

**Government Spending on Education, Economic Growth and Long Waves in a CGE Micro-Simulation
Analysis: The Case of Nigeria**

Ernest Simeon O. Odior (PhD)
Department of Economics, Faculty of Social Sciences
University of Lagos, Akoka, Lagos, Nigeria

ABSTRACT

This paper analyses the dynamic (direct and indirect) effects of government policy on education and its relation to the cyclical economic growth in the long run. The basic objective is to simulate if government expenditure on education would help to improve economic performance in Nigeria in the long run-2015. The paper used an integrated sequential dynamic computable general equilibrium (CGE) model to examine the potential impact of increase in government expenditure on education in Nigeria. The model is calibrated with a 2004 social accounting matrix (SAM) data of the Nigerian economy. The result shows that the re-allocation of government expenditure to education sector is significant in explaining economic growth in Nigeria. This paper therefore recommends that in order to achieve a steady economic growth, investment in education service should receive the highest priority in the public investment portfolio. The policy implication of the study is that, the Nigerian government should be able to move resources from other sectors to provide quality education for her citizens. This type of expenditure not only has a large impact on poverty per Naira spent, but also produces greatest growth in human productivity. The study concludes that if government policy is going to substantially increase growth, then future expenditure has to be pro-growth. Investing in education is one of the pro-growth policies for promoting economic growth.

Keywords: Government Expenditure, Education, Economic Growth, CGE

1. INTRODUCTION

The role of education in economic growth and their inter-relationship are increasingly focus of public debate since the era of Plato. Education has high economic value and hence, a considerable part of the community's wealth must be invested for the same. Investment in education leads to the formation of human capital, comparable to physical capital and social capital, and that makes a significant contribution to economic growth (Dickens et al., 2006; Loening, 2004). Education as an investment secures returns in the form of skilled manpower that geared to the needs of development, both for accelerating economic development and for improving the quality of the society (Yogish, 2006). Human capital theory emphasizes how education increases the productivity and efficiency of workers by increasing the level of cognitive stock of economically productive human capability which is a product of innate abilities and investment in human beings. The provision of formal education is seen as a productive investment in human capital, which the proponents of the theory have considered as equally or even more equally worthwhile than that of physical capital (Sackey, 2005).

Education is considered a major remedy for many problems faced by developing countries (Cochrane 1986, 1988) and the importance of government expenditure in the process of human development (education) is well recognized. Improving the education of people is not only a goal in itself for a better quality of life but also its positive impact on the economic development of a country is far-reaching (Rebelo, 1991). The

provision of education is a key element of a policy to promote broad-based economic growth. Education plays a great and significant role in the economy of a nation, thus educational expenditures are found to constitute a form of investment. This augments individual's human capital and leads to greater output for society and enhanced earnings for the individual worker. It increases their chances of employment in the labour market, and allows them to reap pecuniary and non-pecuniary returns and gives them opportunities for job mobility. Education is a source of economic growth and development only if it is anti-traditional to the extent that it liberates, stimulates and informs the individual and teaches him how and why to make demands upon himself.

This paper seeks to contribute to this debate by providing an integrated assessment of the role of government expenditure on education and economic growth. The basic objective of this paper is to simulate how government expenditure on education would help to improve economic growth in Nigeria by 2015.

The structure of the paper is as follows. After the introductory part, section 2 presents a brief literature review. Section 3 is theoretical framework, while description of policy experiments and model specifications are presented in section 4. The model database and model simulation and analysis of results are discussed in section 5 and 6 respectively. Section 7 is the findings and policy implication, while 8 concludes with a brief.

2. LITERATURE REVIEW

The relationship between government expenditure, education and economic growth is empirically outlined in a number of empirical studies. These studies support the growth linkages emanating from government expenditure in promoting growth. But within the developing countries and less developed countries (LDCs) in the world, the relevance of government expenditure in promoting growth has been the subject of debate for some time, particularly, in sub-Saharan Africa (Landau, 1986).

