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Public Expenditure in the Social Sector and Economic Growth in Kenya

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Abstract

The objective of this study was to investigate the effect of public expenditure in the social sector on economic growth in Kenya. To this end, the autoregressive distributed lag (ARDL) modeling framework was used to disentangle the economic growth effects of public expenditure in the social sector into short-run and long-run. The study focused on expenditure on three sectors that are relevant for human capital development namely, education, health, and social security. The results showed that education had a positive short-run and long-run effects on real gross domestic product (GDP) per capita. Health and social security expenditure, on the other hand, appeared to dampen economic growth. In light of these findings, the study calls for improved expenditure on education. Further, public expenditure in the health and social security sub-sectors should be channeled to productive investments.

Keywords: Kenya, expenditure, education, health, social security

1. Introduction

The government plays an integral role in economic growth and development process, especially in least developed and developing economies, riddled with low per capita income and weak private investment (Folster & Henrekson, 1999). The government may provide goods and services directly and or play a supportive role such as maintaining law and order, regulating economic activities, and developing physical infrastructure to stimulate economic growth. Yet the theoretical and empirical link between public or government expenditure and economic growth remains one of the greatest controversies in economic literature. Theoretically, the main debate has been whether public expenditure is growth-enhancing or growth-retarding in the long-run. The mainstream view is that public expenditure, especially on physical infrastructure and human capital can support economic growth by bolstering productivity in the private sector (Keynes, 1936). However, financing public expenditure may dampen economic growth through distortionary effects of taxation (Glomm & Ravikumarr, 1997). Further, increased public expenditure may promote deficit financing, thereby crowding out private investments as domestic interest rates increase due to heavy borrowing by the government.

The social sector, broadly consisting of education, health, and social protection/ security, is one of the major beneficiaries of public expenditure in developing and developed countries. This is attributed to the fact that investment in health and education facilitates development of the human capital that every country needs to achieve its economic growth and development aspirations (Romer, 1986). Human capital refers to the "knowledge, skills, competences, and attributes embodied in individuals that facilitate the creation of personal, social, and economic well-being" (OECD, 2001). Education is critical for human capital development since it facilitates access to knowledge, skills, and competences. Schultz (1961) considers education a cornerstone of economic growth to the extent that it enhances productivity, innovation, and output.

Grossman (2000) considers health an important aspect of human capital that facilitates participation in market and non-market production at individual level. Further, Bloom and Canning (2000) outlined several channels through which health determines aggregate productivity. First, the productivity of a healthy workforce is expected to be high since workers in good health have greater physical and mental energy. Further, health related downtime is likely to be minimal if the workforce is healthy. Second, good health leads to longer life expectancy that may encourage investment in education. Consequently, labor force participation and per capita income may increase. Third, longer life expectancy due to good health may promote saving for retirement, thereby facilitating increased physical capital accumulation.

Social security/ protection programs such as cash transfers support human capital development to the extent that they facilitate access to healthcare, education, and improved standards of living. According to Lentz and Barrett (2013), food assistance programs alleviate household catastrophic exposure, thereby encouraging savings. This

promotes investment and adoption of better technologies that contribute to economic growth and improved incomes. Further, school-feeding programs may encourage school attendance. The resulting improvement in educational attainment enhances income-earning opportunities in adulthood and boost labor productivity.

Kenya's development blueprint, Vision 2030, recognizes the social sector as a key development pillar expected to provide a pathway for achieving sustainable socio-economic transformation and attainment of the overall wellbeing of the population. To this end, the government has prioritized investment in flagship development projects, as well as, expansion of services in the health and education sector. Additionally, social protection programs such as food aid and cash transfers targeting vulnerable groups such as people living with disabilities, women, and communities living in arid areas are being implemented to build a prosperous society. Figure 1 shows that the combined public expenditure on health, education, and social protection increased steadily in the period 1991 to 2015. Public debt, on the other hand, grew threefold from Kshs. 0.716 trillion in 2007 to 3.2 trillion in 2016 owing to increased public expenditure on education, health, infrastructure, and social protection among others (CBK, 2017). Figure 1 also indicates that economic growth measured by gross domestic product (GDP) (right hand vertical axis) was characterized by significant fluctuations and averaged only 3.59 percent between 1991 and 2015. Although Vision 2030 was launched nearly seven years ago (in 2008), Kenya is yet to achieve the targeted annual economic growth rate of 10 percent given that GDP growth averaged only 5.56 percent in the period 2009 to 2015.

