

Effects GDP on Public Expenditure on Education in Kenya (1978-2018)

Corresponding Author: XXXX

Abstract: *This study sought to analyse the relationship between the changes in GDP and that of total expenditure on education. Indeed the study was intended to determine the effects of GDP on total expenditure on education in Kenya. The study was aimed at proving the null hypothesis that the growth in GDP in a given period has a significant impact on the level of government spending on education in Kenya and hence budgetary allocations keep on changing. The study employed a regression model using OLS method with GDP against total education expenditure during the review period. Diagnostic tests were carried out to check on problems associated with time series analysis. The linear regression tests assumptions includes linearity test, homoscedasticity, autocorrelation and normality. The findings of the study revealed that education expenditure was significantly related to changes in GDP. This indicated that an increase in GDP led to a slightly more than proportionate increase in public expenditure on education in Kenya during the period under review. Such findings imply that the government is making efforts to revise education budget as the economy grows. This move indicates the effort by the government in trying to cope with rapidly increasing demand for education in Kenya.*

Key words

Gross Domestic Product (GDP)-*This is the total value of the country's output of goods and services produced within the borders.*

Public Expenditure-*Any amount of money spent by the government for a particular purpose in the economy*

Public Expenditure on Education-*Government money allocated to education sector*

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I. INTRODUCTION

Knowledge is the driving force in the rapidly dynamic globalised economy and society (Rani, 2004; Tilak, 2001). In this regard, quantity and quality of highly educated and specialised labour force determine their competence in the global market. It is now well recognised that the growth of the global economy has increased for those countries with good levels of education and vice versa for those without such developments (Tilak, 2001; Mugambi, 2012). More importantly, the benefits of globalisation accrue to the countries with highly skilled human capital and a curse for countries without such specialised human capital (Rani, 2014).

There's conclusive evidence that education improves societal well-being. For this reason societies invest heavily in inclusive and quality education. Kenya's budgetary allocation to education in the current financial year stands at 494.8 billion shillings (about US\$4.95 billion). This is twice the combined allocations for defence, health and the presidency. Put simply, the education budget is about 5.3% of 2018 GDP ((Ngware 2019)

Developing countries are faced with a big challenge in a highly competitive world economy because their education systems are not adequately tailored for the creation and use of knowledge (Hanushek, 1996; Hanushek and Kimko, 2016). This weakness has its roots right from basic levels where primary education is not provided with the required quality especially in public institutions. Although the basic education system and the pattern of financing it differ a great deal across countries in terms of their cost structure and degree of institutional diversification, many of these countries are faced with severe financial crises in providing education that is suitable for their specific needs (Lienert and Saraf, 2001; Mugambi, 2012).

The Kenya government has been reviewing its education budget upwards over time such that currently this sector is the leading recurrent spender compared to other main services in the country. Nevertheless the country faces a number of challenges in its quest for sufficient supply of education at all levels in the country. Much of these challenges have to do with sustainability of the government budget for various education programmes which have been initiated at various levels of education in the country.

The purpose of this study is to analyse the responsiveness of educational expenditure to changes in GDP in Kenya over the study period. This is in an attempt to observe the extent to which the government responds to education funding due to changes in GDP.

Education as Investment

The human capital approach views expenditure on education primarily as an investment which earns a net positive rate of return for the investor (a student in this context) in terms of a future stream of higher earnings than what would have been otherwise possible exceeding costs of education comprising explicit as well as implicit costs. Based on this, Schultz 1961 and Becker 1993 is argues that education in general, and higher education in particular, should be primarily funded by investor as the private rate of return exceeds the social rate of return narrowly defined (Psacharopoulos and Patrinos, 2014). However, there is a rationale for public support for higher education if the social rate of return is broadly defined with the inclusion of positive externalities which eventually exceeds private returns. In this approach, the rate of return is used for guiding the allocation of resources within the education sector as well as at the macro level.

Human capital features prominently in the endogenous growth models primarily to overcome the diminishing marginal productivity of capital exhibited under the constant returns to scale production function which is the basis of Solow's model of growth where the contribution of technological progress is determined residually. Existing studies indicate that education, and particularly, higher education has a substantial potential for fostering technological development and is crucial for building a knowledge society to gain a competitive edge in the world economy. Indeed, the situation in Kenya is such that education is used as the basis for allocation of human resources that are productive in the economy, although there could be some political expediency in some aspects. For instance the highly educated echelons are placed at strategic positions in the crucial sectors of the economy to act as the drivers of economic growth in those particular sectors.