The major contribution to the issue on the relationship between education and economic growth was first made by Adam Smith, followed by Marshall, Schultz, Bowman and others (Tilak, 2005). Over the time, economic offers a variety of theories and model for relating education and economic growth (Lucas, 1988; Romer, 1990; Rebelo, 1991; Francis and Iyare, 2006). These are mostly deal with endogenously generated economic growth and stresses on the role of human capital accumulation in economic growth (Chakraborty, 2005). Most of them viewed that human capital is an alternative engine of economic growth to technological change. However, to boost human capital, the country has to invest more on education. According to Dahlin (2005), an investment in education is very beneficial in the society, both at the micro level as well as macro level and affects the system both directly and indirectly.

The available literature reflects that over the last 40 years output has increased about 3.5% a year. Growth in the labour productivity, a major driver of increasing wages and standard of living, has raised about 2.4% per year. The contribution of education to labour productivity growth is estimated in different studies to be between 13% and 30% of the total increase. Whatever the contribution of education to growth in the past, investments in human capital (education) may rise in importance relative to investments in other forms of capital as we transition to a post-industrial, knowledge-based economy (Dickens et al., 2006). Human capital theory emphasizes how education increases the productivity and efficiency of workers by increasing the level of cognitive stock of economically productive human capability which is a product of innate abilities and investment in human beings. The provision of formal education is seen as a productive investment in human

capital, which the proponents of the theory have considered as equally or even more equally worthwhile than that of physical capital.

Most theoretical and empirical studies on education and economic growth, both cross-section and time series, under distinct theoretical approaches, have repeatedly proved the existence of a significant association (and causality) between the economic performance of national economies and the level of education of their population. Long-run historical approaches concerning economic backwardness have underlined how a poorly educated, trained and culturally unaware population have been a decisive factor of persistent low productivity levels, low labour mobility, slow structural changes, slow diffusion of innovation, preventing sustained economic growth to set in. Moreover, if an economy, though succeeding, at last, to achieve modern economic growth is not able to overcome rapidly the human capital accumulation gap, some loss of opportunities for the expected catch up growth will be met and growth rates will be comparatively small (Nunes, 2001).

Recent case studies on European economies, rooted in the systemic regulation theory, have analysed the evolution of aggregate series for government expenditure on education and its relation to the cyclical economic growth in the long run, following Fontvieille's seminal work on the French case (Fontvieille, 1990). Some development economists of the structuralist school posit that some categories of government expenditure are necessary to overcome constraints to economic growth theory (Chenery and Syrquin, 1975; Turnovsky and Fisher, 1995; Turnovsky, 1998).

The findings of Landau (1983) showed that the share of government consumption in GDP reduced economic growth. These findings were consistent with the pro-market view that the growth in government constrains overall economic growth. These findings were robust to varying sample periods, weighting by population and mix of both developed and developing countries (104 countries). The conclusions were germane to growth in per capita output and do not necessarily speak to increases in economic welfare. Economic growth was also found to be positively related to total investment in education. In a later study, Landau (1986) extends the analysis to include human and physical capital, political, international conditions as well as three year lag government expenditure in GDP. Also, Landau (1986) asserts that the contribution of education to economic growth and development occurs through its ability to increase the productivity of an existing labour force in various ways.

On the roles of total factor productivity (TFP) growth and factor accumulation, in the determinants of GDP growth and the links between education and growth. According to Chemingui (2005) an increase in government expenditure devoted to these three priority areas (agriculture, education, and health) will affect the economy through increase in sectoral or economy-wide TFP. In fact, good education and health care help the poor lead more productive lives, increasing the return on investment. As growth is mostly driven by labour and TFP including human capital, any investment intended to improve the productivity of labour and total factor productivity will improve the sustainability of economic growth in a given country, and through a more productive labour force, help to stimulate development of the private sector.

According to many recent studies, such as those conducted by Klenow and Rodriguez-Clare (1997) and Easterly and Levine (2001), cross-country differences in income levels and growth rates are mostly due to differences in productivity. Government expenditure on Research and Development (R&D), infrastructure,

and human capital is believed to be one of the determinants of economic growth, mainly through improving total factor productivity. Thus, an indirect way for assessing the effect of public spending on economic growth is to use TFP as a dependent variable and to regress other variables on it mainly those that related to public spending, assuming that targeted public spending will improve TFP and through improvement of TFP, the economy will grow faster.