Therefore, the objective of this study was to determine whether public expenditure in Kenya is growth-enhancing or growth-retarding. It particularly focused on public expenditure categories that are crucial for human capital development namely, health, education, and social security. Existing studies on the effect of social sector expenditure on economic growth are largely inconclusive. The findings are as varied as the methods and data used, as well as, the sample period and countries/ regions under consideration. For instance, positive growth effects were reported by Alshahrani and Alsadiq (2014); Ebong, Ogwumike, Udongwo, and Ayodele, (2016); and Koenig and Myle (2013). Negative growth effects were reported by Fasoranti, (2012) and Nurudeen and Usman (2010), whereas insignificant effects were reported by Cooray (2009) and Carter, Craigwell, and Lowe (2013). This study contributes to the body of literature on the economic growth effects of social sector expenditure with the aim of informing public expenditure related policies to ensure robust economic growth and development in Kenya.

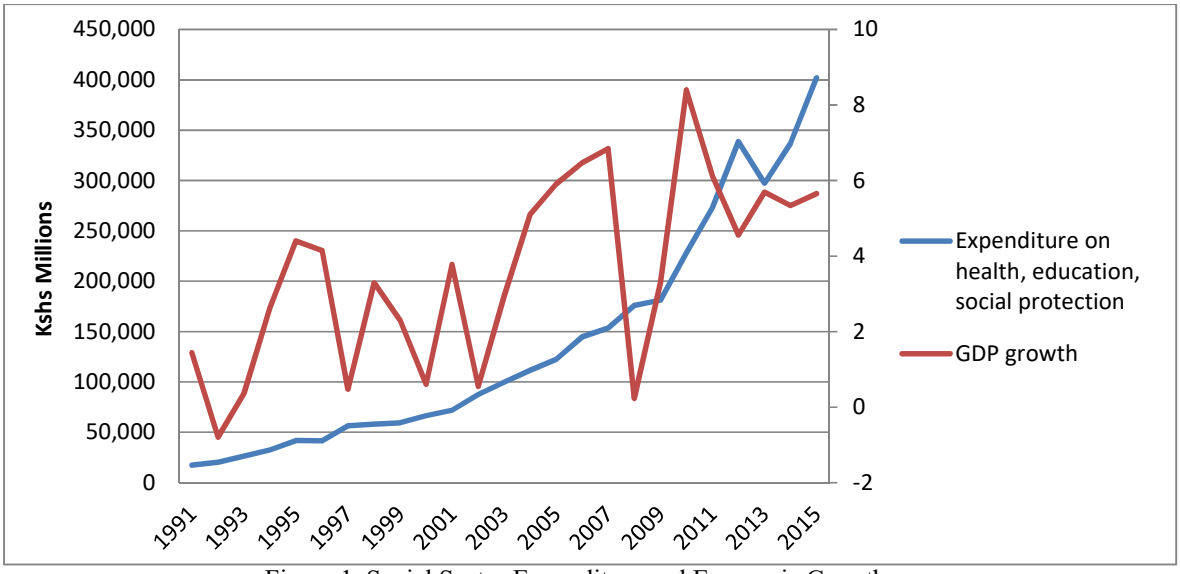

Figure 1. Social Sector Expenditure and Economic Growth
Source: Based on data from KNBS

The rest of the paper is organized as follows. Section 2 reviews the theoretical and empirical literature on public expenditure and economic growth. Section 3 highlights the methodology used in the study. Section 4 presents the results, whereas the conclusions and policy recommendations are presented in section 5.

