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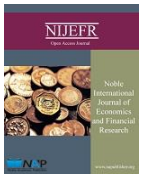

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Effect of Government Infrastructure Expenditure on Poverty in the East African Community

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Abstract: The East African Community (EAC) level of economic integration is among the most advanced Regional Economic Communities (RECs) in Africa. With advancement in integration, efforts are being made by the member countries to have collective decision making on fiscal policies with the view of addressing poverty situation among other economic factors. However, while economic theory indicates that increased government expenditure leads to reduced poverty, empirical literature pits conflicting results. The difference in opinions poses lack of predictability of public finance decision making as to whether a perceptible relationship exists between public expenditure on infrastructure and poverty. This study thus, assessed the effect of government expenditure on infrastructure and poverty in EAC. Poverty was measured by private consumption per capita. The study was anchored on the Ferroni and Kaburi resource allocation framework. Correlational research design was adopted in the study. The analysis span between 2007 and 2018. The study used data drawn from five countries, namely, Burundi, Kenya, Rwanda, Tanzania and Uganda. Panel data analysis was employed to interrogate the study topic. The Random Effects Model was used to estimate the relationship after converting the log transformed data to stationary series. The results indicated that Government expenditure on infrastructure was significant in lowering poverty ($\beta 2=0.1577$; $p=0.0000$). Thus, the need to enhance allocation and expenditure on infrastructure to arrest poverty. The findings may be beneficial to policymakers, strategists, government and advocacy groups.

Key words: Government expenditure, Infrastructure, Economic Integration, FK framework, Panel, Poverty, East African Community.

1. Introduction

The East African Community (EAC) is one of the most advanced Regional Economic Communities (RECs) in Africa. The bloc has thus far been successful in implementing the free market, customs union and common market with the next pillars of integration being the operation of the East africa Monetary Union protocol and political federation (East African Community Secretariat, 2020). The Community has also made considerable progress in integrating the social and economic aspects of the countries. Language and culture as well economic negotiations such as that for Economic Partnership Agreements have been embraced in the recent past too (East African Community Secretariat, 2020).

Government expenditure is usually shaped by the needs of the people of a country given the economic and social conditions (Mwasagua *et al.*, 2018). In the recent years, more and more governments have increased expenditure towards productive sectors as opposed to social sectors as was witnessed earlier (Wilhelm and Fiestas, 2005). With this in mind, the a priori expectation is that poverty will play a key role in guiding decision making on allocation and distribution of funds per sector.

The relationship between government expenditure on infrastructure and poverty has been a subject of interest to many scholars. The theories of poverty albeit having many similar components diverge in views (Davis and Sanchez-Martinez, 2015). While the Classical theory of poverty is originated on the notion that the economy is self-adjusting, and poverty is self-inflicted, the Keynesian theory of poverty asserts that market inefficiencies are also to blame for poverty (Davis and Sanchez-Martinez, 2015). Therefore, Keynesians argue for state intervention as a means of alleviating poverty.

Gasiorek *et al.* (2016) observed that between 1992 and 2009, appropriately a third of poor Ugandans escaped poverty. In Kenya, the number of Kenyans who fell into poverty grew annually by close to two percent between 1997 and 2005. In terms of public expenditure, Kenya grew her expenditure more than Uganda by 10% between 2005 and 2009. This indicates that in spite of Kenya maintaining a

higher incremental rate of public expenditure, Uganda managed to alleviate poverty by a wider margin. The unexpected pattern indicates the need to interrogate the effect between public expenditure and poverty.

Infrastructure facilitates and enables regional integration through trade, agriculture, tourism and investment. The government of Kenya, in view of improving the welfare of her people developed a plan known as the Big Four Agenda (BFA) which seeks to address infrastructure development, health and wellness, housing and food security (Parliamentary Budget Office, 2018). According to Fan *et al.* (2004), developing the sector will yield alleviation efforts in poverty situation since infrastructure is key in provision of social services such as health and education. Similar findings were observed by Ogun (2010) and Seetanah *et al.* (2009). However, contradicting findings were found by other scholars noting that as governments allocated more finances to infrastructure sector, poverty worsened (Osundina *et al.*, 2014; Sunkanmi and Abayomi, 2014). The disconnect in the findings reveals that the relationship between government expenditure on infrastructure and poverty is still unclear.

1.1. Statement of the Problem

The goal to alleviate poverty and improve welfare of the people in lower quintiles is revered globally. In the EAC, various policies have been developed to guide and inform the government funds allocation mechanism. The common principle has been to focus on productive sectors such as infrastructure which provides the poor with the prerequisite instruments necessary to produce goods and services thereby enhance their welfare. As such, the member states have been allocating more funds to infrastructure over the years. However, while some countries have been able to reduce poverty, the situation has worsened in others. Existing literature also pit conflicting findings which leave the true nature of the relationship as ambiguous this formed the basis for this study that would provide information that may serve as a guide on collective government expenditure decision making.