3. THEORETICAL FRAMEWORK

Following Judson's (2002) cost-based method, we use expenditure on education to capture the quality of education. This allows us to estimate the human capital stock expressed in 1990 international USD, which makes it directly comparable to physical capital and GDP. Judson calculates the stock of human capital stock based on replacement costs with the following formula:

$$h_{it} = \sum_j d_{ijt} a_{ijt} \quad (1)$$

where d_{ijt} is the public expenditure on education per level of education j in country i in year t , and a_{ijt} denotes the share of the labour force in year t with a certain level of education. h_{it} is the average per worker human capital stock. If one wishes to arrive at the total human capital stock, h_{it} must be multiplied with the labour force (L_{it}):

$$H_{it} = h_{it} L_{it} \quad (2)$$

Judson (2002) identifies four problems concerning this method. First, current production costs may not be a good indicator of the value of human capital that has been produced earlier. Second, she does not use private expenditure on education since these data are usually difficult to obtain. Third, foregone income during the time of study is not taken into account. Fourth, while private expenditure is generally neglected, the available figures on students enrolled often include students entering private education. Consequently, if the private expenditures are differently distributed per level of education than public expenditures, the estimates may be biased. We may mention a fifth problem regarding this method. Judson's method uses d_{ijt} , the expenditure per level of education for year t and weighs this with the shares of primary, secondary, and higher educated in the working population. Hence, even after multiplying with the total working population she arrives at the replacement value of a single year of education instead of the total accumulated stock of human capital. As such, the human capital stock by the original method of Judson is very likely to underestimate the value of the stock of human capital.

The above-mentioned weaknesses of the Judson method are serious but can be solved. We can address the second and third problem by adding private expenditure and foregone wages to the HC stock. Since foregone wages are likely to increase over time, including it will lead to a faster appreciation of human capital. As for the fourth problem, similarly to Judson, we assume that private expenditures are identically distributed to public expenditures. The fifth problem is corrected for by multiplying equation (2) with average years of education. The corrected stock of human capital is denoted by H^* :

$$H_{it}^* = H_{it} Educ_{it} \quad (3)$$

4. DESCRIPTION OF POLICY EXPERIMENTS AND MODEL SPECIFICATIONS

4.1.1. Description of Policy Experiments (Simulations)

Computable general equilibrium (CGE) model is used to explore the impact of government policies on education and poverty reduction in Nigeria, using it as a simulation laboratory for investigating the economy wide consequences of alternative investment and growth scenarios. The starting point is a dynamic base simulation which provides a benchmark against which the other scenarios are compared. The base simulations assumptions are based on annual percentage growth rates of the education sectors. The dynamic model will be validated, by comparing the base run to the country's historical path before any counterfactual experiment is performed. The base run is for the period 2004-2015. Constant growth rates are assumed for all exogenous variables over the simulation period.

In this paper we assume that government demands across all functional areas grow at the same annual rate across all government functions. One policy experiment is carried out. "In the experiment, government demand is reallocated to education; we raise the base-year expenditure on education by some percentages, as a share of GDP. This is to see, if intervention will have a positive impact on macroeconomic and sectoral variables."

4.1.2. Model Specifications

Production and Commodity

CES Technology: Activity Production Function:

$$QA_a = \alpha_a^a \cdot \ell_a^a \cdot QVA^{-\rho_a} + (1 - \delta_a^a) \cdot QINTA^{-\rho_a} \quad (4)$$

Commodity Production and Allocation: $QXAC_{ac} + \sum_{h \in H} QHA_{ach} = \theta_{ac} \cdot QA_a$ (5)

Output Aggregation Function: $QX_c = \alpha_c^{ac} \cdot \left(\sum_{a \in A} \delta_{ac}^{ac} \cdot QXAC_{ac}^{-\rho_c^{ac}} \right)^{-\frac{1}{\rho_c^{ac}-1}}$ (6)