2. Literature Review

2.1 Theoretical Literature

The relationship between public expenditure and economic growth, proxied by GDP or GDP per capita, has

attracted significant attention in economic literature. On the one hand, public expenditure is considered an outcome rather than a cause of economic growth. Wagner 1883, lent support to this argument by postulating that activities or functions of the government increase over time as the economy develop. This expansion of functions necessitates an increase in public expenditure. Peacock and Wiseman (1961) in their analysis of growth of public expenditure in the UK concluded that Wagner's hypothesis was valid. They noted that during times of emergencies such as wars, the public is more tolerant to tax increases. This allows the government to set a new high tax rate that is accepted by the public over time and may not be reduced after the emergency. The resulting increase in revenue collection enables the government to increase public expenditure.

On the other hand, public expenditure is considered an exogenous factor that drives economic growth. The Musgrave-Rostow model, for instance, linked public expenditure to various stages of economic growth and development. In the early stages of economic growth and development, the public sector is expected to provide social infrastructure overheads that include roads, education, health, and sanitation to enhance productivity and propel the economy to a higher level of growth (Musgrave, 1969). Further, public expenditure is required at various stages of growth to deal with market failures that are likely to impede economic growth and development. After achieving high levels of economic development and growth, public expenditure may still be required to implement income maintenance programs.

Keynes (1936) considered public expenditure an important policy instrument for driving economic growth. In the Keynesian tradition, public expenditure can contribute to economic growth even if it is of recurrent nature. An increase in government expenditure is expected to promote creation of employment opportunities, improve profitability, and enhance investment. Thus, public expenditure promotes economic growth through the aggregate demand channel. Critics of the Keynesian view hold that increased government expenditure increases budget deficit, which necessitates public borrowing. This leads to crowding out of private investments and dampens economic growth. Barro and Sala-i-Martin (1992) opine that productive public expenditure may directly support economic growth. However, unproductive expenditure may have indirect or no effect on economic growth. Application of this perspective in empirical analysis, however, is limited by the difficulty in categorizing expenditures as either productive or unproductive.

2.2 Empirical Literature

There is a growing body of empirical evidence supporting the premise that public expenditure in the social sector may have differential output growth effects. Expenditure in some sub-sectors such as education and health may positively affect economic growth, whereas social security expenditure may depress output growth and vice versa. In Nigeria, for instance, Ebong, Ogwumike, Udongwo, and Ayode (2016) concluded that public expenditure on education had positive and statistically significant effect on GDP growth in the short and long-run. Their finding was based on ordinary least squares (OLS) and error correction model (ECM) based on the Engle-Granger approach to co-integration test. Similarly, Otieno (2016) reported that public expenditure on education affected economic growth positively in Kenya. However, his analysis focused on education expenditure per worker rather than total education expenditure. Idrees and Siddiqi (2013) using Fully Modified Ordinary Least Squares (FMOLS), however, showed that the positive effect of education expenditure tend to be stronger in developed than developing countries. Their finding suggests that economic growth and development in developing countries can converge to that of developed countries through improved public investment in education.

Although education expenditure supports human capital development, it can also depress economic growth. Nurudeen and Usman (2010) attested to this fact in their analysis of Nigerian data using the ECM technique, which showed that education expenditure had a negative effect on economic growth. Focusing their analysis on a small open economy (Barbados) using dynamic OLS and unrestricted ECM, Carter, Craigwell, and Lowe (2013) further demonstrated that public expenditure on education dampens economic growth. In China, Qi (2016) reported a positive relationship between total government expenditure on education and GDP growth. However, upon disaggregating the data by level of education, expenditure on higher education was found to affect GDP growth negatively. By contrast, expenditure on lower levels of education had a positive effect on economic growth.

In a sample of 46 low and middle-income developing countries, Cooray (2009) concluded that education expenditure affects economic growth indirectly. Her analysis based on OLS and Generalized Method of Movements (GMM) estimation techniques showed that total public expenditure on education had no statistically significant relationship with GDP per capita. However, increased government expenditure on education improved the quality of education, proxied by enrollment in primary, secondary, and tertiary levels, which in turn

positively affected economic growth. In a more pessimistic view, Fasoranti (2009) and Gisore, Kiprop, Kalio, and Ochieng (2014) concluded that public expenditure on education had no effect on economic growth.