1.2. Objective

This study sought to establish the effect of government expenditure on infrastructure on poverty.

Hypothesis

H_0: Government expenditure on infrastructure does not affect poverty.

H_1: Government expenditure on infrastructure affects poverty.

2. Literature Review

A study in Cambodia by Runsinarith (2004) interrogated the effects of increased government allocation of infrastructure on poverty reduction. The study which was founded on the Neoclassical framework postulated that growth in infrastructure led to a growth in Gross Domestic Product (GDP) and Per Capita Income (PCI) as well as a in improvement in the poverty levels. To measure poverty, per capita consumption was utilized. The study's findings showed that indeed the provinces of Cambodia needed to increase the amount of expenditure in infrastructure as this had an effect of lifting the poor people out of poverty. Albeit providing clear consequential effects between the variables, the assumption posited by the study of the interchangeability of GDP and PCI may not necessarily hold where GDP growth is occasioned more by population growth.

Similar results were found in a panel study conducted by Seetanah *et al.* (2009) on a 26-year period in 20 developing countries. The study analysed the effects of changes in government expenditure on infrastructure on poverty using the Gaussian Mixture Model (GMM) which revealed that placement of increased weight towards the infrastructure in the countries did go a long way in arresting poverty. The study having been conducted in a mix of developing countries; the spectrum of these countries may be different than that of the EAC countries.

In Nigeria, Ogun (2010) interrogated the relationship between poverty and government expenditure on infrastructure. The study's aim was to review the effects of the two over a 35-year period which span between 1970 and 2004. Using per capita consumption as the proxy for poverty, the study established that the coefficients for the independent variable achieved statistical significance. Where the government allocated more to the sector, per capita consumption was found to rise, indicating betterment to the people. The study primarily focused on urban Nigeria, drawing inferences from this may be difficult.

A different study was carried out within the EAC, in Uganda by Fan *et al.* (2004). The study which looked into forty-five districts in rural Uganda sought to establish the relationship that existed between public expenditure on infrastructure and poverty. Data was collected from three years spaced across 1992

and 1999. The study's findings were in tandem with those of the previous studies revealing the importance of planned and intentional increment of public finance allocation to infrastructure in improving the livelihoods of the poor. However, much like the study by Ogun (2010), the study did not attempt to divulge how the variables would have interacted at a national level.

While most studies' findings agreed with the a priori expectations, there were a few studies which found contradicting results. Sunkanmi and Abayomi (2014) and Osundina *et al.* (2014) are such cases. Both studies were undertaken in Nigeria and found that additional allocation of resources to infrastructure had devastating effects on poverty reduction. Policies advocating for reduced expenditure in the sector were thus preferred to combat poverty. The findings did not conform to expectation and instead opened up discussions on the subject for further scrutiny of the effect of growth in infrastructure expenditure by the government on poverty.

3. Methodology

The study employed correlational research design which Creswell (2008) noted is suitable in establishing the nature of relationships. Panel data drawn from economic surveys of the members' states was used to establish the effect of government expenditure on infrastructure on private per capita consumption that was used as a proxy for poverty situation in the study. The study focused on five countries namely, Burundi, Rwanda, Uganda, Kenya and Tanzania.

3.1. Model Specification

The study borrowed from the Ferroni and Kanbur (1990) framework of public expenditure. The framework notes that poverty reduction occurs as a result of increased government expenditure allocations. The allocation notes that while the size of expenditure affects poverty, the structure or allocation of expenditure also affects poverty.

The study thus adopted a linear function to specify the effect of public expenditure on infrastructure on poverty as follows

$Poverty_{i,t} = f(public\ exp\ enditure)_{i,t}$ ..... (i)

Fan *et al.* (2004) predict that improvement in infrastructure has a significant impact on alleviating poverty. Hence;The Specific functional relationship was written as:

$P_{i,t} = f(EXPI_{i,t})$ ..... (ii)

Where: $P_{i,t}$ represents poverty situation for country i at time t

And $EXPI_{i,t}$ represents government expenditure on infrastructure

The study utilized private per capita consumption as the proxy for poverty. The choice of the proxy was informed by the lack of data on poverty incidences for the five countries across the selection period. Further, the proxy had been used by other scholars before including Runsinarith (2004) and Ogun (2010).