Output Transformation (CET) Function: $QX_c = \alpha_c^t \cdot \ell_c^t \cdot QE_c^{\rho_c^t} + (1 - \delta_c^t) \cdot QD_c^{\rho_c^t} \quad (7)$

where QA_a is Level of domestic activity a, QVA_a is Quantity of aggregate value-added a, $QINTA_a$ is Quantity of aggregate intermediate input, QHA_{ach} is Quantity of consumed home commodity c from activity a by household h, QD_c is Quantity sold domestically of domestic output, QE_c is Quantity of exports, QX_c is Quantity of domestic output of commodity c, $QXAC_{ac}$ is Quantity of commodity c from activity a

Factors Demand

Value-Added and Factor Demand: $QVA_a = \alpha_a^{va} \cdot \left(\sum_{f \in F} \delta_{fa}^{va} \cdot QF_{fa}^{-\rho_a^{va}} \right)^{-\frac{1}{\rho_a^{va}}}$ (8)

$WF_f \cdot \overline{WFDIST}_{fa} = PVA_a (1 - tva_a) \cdot QVA_a \cdot \left(\sum_{f \in F} \delta_{fa}^{va} \cdot QF_{fa}^{-\rho_a^{va}} \right)^{-1} \cdot \delta_{fa}^{va} \cdot QF_{fa}^{-\rho_a^{va}-1}$ (9)

where QF_{fa} is Quantity demanded of factor f from activity a, PVA_a is Price of (aggregate) value-added

WF_f is Average price of factor, \overline{WFDIST}_{fa} : wage distortion factor for factor f in activity a (exogenous variable)

Government

The government earns most of its incomes from direct and indirect taxes and spends it on consumption, transfers, investment, and interest payments (on its foreign and domestic debt). Real government demand (consumption and investment) is exogenously disaggregated by function.

Government Consumption Demand

$$QG_c = \overline{GADJ} \cdot \overline{qg}_c, \quad c \in C \quad (10)$$

Where;

\overline{QG}_c is the government consumption demand for commodity,

\overline{GADJ} is the government consumption adjustment factor (exogenous variable) and

\overline{qg}_c is the base-year quantity of government demand

Government revenue

Government revenue is made up of tax revenue and other sources. The latter is exogenous in the model. Tax revenue is made up of import tariffs, direct and other indirect taxes.

$$YG = \sum_{i \in INSDNG} TINS_i \cdot YI_i + \sum_{f \in F} tf_f \cdot YF_f + \sum_{a \in A} tva_a \cdot PVA_a \cdot QVA_a + \sum_{a \in A} ta_a \cdot PA_a \cdot QA_a + \sum_{c \in CM} tm_c \cdot pwm_c \cdot QM_c \cdot EXR \\ + \sum_{c \in CE} te_c \cdot pwe_c \cdot QE_c \cdot EXR + \sum_{c \in C} tq_c \cdot PQ_c \cdot QQ_c + \sum_{f \in F} YIF_{gov.f} + transfr_{gov.row} \cdot EXR \quad (11)$$

where YG is government revenue. Total government revenue is the sum of revenues from taxes, factors, and transfers from the rest of the world.

Government Expenditure

Government expenditure is made up of expenditure on the goods in the economy and transfers to households. That is, government spends its revenue on consumption demand, investment, and interest payments (on its foreign and domestic debt).

$$EG = \sum_{c \in C} PQ_c \cdot QG_c + \sum_{i \in INSDNG} transfr_{igov} \cdot CPI \quad (12)$$

where EG is government expenditure.

Total government spending is the sum of government spending on consumption and transfers.

$$\text{Government Balance: } YG = EG + GSAV \quad (13)$$

where GSAV is Government savings

$$\text{Ratio of Government Consumption to Absorption: } GOVSHR.TABS = \sum_{c \in C} PQ_c \cdot QG_c \quad (14)$$

where GOVSHR is Government consumption share in nominal absorption, TABS is Total absorption, PQ_c is Price composite commodity c

5. 0. THE MODEL DATABASE

The model database, which captures the structural features of the Nigerian economy, consists of social accounting matrix (SAM), and projected values for labour force, population, poverty level, government demand policies, savings, and various elasticity parameters for functions specifying production, import

demand, export supply, consumer expenditures, links between government investment, trade, and sectoral total factors productivity (TFP). The model is calibrated with 2004 data of the Nigerian economy.

