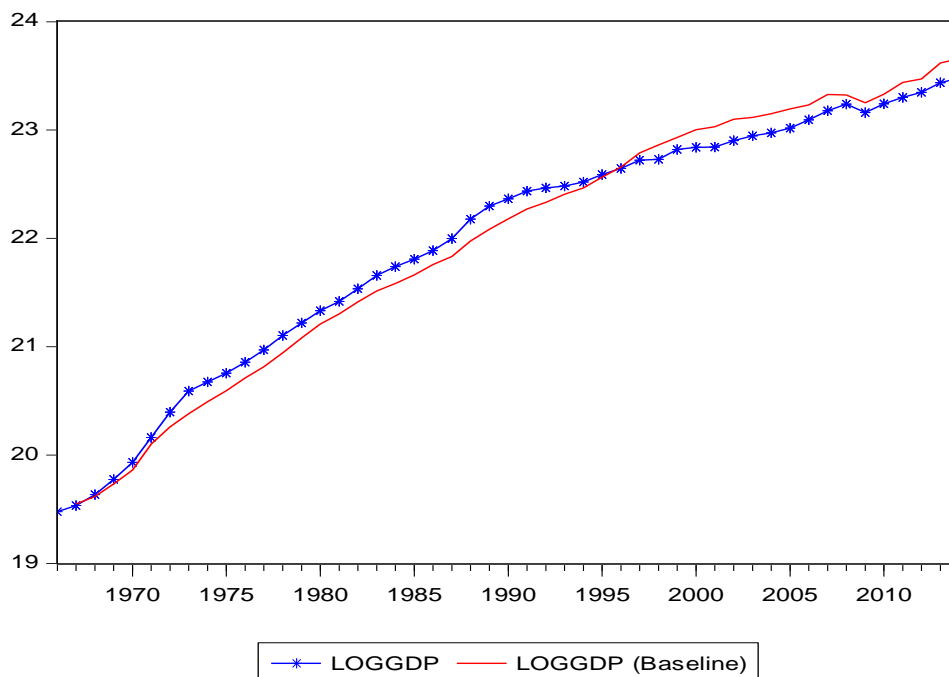
Table 5: short run estimation model

Test type	Probability	Conclusion
Jarque-Bera	0.9813	The residuals are normally distributed
Ramsey Rest	0.7188	No specification error in the model
White test	0.7674	No heteroscedasticity in the residuals

The above Table 5 provides the results for normality test using the Jarque-Bera test. The test assumes that the null hypothesis is that the residuals are normally distributed. From the results it indicates that the probability value is 0.981. Therefore, the study reject the null hypothesis and confirm that the residuals are normally distributed. The second test is the Ramsey Rest to test for misspecification in the model. The results shows that the model has passed the of no specification error. The last diagnostic test the study applied is heteroscedasticity. The study applied the White test to investigate the phenomena. The results shows that the probability value is 0.7674, which implies that the study cannot reject the null hypothesis of no heteroscedasticity.

One of crucial step in time series is the dynamic simulation of both the short and long run characteristics of the model. This step in macroeconomics it became the tradition following various empirical studies. The figure below provides the results for simulation of the estimated model.

Figure 1: Actual and fitted values of domestic production model



From the figure above it can be observed that the estimated model is stable and well specified. This is confirmed by closeness of fit of the model between the actual and estimated domestic production.

## 5. Conclusion and discussion of the study

The main intention of this research paper was to investigate the demand side of the economy of Botswana. The interest of the study was also to explore the whether the Keynesian hypothesis holds for economy. The research adopted the basic Engle-Granger two step method to investigate the Keynesian hypothesis (Demand side) for economy of Botswana. The study covers the period 1966 to 2014, which makes the total of 49 observation available for analysis. In the first preliminary test on unit root on variables of interest, it was found that all of them they are intergrated of order one.

The study applied Engle-Granger method to investigate cointegration among the variables. The test proved that for the study there is a long run cointegration existing among the variables. In the analysis it is shown that the behavior of all the exogenous variables performed according to the expected theory. The results shown that household consumption have a positive impact on economic growth. This results are in accordance with the work of Bin-Amin (2011) and Ramlil & Andriani (2013). The study also found that there is a positive relationship between capital formation and economic growth. The results are consistent to prior theoretical expectations and empirical studies. The findings are in line with the work of Karim, Karim and Ahmad (2010), when investigating dynamic linkages between economic growth, fixed investment and household consumption in Malaysia. The current study also found that government expenditure had a positive impact on economic growth in the long run. This findings are not consistent with the work of Antwi, Millis and Zhao (2013) when investigating major macroeconomic factors that drive economic growth in Ghana.

The effect of exports of goods and service was found to have a positive impact to economic growth. This results are in line with the Keynesian economic theory on economic growth. Their also consistent to the work of Mosikari and Sikwila (2013) when investigating trade openness and economic growth in South Africa. Botswana imports of goods and service had a negative impact on economic growth in the long run. This findings are in line with the Keynesian economic theory that postulates that imports results in a decrease in total domestic production. Based on the findings of the study it is suggested that in order for Botswana economy to alleviate poverty and create employment is to follow the Keynesian expenditure approach.

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