Therefore, Equation (ii) was rewritten as

$PC_{i,t} = f(EXPI_{i,t})$ ..... (iii)

Where $PC_{i,t}$ represents private per capita consumption for country i at time t

The FEM model was found appropriate and thus function (iii) was transformed to the following

$PC_{it} = \beta_{1i} + \beta_2 EXPI_{it} + \mu_{it}$ ..... (iv)

Where μ_{it} is model specific error

Equation iv was then transformed to take the form below to remove the effect of the differences in population across the member states

$PC_{it} = \beta_{1i} + {}^{\beta_2 EXPI_{it}}\big/_{POP_{i,t}} + \mu_{it}$ ..... (iv)

Where $POP_{i,t}$ refers to the value of population for country i at time t

But, ${}^{EXPI_{it}}\big/_{POP_{i,t}} = GOVI$, and, $\beta_{1i} = \beta_1 + \varepsilon_i$ therefore, the equation above can be re-written as:

$PC_{it} = \beta_1 + \beta_2 GOVI\varepsilon_i + \mu_{it}$ ..... (v)

Where ε_i is random error (error for individual country)

The FEM model, therefore, assumed the form:

$PC_{it} = \beta_1 + \beta_2 GOVI_{it} + \omega_{it}$ ..... (iv)

Where composite error term: $\omega_{it} = (\varepsilon_i + \mu_{it})$

4. Results and Discussion

4.1. Descriptive Statistics

The data was manipulated to correct for the effects of inflation by use of the Consumer Price Index (CPI) and GDP deflator. The data was then subjected to natural algorithms to linearize the series.

The descriptive statistics summary for the variables in the study is provided in Table 1. The summary includes the mean, maximum, minimum, and standard deviation.

Table 1. Descriptive Statistics

	PC (USD)	GOVI (USD)
Mean	577	29.46
Maximum	956	116.30
Minimum	407	3.44
Std. Dev	133	27.84
Observations	60	60

Source: Own computation, 2021

The data used for analysis comprised 60 observations from 2007 to 2018. The mean, maximum and minimum for consumption per capita was found to be USD 577, USD 956 and USD 407 respectively. This indicated that for the people of the East African Community, household consumption ranged between USD 407 and USD 956 and averaged at USD 577 annually. Government expenditure per capita averaged at USD 29 indicating that for the period under analysis, the proportionate amount of government expenditure for each person in the Community was between USD 3 and USD 116 and averaged at USD 29.

4.2. Cross Sectional Dependence Test

In panel data, cross sections especially such as in a case where the sections represent neighbouring countries may be dependent. Cross section dependence may influence the data set and should be tested to determine which tests are relevant on the data (Arouri and Rault, 2014).

Table 2. Unit Root test

Test	Chi2(10)	Prob > chi2	Comment
B-P LM test of independence	29.293	0.0011	Residuals are cross sectional dependent

Source: Own computation, 2018

The test results revealed that the chi square value was significant; therefore, the alternate hypothesis of cross-sectional dependence was not rejected.

4.3. Test for Stationarity

Before conducting any econometric study, Granger and Newbold (1974) guides that stationarity must be checked to ensure that the variables under study are either converted to stationary or used at levels whereby found to be stationary. (Granger and Newbold, 1974) notes that tests from non-stationary data leads to spurious results.

The data was tested for stationarity using Pesaran's Cross-sectionally Augmented Dickey Fuller (CADF) panel unit root test. The results were as shown below:

Table 3. Unit Root test

Method		**LN_PC**		**LN_GOVI**	
Null: Unit root	Order of Integration	Stat	Prob.	Stat	Prob.
Levels	Order 0	-2.418	0.073	-1.935	0.322
1st Difference	Order 1	-4.314	0.000	-2.890	0.008

Source: Own computation, 2021

The results showed that both per capita consumption and government expenditure on infrastructure were stationary at first differencing.

4.4. Correlation

Correlation of the panel series was conducted with data at levels to assess the degree of covariance between the two variables.

Table 4. Correlation

Correlation		
t-statistic		
Probability	DCONEXP	DGEA
DLN_PC	1.000000	
LN_GOVI	0.7506	1.000000
	7.4498	
	0.0000	-----

Source: Own computation, 2021

The correlation matrix above shows that the From Table 4 above, there was significant association between the variables.

4.5. Model Estimation

4.5.1. Pooled Ordinary Least Square

The Pooled Ordinary Least Square (POLS) regression in its analysis of panel data assumes that the cross sections are indistinguishable across each other and thus the simplest of the methods of panel data analysis (Wooldridge, 2010).