Macro SAM Description: The SAM is based on the data extracted from the 2004 input-out matrix of the National Accounts of Nigeria data (NBS, 2005; CBN, 2005.), the Nigerian Statistical Fact Sheets on Economic and Social Development (NBS, 2006), CBN Annual Report and Statement of Accounts (2004) and the CBN Statistical Bulletin (2004). It has eight blocks. It is designed to analyze the links between government expenditure (both current and capital) policies on growth and poverty reduction in Nigeria. Recall that a SAM brings disparate data (including input-output tables, household surveys, production surveys trade statistics, national accounts data, balance of payments statistics, and government budget information) into a unified framework (Lofgren et al, 2003).

Micro SAM Description: The Micro SAM is disaggregated to 39 sectors including the total. The model has 13 activities and 13 commodities sectors. Four of these sectors are agriculture based, 1 mineral and 1 manufacturing sector and 7 services sectors including other service. The model has 6 institutions (3 households, government, saving-investments, and rest of the world), and 1 direct and 1 indirect taxes. The model used 4 factors of production categories disaggregated to agricultural and non-agricultural labour, and agricultural and non-agricultural capital. The model identifies 3 households categories disaggregated to rural, lower urban and higher urban. The micro SAM was built by disaggregating the information in the macro SAM.

6. MODEL SIMULATION AND ANALYSIS OF RESULTS

In the computable general equilibrium (CGE) modeling framework, it is essential to establish a baseline scenario as a counterfactual for comparing the outcome of a policy shock. The indicators chosen to be important in calibrating the model and key assumption used in determining the base growth path (BGP) are presented in Table 1. We use the model to explore the impact of alternative policies on long-run growth and poverty in Nigeria. Our starting point is a dynamic base growth path (2004 data) which provides a benchmark against which the other scenarios are compared. We use this to project a growth path for Nigeria's economy for the period 2004-2015. The dynamic or 'between-period' component of the model is calibrated to the annual growth rate of the Nigerian economy in order to replicate the performance of the key economic indicators. One alternative government expenditure scenarios is carried out in this paper. The experiment is increasing government expenditure on health services.

Government expenditure comprises of government demand and transfers and investment to domestic institutions. In the base growth path, government demand (consumption and investment) grows at the same annual rate across all government functional areas by 6.92% per year, a rate that is calibrated to maintain the base-year absorption share for this demand category. The base-year (2004) shares are also maintained throughout the simulation period for the other parts of absorption, private investment and household consumption. Most real macro aggregates, including real household consumption, grow at annual rates of between 6.09% and 8.70%. This range of growth rates also holds for all aggregate production sectors except mineral products sectors. The endogenous annual rate of total factor productivity (TFP) growth is greater than zero (0.17). Given a high population growth rate of 2.83%, the economy shows a low per-capita income.

The assumptions for the non-base simulations and the empirical total factors productivity (TFP) are presented in Tables 2 and 3. TFP linkage elasticities on which the elasticity parameters for our productivity functions are based, the elasticities in the model productivity functions have been scaled on the basis of the share of base-year economy represented by the activities or factors to which the productivity effect is directed. For example, if the empirical, economy-wide TFP elasticity for the public capital stock in agriculture is 0.2 and the agricultural activities represent one third of GDP at factor cost, then the elasticity used in the model function linking agricultural TFP to the public agricultural capital stock is 0.6.

The results of this paper depend on the values of the different elasticities of government expenditure on economic growth, which were taken from literature as a result of many econometric and data scanty problems in Nigeria, related to TFP linkage elasticities. For these reasons, it can be justified to use results on growth elasticities of government expenditure obtained from other studies, mainly through cross-country analysis. Thus, the elasticities used in the empirical assessment of government expenditure on poverty in Nigeria came from the empirical literature devoted to the determinants of economic growth at aggregate level and human capital development (Barro, 1997; Mundlak et al, 1997). They are not specific to Nigeria. Using these elasticities is appropriate if one believes that Nigeria's economy will adjust and respond to the same basic economic forces on education and health services, which will make her human capital more productive as we see in a cross-section of many other countries.