Turning to the health sub-sector, Aboubacar and Xu (2017) applied the GMM modeling technique to data for a sample of 36 Sub-Saharan African countries to determine the growth effects of healthcare expenditure. Their study established a positive relationship between health expenditure and GDP per capita. The researchers concluded that healthcare is a necessity rather than a luxury good in Sub-Saharan Africa. This conclusion echoes the findings of Gisore, Kiprop, Kalio, and Ochieng (2014), Nurudeen and Usman (2010), and Alshahrani and Alsadiq (2014) who found that health expenditure enhanced economic growth in East Africa, Nigeria, and Saudi Arabia respectively.

On the flip side, Tolulope and Taiwo (2014) in their analysis of data for 30 Sub-Saharan African countries using the GMM framework found the economic growth effect of health expenditure to be negative. Fasoranti (2009) using the vector error correction model (VECM) and data for Nigeria also lent support to the negative effect of health expenditure on economic growth in the long-run. However, Ebong, Ogwumike, Udongwo, and Ayode (2016) and Carter, Craigwell, and Lowe (2013) concluded that public expenditure on health had no significant effect on economic growth.

According to Periera and Andraz (2014), an increase in public expenditure on social security has adverse macroeconomic effects. Their analysis based on data for 12 European Union (EU) countries and VECM indicated that public expenditure on social security had a significant and negative effect on output. In Greece, Sakellaridis (2009) further provided evidence of the negative relationship between government expenditure on social security and economic growth. However, Carter, Craigwell, and Lowe (2013) found that public expenditure on social security had no statistically significant effect on GDP per capita in Barbados. By contrast, Koenig and Myles (2013) showed that every dollar spent on social security generates nearly two dollars of economic output in the United States. This strong positive effect was attributed to the positive impact of expenditure on social security programs such as unemployment benefits on aggregate demand.

The empirical literature reviewed in the foregoing section reveals that various studies have arrived at different conclusions regarding the effects of public expenditure in the social sector on economic growth. This variation can be attributed to, among other factors, differences in the methodology, data, and countries considered in previous studies. National level studies may not be comparable due to differences in economic structures and fiscal policies that dictate the level of government spending in the social sector in various countries. Further, the effect of social security expenditure on economic growth in developing countries has received little attention in the existing literature.

3. Methodology

3.1 Theoretical Framework

Public expenditure on health and education is considered an investment in human capital development. Additionally, expenditure on social security programs such as cash transfers may support human capital development by enhancing access to education and health. Further, social security expenditure may positively affect economic growth through the aggregate demand channel. Human capital being a factor of production enters the production function as an explanatory variable. Therefore, the aggregate production function is defined as:

$$Y = f(K, L, H) \quad (1)$$

Where Y denotes national income proxied by real GDP per capita, K is stock of physical capital, L is labor, and H is human capital. This study adopted an aggregate three-factor Cobb-Douglas production function by expressing equation 1 as:

$$Y_t = AK_t^{\beta} L_t^{\delta} H_t^{\gamma} \quad (2)$$

Where the subscript t denotes time/ period, A is technical change, β, δ, and γ are relative shares of capital, labor, and human capital in total output respectively. Linearizing equation 2 through log transformation gives:

$$LnY_t = \alpha + \beta LnK_t + \delta LnL_t + \gamma lnH_t + \varepsilon_t \quad (3)$$

Where Ln denotes natural logarithm, α, β, δ, and γ are parameters to be estimated and ε is a white noise error term. H = Ed + Hl + SS where Ed, Hl, and SS are respectively real public expenditure on education, health, and social security. Equation 3 is the baseline model that underpins the analysis in this study.