Objectives of the Study

The main objective of this study was to analyse the relationship between the changes in gross domestic product (GDP) and budgetary allocations to education sector in Kenya during the sample period.

Hypotheses of the Study

The study sought to prove the null hypothesis that growth in GDP in a given period has a significant impact on the level of government spending on education in Kenya and hence budgetary allocations are changing.

II. METHODOLOGY

This study uses the deductive scientific method premised into an econometric model based on the extended version of Cobb-Douglas Equation. The model is applied in the analysis of historical time series trends in public expenditure during the sample period. The regression of the modelled equation was carried out using Ordinary Least Squares (OLS) method utilising Eviews econometric package. The choice of the model was deemed appropriate for the study because of its versatility in addressing the problem of non-linearity of the relationship among the variables. The model also allows interpretation of the parameters in terms of elasticities since the study is concerned with the relative responsiveness of dependent variable to changes in each independent variable in the model.

Research Data

This study uses secondary data from the existing government records and documents in Kenya. The main data used in this study are the national income (GDP) at market prices and government expenditure on education at their nominal values. Regarding the econometric model the study uses nominal values of GDP and expenditure data. The GDP and public expenditure figures have been expressed in constant prices to check the trend. For this purpose the data is converted into constant prices using 2000/2001 as the base year. This data was obtained from various issues of Economic Survey; Budget Statistical Annex; Kenya Bureau of Statistics (KEBS); International Financial Statistics (IFS) and Government Printed Estimates (GPE) by the Ministry of Finance.

Choice of Variables

This study is carried out with clear understanding by the researcher that quite a number of macroeconomic changes took place in Kenya during the long study period, and hence, all these had substantial impact on the economy in general and on public expenditure on education in particular. For instance the country experienced high fiscal deficits coupled with high inflation rates in 1990s followed by declining economic growth rate which plummeted to a paltry 1.7 percent in 2006/07 (GoK, 2007, 2008). In addition, economic liberalisation and other SAPs were implemented in 1990s to cope with the IMF/ World Bank demands. It is during the same period that a number of expansionary undertakings were done on various sectors of the

economy including education, health and infrastructure. Moreover, the constitution was changed during the same period which saw implementation of devolved system of governance in the year 2013.

All these macroeconomic variations had significant effect on the government budgets in the subsequent years. The choice of these variables is justified on grounds that a number of previous studies related to this topic have used similar variables in the analysis. These include: Al-Samarrai (2013); Onsomu, Muthaka, Ngware and Kosimbei (2006). In addition, Anyanwu and Erhijakpor (2007); Olusegun and Schoeman (2007); Davoodi et al (2001) used similar variables among others in the analysis.

For the purpose of this study Public expenditure on education was used as the dependent variable against the GDP as explanatory variable.

Public Expenditure on Education

It is the responsibility of the Kenya government to allocate additional public expenditure on education as the economy improves. Thus holding other factors constant, public expenditure on education increases as GDP increases. Such a relationship between dependent variable and explanatory variable can be analysed in terms of elasticities of the former in response to changes in the latter as is the case in the current study. In this regard, the elasticity of GDP in relation to changes in public expenditure on education is analysed to determine policy implications of such changes (Johnson1985; Klein, 1974). Changes in public expenditure on education at each level of schooling can be influenced by a myriad of factors including enrolment of students, staffing situations, institutional infrastructure and, salary outlay for teachers among other factors. This means that whenever these variables change substantially, the government is expected to adjust budgetary allocation to the education sector in response to these changes. Similarly, various economic reforms initiated in the education sector can also influence public expenditure on education directly or indirectly through a causality response on changes in variables such as enrolment, staffing situation, level of infrastructure and staff salaries, among others, at each level of education. In this case, the responsiveness of public expenditure on education to changes in these explanatory variables is analysed through elasticities(Johnson1985; Klein, 1974; Mingat, 1996; Njeru, 2003). Consequently, an econometric approach is used for the analysis of this data in an attempt to find out the outcome of this analysis for policy purposes.