Table 1: Macroeconomic Base Simulation Assumptions, Base year, 2004

Items	Billion of Naira	Base Annual growth rates (%)	Ratios to GDP (%) base year 2004			Percentage point deviations from base year (2004) values
Total GDP (at factor cost)	8261.44	6.09	Investment	7.64	2.43	
Absorption	8320.10	4.72	Government expenditure	16.66	-0.99	
Household consumption	7196.43	6.30	Saving	15.87	1.80	
Government demand	1123.67	6.92	Government saving	8.24	-0.63	
Investment	631.15	6.36				
Gross fixed capital formation	1381.53	4.36				
Exports	4358.23	7.51	Base year % share of Government Expenditure in Total GDP			
					Base Annual Share of Govt. Expenditure in Total GDP (%)	
Imports	4150.17	8.69	Priority Sectors	Billion of Naira		
Agriculture	2578.96	6.50	Agriculture	49.95	0.60	
Mineral products	2842.84	3.43	Transport	15.05	0.18	
Manufacturing industry	372.06	10.07	Education	85.58	1.04	
Government services	471.66	10.85	Health	52.42	0.63	

Other services	1999.43	8.20	Defence	85.05	1.10
Real exchange rate	100.00	-0.42			
Agric/non-agric terms of trade	100.00	-0.33			
Population	129.18	2.83			
Capital depreciation	47.40	10.05			
TFP index	100.00	0.17			
Total factor income	8262.08	6.15			
Agric-Labour	56.23	4.20			
Non-Agric Labour	122.14	3.81			
Agric Capital	2619.79	2.63			
Non-Agric Capital	5439.91	1.77			

Source: Author's Computations based on 2004 SAM data of the Nigerian economy; NSB-PPN, 2005, CBN Statistical bulletin, 2004. Notes: All quantity annual growth rate variables are in real terms. Income variables are deflated by the consumer price index (CPI). The real exchange rate is price level deflated; the price index used is the CPI.

Table 2: Assumptions for Non-Base Simulation	
Simulation Name	Description
SIMEDU	shift in government expenditure from "other" to health services
Notes: In all government expenditure simulations, expansion or reallocation refers to a change in 2005 corresponding to 10% of 2004 government demands (or 1.36% of GDP). Starting from 2005, all government demand areas grow at a uniform annual real rate of 6.92%. Unless otherwise noted, we use elasticities. "other" are areas of government spending except for education.	

Table 3: Total Factors Productivity (TFP) Linkage Elasticity Parameters

Government expenditure category	TFP link elasticity value	Standard error of estimated elasticity	Linkage channel
Agriculture	0.052	0.024	TFP in agriculture
Education	0.211	0.044	Labour productivity in all sectors
Health	0.115	0.034	Labour productivity in all sectors
Defence	-0.182	0.034	TFP in all sectors
Transportation	0.021	0.021	TFP in trade services (strong effect); TFP in other non-mining sectors (weak)

Notes: Elasticity estimates and the statistics are based on Fan and Rao (2004). Their independent variables also include labour and private capital. Linkage channels are incorporated in the dynamic CGE model.

Table 4 below; provide a summary of the simulation results. These simulations all involve reallocating government demand into alternative priority areas while keeping the real growth of total government demand constant. Unless otherwise noted, in year 2 (2005), 10% of total government expenditure is moved from what is classified as "other" (which has no productivity effects) into education, that is, a reallocation that in the

base year corresponds to 1.36% of GDP or 10% of government demand. After this, government demands in all functional areas grow at the same annual rate across all government functions (6.92%). All the non-base simulation assumptions consider the impact of reallocating government demand into target areas on growth.