3.2 Empirical Model and Estimation Strategy

The study adopted the autoregressive distributed lag (ARDL) model developed by Pesaran and Shin (1999) and Pesaran, Shin, and Smith (2001) to determine the short-run and long-run effects of public expenditure on education, health, and social security on economic growth measured by real GDP per capita. The ARDL is a dynamic model in which the dependent variable is expressed as a function of its lagged values, as well as, current and lags of explanatory variables. The ARDL as a technique for testing for co-integration or existence of long-run relationship does not require all variables to have the same order of integration. Thus, it can be applied when the variables under study are integrated of order zero I(0), order one I(1), or fractionally integrated. However, the ARDL is not applicable if the variables are I(2). Another advantage of the ARDL technique is that it is relatively more efficient in small and finite samples such as the one considered in this study. These advantages informed the choice of the ARDL model over other approaches to co-integration such as Johansen's maximum likelihood and Engle-Granger two-step techniques.

The empirical model was defined by adding other variables that are likely to determine real GDP per capita in equation 3. The additional variables included aggregate household expenditure, real interest rate, and population size. Real interest rate is a measure of the cost of financial capital (credit), which is required to access other forms of capital. Household expenditure is expected to affect economic growth through its influence on aggregate demand. Population size is expected to influence economic growth through supply of labor and the aggregate demand channel. Equation 3 in ARDL form is expressed as:

$$\Delta lnGDPcap_t = \alpha_0 + \sum_{i=1}^{n} \alpha_{1i}\Delta lnGDPcap_{t-i} + \sum_{i=0}^{n} \alpha_{2i}\,\Delta lnEdExp_{t-i} + \sum_{i=0}^{n} \alpha_{3i}\Delta\, lnHlExp_{t-i} + \sum_{i=0}^{n} \alpha_{4i}\Delta lnSSExp_{t-i} + \sum_{i=0}^{n} \alpha_{5i}\Delta lnPop_{t-i} + \sum_{i=0}^{n} \alpha_{6i}\,\Delta Rint_{t-i} + \sum_{i=0}^{n} \alpha_{7i}\,\Delta lnHHExp_{t-i} + \beta_1 lnGDPcap_{t-1} + \beta_2 lnEdExp_{t-1} + \beta_3 lnHlExp_{t-1} + \beta_4 lnSSExp_{t-1} + \beta_5 lnPop_{t-1} + \beta_6 Rint_{t-1} + \beta_7 lnHHExp_{t-1} + \varepsilon_t \qquad (4)$$

Where: Δ is the difference operator, ln is natural logarithm, $\alpha_0 \cdots \alpha_7$ and $\beta_1 \cdots \beta_7$ are parameters to be estimated; ε is a white noise error term and GDPcap is real GDP per capita. The first part of equation 4 with summation signs and coefficients $\alpha_1 \cdots \alpha_7$ represent the short-run dynamics of the model, whereas the second part with coefficients $\beta_1 \cdots \beta_7$ represents the long-run relationships.

Public expenditure variables: EdExp is total expenditure on education; HlExp is total health expenditure; and SSExp is total social security expenditure. The total expenditure in these three sub-sectors consists of development/ capital and recurrent expenditure.

Control variables: Pop is population size; Rint is real interest rate; and HHExp is household expenditure. GDP deflator was used to transform nominal household expenditure, as well as, public expenditure on education, health, and social security to real terms.

Testing for the existence of a long-run relationship among the variables in equation 4 involved conducting the bounds test developed by Peseran, Shin, and Smith (2001) under the ARDL framework. The bounds test is based on Wald or F-statistic, which tests the null hypothesis of no co-integration against the alternative hypothesis of presence of co-integration:

$$H_0 := \beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = \beta_6 = \beta_7 = 0$$
$$H_1 := \beta_1 \neq \beta_2 \neq \beta_3 \neq \beta_4 \neq \beta_5 \neq \beta_6 \neq \beta_7 \neq 0$$

The asymptotic distribution of the Wald test is non-standard under the null hypothesis of no co-integration. Thus, Peseran, Shin, and Smith (2001) provided two critical values (upper and lower critical bounds) to facilitate testing for co-integration. In the lower critical bound, all variables are assumed to be I(0), which indicates absence of co-integration. In the upper critical bound, all variables are assumed to be I(1), which indicates presence of co-integration. Thus, H_0 is rejected (co-integration exists) when the computed F-statistic is greater

than the upper bound critical value. However, H_0 cannot be rejected (no co-integration) if the computed F-statistic falls below the lower bound critical value. The test is inconclusive if the computed F-statistic falls between lower and upper bound critical values.