Elasticity of GDP

For the purpose of this study, Elasticity of GDP refers to the responsiveness of GDP to changes in Public Expenditure on Education holding other factors constant. Elasticity measures the responsiveness of the dependent variable to changes in the independent or explanatory variable(s) within a given time period (Mansfield, 1972; Musgrave and Musgrave, 1988). This elasticity is expressed in percentage form such that the higher the positive value, the higher the degree of responsiveness, and hence, the greater the elasticity of the dependent variable in relation to the selected explanatory variable(s). More importantly, if the value is greater than 100 percent then the GDP is said to be elastic in response to a particular independent variable. On the other hand, if the value is less than 100 percent then it is deemed inelastic in the same respect (Gujarat and Sangeetha, 2007; Madnani, 2005; Mansfield, 1972). Elasticity approach has been used by various researchers to analyse the relationship between GDP and explanatory variables such as public expenditure on education, staff salaries, enrolment and institutional infrastructure expenditure among others (Anand and Ravallion, 1993; Hojman, 1996; Lopes 2002, and Psacharopoulos and Patrinos, 2002). This approach has also been widely used in the analysis of revenue productivity of a tax system in the country (Mugambi, 2012; Osoro, 2013),

6.3.1 The Model

The model is developed and then specified for the purpose of estimation in form of extended version of the Cobb-Douglas Production Function with the two-variable regression equation expressing the relationship between GDP and total public expenditure on education as outlined in Gujarat and Sangeetha (2007) and applied by Anyanwu and Erhijakpor (2007) and Mugambi(2012).

According to Piana (2001) any public expenditure is a component of Gross Domestic Product (GDP) and, hence it has an immediate impact on national income. Thus, other things remaining equal, an increase of public expenditure raises GDP by the same amount. It should be noted that expenditure on education is among the major components of public expenditure in Kenya. The ability of the government in financing programmes aimed at improving the quality and quantity of education depends on its economic capacity as measured by its GDP among other factors. This means that Government Expenditure on Education (E_t) in a particular time is a function of GDP denoted by (Y_t) for the purpose of this study.

This means: $E_t = \mu Y_t^\beta$ (1)

This can be log-linearised as: $\ln E_t = \ln \mu + \beta \ln Y_t + U_t$ (2)

Where μ and β are constants and U_t is the white noise or error term.

Existing studies show a significant impact of public resources utilisation on education development (Colclough and Lewin, 1993; McMahon, 2010). This effect is seen in the light of access, infrastructure development and appropriate staffing among education institutions in an economy (Ranis and Stewart, 2011). The performance of government expenditure in an education system can be demonstrated by its ability to attract more learners at various levels of education and maintain standards and quality of education in the system. This ability is also reflected in the potential for government expenditure to sustain adequate staffing in all educational institutions as well as retaining qualified and experienced teachers in the job through appropriate remuneration packages. The performance can also be displayed by the capability of the expenditure to establish adequate physical facilities and contain educational wastage. In addition the effort of any government in financing its education at any level is mirrored by quality and efficiency with which a country implements various economic reform programmes aimed at promoting education development. Indeed the achievement of such initiatives is determined by the ability of these reforms in mobilising resources towards education development (Lewin and Caillods, 2011).

For the purpose of this study, Equation (2) was estimated for the relationship between Public Expenditure on Education and GDP. The estimation was done by OLS method utilising EViews econometric software package. This software was preferred due to its versatility in analysing multivariate models of this nature.

Estimation Results and Interpretation

Problems Encountered during Estimation

The main problem associated with OLS method when applied on time series data of this nature is autocorrelation. This problem is detected through Durbin-Watson (DW) test. As a rule of thumb the value of DW should be around two (2) if there is no first-order autocorrelation (Gujarat and Sangeetha, 2007). However, for the equations estimated the DW statistic was indicating a positive relationship but its value was about one (1). When the DW value is positive and statistically smaller than 2, it indicates the presence of positive autocorrelation and vice versa if it is negative. This means that the autocorrelation problem was acute for GDP with Total Public Expenditure on Education. In this case, Cochrane-Orcutt iterative process was utilised to rectify the problem.