F = 34.01 R-squared = 0.5864
Prob > F = 0.0000 Adj R-squared = 0.3326

Table 5. Pooled OLS regression

	Coef.	Std. Err	T	P>|t|
DLN_GOVI	2.8604	0.4679	6.11	0.000
_CONS	0.3202	0.0390	8.21	0.000

Source: Own computation, 2021

The results of the POLS regression showed that the factor coefficients collectively were distinguishable from zero. The study found that the government expenditure on infrastructure influenced the welfare of the people of the EAC.

4.6. Fixed Effects Model

The study then ran the Fixed Effects Model (FEM) regression to establish whether indeed the POLS estimator was better in interrogating the relationship between the variables compared to FEM.

F = 79.67 R-squared = 0.8806
Prob > F = 0.0000 Adj R-squared = 0.8696
corr (u_i, Xb) = -0.1765

Table 6. Fixed Effects regression

	Coef.	Std. Err	T	P>|t|
DLN_GOVI	0.1596	0.0274	5.83	0.000
_CONS	5.8527	0.0833	70.30	0.000

F test that all u_i=0: F = 73.40 Prob > F = 0.0000

Source: Own computation, 2021

The limer test at the bottom of the table showed that the FE regression was more appropriate in estimating the effect of the independent variable on the dependent variable as F statistic was statistically

significant. The growth in the F statistic and the coefficient of determination in FEM compared to POLS gave further strength to the finding that there were fixed effects in the regression.

4.7. Random Effects Model

The study ran the Random Effects Model (REM) estimator to assess which is used where the differences in the cross sections are assumed to have little to no effect on the dependent variable.

Wald chi2 (4) = 0.10 Rho = 0.8657

Prob > chi2 = 0.0000 Corr (u_i, X) = 0 (assumed)

Table 7. Random Effect GLS regression

	Coef.	Std. Err	z	P>|z|
DLN_GOVI	0.1577	0.0266	5.94	0.000
_CONS	5.8587	0.1231	47.61	0.000

Source: Own computation, 2021

Further to the F Limer test, the RE regression also showed that the ratio of cross sections variances to the total variance was not zero but 0.8657, thereby, POLS was a weak estimator for the analysis and would have produced inauthentic results if used to draw conclusion on the relationship.

4.8. Hausman Specification Test

Upon confirmation that POLS was not appropriate, the study utilized Hausman test to choose between FEM and REM estimators.

Table 8. Hausman Specification Test

	Coefficients			
	(b)	(B)	(b-B)	Sqrt (diag (V_b-V_B))
	Fixed	Random	Difference	S.E
DLN_GOVI	0.1596	0.1577	0.0020	0.0066

Test: Ho: difference in coefficients not systematic chi2 (1) = (b-B)'[(V_b-V_B)^(-1)](b-B) = 0.09 Prob > chi2 = 0.7650

Source: Own computation, 2021

With a statistically insignificant random probability, the REM estimator was found to be most appropriate to establish the effect of government expenditure on infrastructure on poverty.

4.9. Empirical Results

Having identified the panel regression to use, the equation was thus expressed as:

$$LN\_PC_{it} = \underset{(47.61)}{5.8587} + \underset{(5.94)}{0.1577GOVI} \quad \underset{(0.0266)}{(0.1231)} \quad \textbf{.....(Eq 4.1)}$$

The study found that holding other factors constant, autonomous per capita consumption in the Community grew by 5.86% annually. The results indicate that over the period in question, private consumption per capita grew implying improvement in poverty situation. The RE model returned the coefficient of the government expenditure on infrastructure as 0.1577 indicating that where the government increased expenditure in infrastructure by 1%, private consumption grew by 0.16% translating to poverty reduction of 0.16%.

This result was in consonance with the findings by Runsinarith (2004), Seetanah *et al.* (2009) and Ogun (2010) who found that expanded spending in infrastructure had a ripple effect on improving the livelihoods of the poor people. The studies advocated for state intervention through fiscal policies in arresting poverty among her people. However, the results differed from those of Sunkanmi and Abayomi (2014) and Osundina *et al.* (2014) which observed that state intervention by increased expenditure in the sector had a deteriorating effect on poverty situation of an economy.

5. Conclusion and Recommendations

The aim of the study was to interrogate the effect that government expenditure on infrastructure has on poverty situation in the East African Community. The results of the study corroborated with economic theory by revealing that increased expenditure by the government on infrastructure leads to increased private consumption per capita thus reduced poverty in the Community. On the flip side, where the government reduces expenditure on infrastructure, poverty would rise.

EAC decision making though not yet harmonized should focus on increasing the allocation to infrastructure. Infrastructure is an enabler for production and facilitation of goods and services which has an effect of growing the income of the poor thus, resulting in growth of per capita consumption. Therefore, government allocation and expenditure in infrastructure should thus be increased to realize poverty reduction.

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