3.3. Data

The study used annual time series data for Kenya for the period 1967 to 2015. The choice of the sample period was informed mainly by data availability. Health, education, and social security expenditure data was obtained from Kenya National Bureau of Statistics (KNBS). GDP per capita, population size, real interest rate, and household expenditure data was obtained from World Bank database, specifically World Development Indicators.

4. Empirical Results

4.1 Unit Root Test

The Augmented Dickey Fuller (ADF) test and Philips-Perron test were performed to ascertain the order of integration of the variables before using the ARDL to determine the short-run and long-run relationships among the variables. The results of the unit root test are presented in table 4.1. The ADF and Philips-Perron tests indicate that GDP per capita, health expenditure, household expenditure, and social security expenditure are I(1) at levels, but I(0) in first difference. Both tests show that education expenditure, population size, and interest rate are I(0) at levels.

Table 4.1. Unit root test

	ADF Test H_0: unit root		Philips-Perron Test H_0: unit root	
Variable	Levels	First Difference	Levels	First Difference
GDP per capita	-0.6642	-4.7626***	-0.5131	-4.7626***
Education	-4.0552***		-4.5348***	
Health	-2.5219	-7.0571***	-2.4836	-9.9004***
Social security	-0.7180	-6.9421***	-0.9712	-6.9448***
Population	-2.7095*		-4.9572***	
Interest rate	-3.6974***		-3.6540***	
Household exp.	-1.0386	-5.4249***	-1.1559	-5.4364***

Where *, **, and *** mean significant at 10%, 5%, and 1% significance level

Source: Author's estimation

4.2 Co-integration Test

Since the variables are either I(1) or I(0) at levels, the ARDL technique was applied to test for co-integration or presence of long-run relationship among the variables. To this end, the ARDL was first estimated using OLS. Wald test was then performed to determine the presence of co-integration. The result presented in table 4.2 shows that the computed F-statistic (5.990794) is greater than the upper/ I(1) bound critical values at all significance levels. Thus, the null hypothesis of no long-run relationship/ co-integration is rejected.

Table 4.2. ARDL bounds test

Null hypothesis: No long-run relationship exist		
Test Statistic	Value	
F-Statistic	5.990794	
Critical Value Bounds		
Significance level	I(0) Bound	I(1) Bound
10%	2.12	3.23
5%	2.45	3.61
1%	3.15	4.43

Source: Author's estimation

4.3. Short-run and Long-run Relationships

Having confirmed the presence of co-integration among the variables, equation 4 was estimated to determine the short-run and long-run relationships among the variables. The lag length was selected using Akaike's information criterion (AIC). The results are presented in table 4.3 and 4.4. The lagged error correction term i.e. EC_{t-1} is statistically significant at one percent significance level and bears the expected negative sign. This confirms the results of the bound test, which indicate the presence of a long-run relationship among the variables. Before interpreting the results, a battery of post-estimation tests were conducted to ensure that the estimated parameters are consistent. The results of the tests are presented in appendix 1 and 2.

The Jarque-Bera (JB) test indicates that the null hypothesis of normally distributed residuals cannot be rejected. The Breusch-Pagan-Godfrey test for heteroskedasticity shows that the residuals are homoscedastic. The Lagrange Multiplier (LM) test for autocorrelation indicates that the residuals are serially independent. The Ramsey regression specification error (RESET) test suggests that there is no model specification error (omitted variables, incorrect functional form, and correlation between X and ε). Finally, the cumulative sum of recursive residuals (CUSUM) and the cumulative sum of squared recursive residuals (CUSUMSQ) tests were conducted to determine the stability of the coefficients. The plot of CUSUM and CUSUMSQ statistic are within the 5 percent significance level as presented in appendix 3 and 4 respectively. This means that the coefficients are stable.