6.4.2 Relationship between Public Expenditure on Education and GDP

Table 6.1 shows the regression results of public expenditure with GDP in Kenya for the period 1978 - 2018. Based on the estimated results the model was quite fit for analysis because the F-value was relatively high at 159.89 and the corresponding Prob(F-statistic) was 0.00 implying that the overall model was valid, and hence all the coefficients in the model were statistically different from zero. Both the R-squared statistic and adjusted R-squared displayed a value of about 0.85 each meaning that the model was good in predicting the dependent variable. This implies that GDP determines to a large extent the level of public expenditure on education in the country. The Durbin-Watson statistic was 1.99 and hence very close to the conventional value of 2 meaning that autocorrelation problem was minimal in this particular model the model and therefore no adjustment was necessary. The constant in the model had a coefficient of 4.05 and was quite significant at 1 percent level meaning that the intercept was necessary for the specification of the model.

Table 1: Regression Results for Public Expenditure on Education over GDP

VARIABLE	COEFFICIENT
Constant	4.0452*** (1.0926)
Gross Domestic Product	1.0829*** (0.0856)
R-squared	0.8510
Adjusted R-squared	0.8457
F-statistic	159.8855
Prob (F-statistic)	0.0000
Durbin-Watson stat	1.9928

*Note : *** indicates significance at 1 % level
Figures in parenthesis are standard errors*

Gross Domestic Product

This variable was very significant at the conventional 1 percent level with a coefficient of 1.08. This means that 100 percent increase in GDP led to a 108 percent increase in public expenditure on education during the sample period. This clearly shows that the income elasticity of public expenditure on education with respect to GDP was slightly above unitary meaning that an increase in GDP led to a slightly more than proportionate increase in public expenditure on education in Kenya during the period under review.

The study sought to test the null hypothesis that The growth in GDP in a given period has a significant impact on the level of government spending on education in Kenya and hence budgetary allocations are changing.

On the basis of data analysis for the period 1978-2018 drawn from the findings of Equation (2) GDP was found to be significant relative to total public expenditure on education. Therefore, this null hypothesis is accepted and the study concludes that GDP in a given period is a good determinant of the level of public spending on education in Kenya during the review period.

III. CONCLUSION

The Kenya government has been responding well in financing education as the economy grew. The study reveals that public expenditure on education in Kenya is a function of GDP as confirmed by fair elasticity of the dependent variable which is more than unity. This implies that public expenditure on education responded well to changes in GDP over the review period. However, the response of education expenditure to changes in GDP has not been matching the demand for education since the response was modest based on empirical findings.

IV. RECOMMENDATIONS

This study suggests following steps to improve the conditions in Kenya:

1. The government needs to allocate more funds to finance public education to match the demand at all levels of schooling guided by strategic planning rather than by discretionary policies.

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Effects GDP on Public Expenditure on Education In Kenya (1978-2018)

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Appendices

Appendix 1: Regression Data for Total Education Expenditure and GDP

YEAR	TOTAL EDUCATION EXPENDITURE in Millions of Kshs	GDP in Millions of Kshs
1978/79	14639.2	43347.5
1979/80	14833.8	494386
1980/81	18521.2	56558
1981/82	20055	64002.5
1982/83	19896.7	75501.5
1983/84	25430.4	81673.5
1984/85	29752.2	143272
1985/86	32290.7	159175
1986/87	41448.2	124078
1987/88	44162.4	139936
1988/89	58883.2	159911
1989/90	64702.6	182978
1990/91	81498	208393
1991/92	89049.6	238695
1992/93	123240	320153
1993/94	178921	356921
1994/95	181159	427248
1995/96	179471	494386
1996/97	178792	564698
1997/98	265298	612818
1998/99	316033	714521
1999/00	321302	856893
2000/01	352729	976337
2001/02	384178	1020007
2002/03	340348	1055658
2003/04	430843	1109541
2004/05	476536	1175081
2005/06	585230	1249331
2006/07	648404	1338039
2007/08	706885	1360626
2008/09	814322	2766243
2009/10	888552	3365281
2010/11	920482	4023085
2011/12	1473924	4195664
2012/13	1865709	5041134
2013/14	2298871	5516632
2014/15	2498720	6155583

Effects GDP on Public Expenditure on Education In Kenya (1978-2018)

2015/16	3773405	6401249
2016/17	4186462	6919976
2017/18	4948723	8791828

XXXXX, et. al. "Effects GDP on Public Expenditure on Education in Kenya (1978-2018)." *International Journal of Humanities and Social Science Invention (IJHSSI)*, vol. 09(6), 2020, pp 41-47. Journal DOI- 10.35629/7722