Table 4: Government Expenditure on Education, Economic Growth and Long Waves Scenario: Macroeconomic and Sectoral Summary Results

Items	(Billion of Naira)	Annual percentage growth rates (2004-2015)	
	Initial Value (2004)	Base Growth Path (BGP)	SIMEDU
Total GDP (at factor cost)	8261.44	6.09	7.58
Absorption	8320.10	4.72	5.78
Household consumption	7196.43	6.30	7.94
Government demand	1123.67	6.92	6.92
Investment	631.15	6.36	7.68
Exports	4358.23	7.51	9.25
Imports	4150.17	8.69	10.01
Agriculture	2578.96	6.50	7.87
Mineral products	2842.84	3.43	5.15
Manufacturing industry	372.06	10.07	11.51
Government services	471.66	10.85	11.70
Other services	1999.43	8.20	9.95
Real exchange rate	100.00	-0.42	-0.20
Agric/non-agric terms of trade	100.00	-0.33	0.56
TFP index	100.00	0.17	0.83
Total factor income	8262.08	6.15	7.26
Agric-Labour	56.23	4.20	5.88
Non-Agric Labour	122.14	3.81	5.66
Agric Capital	2619.79	2.63	4.22
Non-Agric Capital	5439.91	1.77	3.02
Ratios to GDP (%)		Percentage point deviations from base year (2004) values	
Investment	7.64	2.43	1.05
Government expenditure	16.66	-0.99	-1.90
Saving	15.87	1.80	-0.09
Government saving	8.24	-0.63	1.38
National poverty headcount (P0)	54.41	-11.19	-22.32

Source: Computations from Model Simulations

Analysis of Simulation Results

In 2004, government expenditure on education was higher than other priority sectors in the economy. In this experiment, government demand is reallocated to education, the GDP share of government expenditure on education expands from 1.04 to 2.40 (see Table 1). And given the empirical estimate of the linkage elasticity

value between TFP and expenditures in the sectors, education is higher (0.211) than other sectors (see Table 3). The increase in government expenditure on education raised the TFP level by 0.66 annual percentage growth rates, for all productive sectors by 2015. This implies that, the sector is highly significant for promoting economic growth (Table 4 SIMHEDU).

Macroeconomic Effects: On the macroeconomic effects of the education scenario, the results show that the government expenditure on health is significant for economic growth. The decomposition of the results shows that annual growth in most macro aggregates increases approximately by an average above 1.25%. As expected, due to the presence of accumulation effects in the long-run, the real annual real GDP growth. The annual growth rate of GDP goes from 6.09% in the base run 2004, to 7.58% in 2015; this represents an increase of 1.49 annual percentage growth rate or 24.47% over the base growth path (BGP) in the annual GDP growth, this result is impressive. Total absorption (the sum of private consumption, government consumption, and investment) witnessed an increase of 22.46% over the BGP or 1.06% annual growth rates. Other macro aggregate components also showed positive increases, the terms of trade for agriculture relative to non-agriculture witnessed 0.89 annual percentage growth rate, while investment recorded 20.75% over BGP and household consumption was 26.03% over BGP. The results show that, in the long run, the export sector expanded more than the import sectors (see Table 4 SIMEDU).

Sectoral Effects: At the sectoral level, the reallocation of government demand to education has positive impacts on all the activity sectors; namely, government services (which include education, health and public administration), agriculture, mineral products and manufacturing sectors. The reallocation effects among these sectors are determined by the change in value-added price. The results indicate that resources will move towards the mineral products sector in the long-run. Variations in value added prices influence the capital rental rate and labour wage rates. With the health simulation scenario, government services sectors registers positive growth in the long runs due to changed government health investment. The results show that government services sectors will increase by 0.85 annual percentage growth rate or 7.83% over the BGP in 2015 compared to the base growth path. The result shows that mineral product sectors benefits most (50.15% over the base growth path) followed by agriculture production sectors (21.08% over the base growth path). Manufacturing sectors have the least benefit (14.30% over the base growth path) (see Table 4 SIMEDU).

We look at the sectoral impact on factors of production, total factor income increase for all type of factors with agricultural labour and non-agricultural labour benefiting less (40.0% and 48.56%, respectively, over the base growth path). Non-agricultural capital benefiting the most (70.62% for non-agricultural capital compared to 60.46% for agricultural capital over the base growth path), all these will increase the demand for Non-agricultural capital and this will raises capital rental rate (see Table 4 SIMEDU).