Table 4.3. Short-run coefficients

	Coefficients			
Variable	Lag (0)	Lag (1)	Lag (2)	Lag (3)
ΔlnGDPcap		0.543574*** (0.177037)		
ΔlnEdExp	0.163704** (0.073611)			
ΔlnHlExp	-0.044658 (0.033341)			
ΔlnSSExp	-0.065551** (0.025489)			
ΔlnPop	35.139842*** (10.681505)			
ΔRint	-0.000174 (0.001146)	-0.000057 (0.000903)	0.001016 (0.000946)	0.001856* (0.000930)
ΔlnHHExp	0.840527*** (0.051066)	-0.405813*** (0.137711)		
EC_{t-1}		-1.324115*** (0.230812)		

Where *, **, and *** mean statistically significant at 10%, 5%, and 1% respectively

Figures in parentheses are standard errors

Source: Author's estimations

In the short run, public expenditure on education has a positive effect on GDP per capita, which is statistically significant at 5 percent significance level. Public expenditure on social security has a negative effect on GDP per capita. This effect is statistically significant at 5 percent significance level. Population size has a positive and statistically significant effect on GDP per capita. An increase in population in the short run may increase labor supply, thereby reducing the cost of production, which in turn supports economic growth.

Real interest rate lagged three periods has a positive effect on GDP per capita, which is statistically significant at 10 percent significance level. An increase in real interest rate in the previous period may support current growth in GDP per capita to the extent that it encourages savings that facilitate investment and consumption in the current period. Current expenditure by households has a positive and statistically significant effect on GDP per

capita. However, the effect turns negative but statistically significant when household expenditure is lagged by one period. An increase in household expenditure in the current period is expected to support growth in GDP per capita through an increase in aggregate demand. However, an increase in household expenditure in the previous period may imply a decline in savings, which in turn negatively affects economic growth in the current period.

Table 4.4. Long-run coefficients

Variable	Coefficient	Standard Errors
LnEdExp	0.123633**	0.057684
LnHlExp	-0.062913**	0.030405
LnSSExp	-0.026272*	0.015329
LnPop	-1.284063***	0.090521
Rint	-0.003098***	0.001102
LnHHExp	0.813789***	0.032962
Constant	8.381870***	1.275335

Where *, **, and *** mean statistically significant at 10%, 5%, and 1% respectively

Source: Author's estimations

Table 4.4 shows that the coefficient of expenditure on education remains positive and statistically significant in the long-run. This means that an increase in public expenditure on education by one percent raises real GDP per capita by 0.12 percent. This supports the view that increased expenditure on education enhances economic growth through, among other channels, improvement in the quality of labor. Additionally, in a developing country such as Kenya where the education sector is a major source of employment, increased public expenditure on education may spur economic growth through an increase in aggregate demand. The result is consistent with Idrees and Siddiqi (2013) and Ebong, Ogwumike, Udongwo, and Ayode (2016), but contradicts Nurudeen and Usman (2010) who reported a negative effect.

The coefficient of health expenditure is negative and statistically significant at 5 percent significance level in the long-run. This means that an increase in health expenditure by one percent decreases GDP per capita by 0.06 percent. The result supports Fasoranti (2009) and Tolulope and Taiwo (2014), but is inconsistent with Gisore, Kiprop, Kalio, and Ochieng (2014) and Alshahrani and Alsadiq (2014). An increase in health expenditure may negatively affect economic growth if its financing increases domestic public borrowing, thereby crowding out private investment. Further, an increase in health expenditure may improve fertility, which in turn increases population growth, especially when the uptake of family planning services is low. A rapid growth in population hinders economic growth by increasing dependency.

The coefficient of social security expenditure remains negative, but statistically significant at only 10 percent significance level. The result means that an increase in social security expenditure by one percent decreases GDP per capita by 0.03 percent. This is an indictment of the unproductive nature of most social security programs. Periera and Andraz (2014) also concluded that social security expenditure affects economic growth negatively.

Population size has a long-run negative and statistically significant effect on GDP per capita as expected a priori. A one percent increase in population size corresponds to a 1.28 percent decrease in GDP per capita. Real interest rate also has a negative coefficient that is statistically significant at one percent significance level. A one percent increase in real interest rate reduces GDP per capita by 0.003 percent in the long-run. An increase in real interest rate raises the cost of credit. The resulting reduction in access to credit constrains investment and consumption, thereby depressing economic growth. Household expenditure positively affects GDP per capita in the long-run as expected a priori since its coefficient is statistically significant at one percent significance level. An increase in household expenditure by one percent increases GDP per capita by 0.81 percent.

5. Conclusion and Policy Recommendations

The main objective of this study was to determine the economic growth effects of public social sector expenditure in Kenya. To this end, the study focused on public expenditure in three sub-sectors that are critical for human capital development namely, education, health, and social security. The results of the study indicated that the effect of social sector expenditure on economic growth, proxied by real GDP per capita is heterogeneous in the short and long-run. Education expenditure promotes economic growth in the short and long-run. However, health and social security expenditure had negative effects on real GDP per capita in the long-run. Apart from

social sector expenditure, real GDP per capita is affected by population size and real interest rate. Specifically, population size and real interest rate negatively affects real GDP per capita in the long-run.

In light of these findings, the study calls for improved public expenditure on education to support robust economic growth. This can be achieved by using public funds to improve the quality of education at all levels of learning (primary, secondary, and higher education) through training programs that provide the skills and knowledge required to enhance labor productivity and create more job opportunities. Public expenditure in the health and social security sub-sectors should be channeled to productive investments to support economic growth. Social security expenditure should be geared towards eliminating income inequality and poverty reduction. For instance, it can be channeled towards creating economic opportunities for vulnerable groups such as the disabled to enable them participate effectively in economic activities. Further, growth of the population should be controlled through effective family planning programs given that a rapid increase in population size is expected to impede economic growth.

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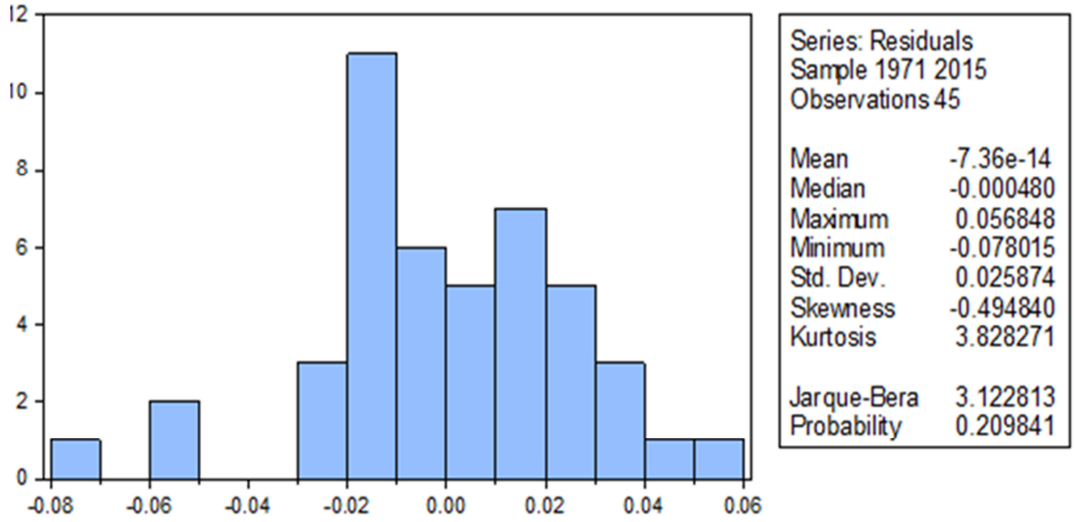
Appendix

Appendix 1: Normally test based on histogram and Jarque-Bera tests



Appendix 1. Normality test

Source: Author's estimation

Appendix 2. Serial correlation, heteroskedasticity, specification error tests

Test	Null hypothesis	Test Statistic	Probability
Breush-Godfrey Serial correlation LM test	No serial correlation	2.954467	0.7070
Breusch-Pagan-Godfrey Heteroskedasticity test	No heteroskedasticity	18.91266	0.3336
Ramsey regression specification error (RESET) test	Correct specification/ No specification error	0.979388	0.3315

Source: Author's estimation