7. FINDINGS AND POLICY IMPLICATION

The main findings of this paper is that reallocating government expenditure to education sectors will in the long-run lead to substantial growth of the economy. These impacts are strong and statistically significant in all sectors of the economy, which have the large measured returns to growth. The results also show that greater benefits in terms of economic growth can be expected from targeting government expenditure to education services. As in indicated in results, economic performance can be improved significantly when government resources are reallocated from unproductive areas to the education, with a positive over-all effects. From the results, the reallocation of 10% of government expenditure (1.36% of GDP) from

unproductive areas at the beginning of the period increase the annual growth rate of GDP goes from 6.09% in the base run 2004, to 7.58% in 2015, an increase of 1.49%. It implies that, increasing government expenditure on education services also has positive effect on macroeconomic and sectoral performances. However, in order to achieve maximum economic, government expenditure needs to be better prioritized; investing in education offers high return in terms of growth.

The results of this study have important policy implications. In order to achieve maximize economic growth government expenditure needs to be better prioritized. The Nigerian government should give priority to increasing its expenditure on education services. These types of expenditure not only have a large impact on poverty per Naira spent, but they also produce greatest growth in human productivity. The implication of this is that as more people get good education and acquire more skills, they will increase their productivity at work. It is important, however, to ensure that the investment in education is sustained, this will drastically increase growth.

The government provision of education may be considered using rights-based and needs-based approaches. Owing to the limited resources of government in developing countries, the universal provision of education is almost impossible. However, basic education commands general support under a rights-based approach. The government provision (free or subsidized) of other education services should respond to the needs of marginalized and disadvantaged groups. Huge financial resources are needed in most countries of the region to expand education services and improve the quality. Shifting resources from low-productivity sectors, such as defence and general administration, to education can go some way towards meeting the need. In this respect, increasing government expenditure in education could generate more benefit for the country than focusing only on transportation, agriculture and defence sectors. Multiple channels of financing will also be required to raise sufficient resources, including government and private sources, communities, non-government organizations, bilateral donors and multilateral organizations. An integrative approach using multiple sources is recommended for the provision of education services and future increases should be geared to improving the efficiency of existing government educational systems.

8. CONCLUSION

The main objective of this paper was to evaluate the impact of government expenditure on education, in order to better target the available resources to achieve higher economic growth. This paper has provided both theoretical and empirical knowledge about the extent and structure of government expenditure on education and growth, using a computable general equilibrium microsimulation model to examine the impact of government expenditure policy on education and growth in Nigeria. We used a dynamic recursive CGE-MS model that incorporates these links to simulate the impact on growth and targeting education and applied it to the Nigerian economy over the period 2004-2015. The path generated by a recursive expansion of the economy shows that accumulation effects captured by our model contribute to a substantial growth of the economy. Our base growth path projects a continuation of past trends in factor accumulation and TFP growth, with only modest aggregate GDP growth over the period 2004-2015. The government investment on education scenarios considered showed improved economic performance compared to the base growth path.

From this research perspective, our results show that the analysis of government expenditure on education and growth, are best analyzed in a computable general equilibrium microsimulation framework, given the economy-wide nature and strong equilibrium effects they imply. CGE-MS models are best suited to capture

policy changes within the economy since they take into account interactions and interdependencies within the economy.

To ascertain the impact of government expenditure, we rely on econometric estimates of linkages between TFP growth and government expenditure in different functional areas, while the results depend on the values of the different elasticities of government expenditure on education which are taken from literature. The path generated by a recursive expansion of the economy shows that accumulation effects captured by our model contribute to a substantial growth of the education. Our base growth path projects a continuation of past trends in factor accumulation and TFP growth, with only modest aggregate GDP growth over the period 2004-2015. The decomposition of the results shows that the re-allocation of government expenditure to the education sector appears to contribute significantly to growth. In this case, the results of experiments show that more targeting government expenditure towards improving education services will foster economic growth.

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