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Relative Maxima of the Public Sector: A Comparative Study of Nigeria and Ghana

ANADUAKA Uchechi Shirley

Department of Economics, University of Nigeria Nsukka (UNN)
Email: uchechi.anaduaka@unn.edu.ng

NNETU Vivian Ikwuoma

Department of Economics, University of Nigeria Nsukka (UNN)
Email: vivian.nnetu@unn.edu.ng

AGUEGBOH Stephen Ekene

Department of Economics, University of Nigeria Nsukka (UNN)
Email: stephen.aguegboh@unn.edu.ng

OKORIE David Iheke

Department of Economics, University of Nigeria Nsukka (UNN)
Email: okorie.davidiheke@gmail.com

Abstract

Over the past year(s), government's aggregate expenditure has been less than its aggregate expenditure the present year(s) in Nigeria and Ghana. This has made the government size of these economies big enough to command a significant economic growth in these countries, but this is not the case in these countries. This work adopted a concave parabolic model from the origin which portrays the Armey curve model to empirically validate not only the existence of Armey curve hypothesis but also to fond the optimizing government expenditure of Ghana and Nigeria, using time series data from 1970 to 2014. The result showed that Armey curve hypothesis exists both in Nigeria and Ghana. However, the result shows a strong statistical influence of Armey hypothesis in Nigeria than in Ghana. Adopting the Relative Maxima methodology, the Government of Nigeria and Ghana should spend 12.1% and 9.8% respectively, of her gross domestic product (GDP) to attain the optimal growth of ₦9.96 Trillion Naira and ₵6.422 million respectively. The researcher recommends that these governments should cut down their expenditure to the optimizing size of their governments so as to grow effectively and efficiently which is a macroeconomic goal of every economy.

Keywords: Public Sector, Government Expenditure, Government Size, Economic Growth, Ghana, Nigeria

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I.   Introduction

It has been a trend in Nigeria that each year's budget expenditure is a mark-up of the previous year's budget expenditure. Many may believe it's a result of the type of budgeting system predominant in Nigeria (Traditional Budgeting system). The view of most economists is not on the incremental aspect of the budget of Nigeria, but on its significance and positive or/and negative effects on the economy of Nigeria. This becomes the issue as the economic growth in Nigeria becomes only a matter of literature and not a realistic issue. The economy even seems to rather be deteriorating than stagnant which is not supposed to be the case. The economy however should push forward in growth and development as the annual budget of the government increases which leads to a puzzle.

Ghana on the other hand uses Activity Based Budgeting (ABB) in which the expenditure of the government is a function of the costs of significant activities in the economy that drives growth and development. Herein the government of Ghana channels its expenditures to the mega and significant projects or activities that drives social welfare upwards. It is also observed that despite the system of budgeting adopted in Ghana, there has also been an annual increase in the public spending or public consumption of the government of Ghana, similar to that of Nigeria.

These scenario has given birth to finding the optimal size of the government (Public sector) in any economy so as to determine the peak of government expenditure, above or below which will not lead to the optimal economic growth. This debate is still ongoing till date. Most economists believe that the government of bigger nations has bigger burdens and also should spend more always while others don't follow suit but believes that the government is inefficient and to spend less no matter the size of the economy as the efficient privates regulate the economy (Amoafo, 2011).

Moreover, this debate borders on the role and efficiency of the government in an economy, as it is between the classical economists and Keynesian economists. The Classicalist had always believe in the doctrine of Laissez – faire, which however connote little or no government participation in economic affairs of the nation. Saying that the economy should be driven by an invisible hand (the market forces) while the existence of the government is to enforce laws and contract.

The Great Depression of the 30s questioned the validity of the Classical Economics' doctrine. When unemployment soared higher without hope or coming down, stock market crashed, business collapse, rich and wealthy people become poor all of a sudden, investments became worthless, etc. Economists have to explain what happened, how it happened and the possible remedies. Hence the drive to explain the economic situation of the economies of the world led to the Keynesian school of thought as led by Lord Maynard Keynes.

The Keynesians was able to identify the root or cause of the world depression as absence of a controlling hand when the invincible hands refuses to be invincible (effective enough). They therefore suggested that the intervention of the government in the economy as the only way out. They believe that the growing intervention of the government is a necessary condition, though not sufficient, to correct private sector inefficiencies (Garrett and Rhines, 2006). There propositions was the back bone to combating the great depression. Thus, the government

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participation in the economic affairs of every economy began to increase tremendously. It is important to note that the government is not without flaws.

The different sizes of government have two effects on growth rate, namely:

1. An increase in taxes reduces growth rate through disincentive effects.
2. Increase in spending by the government raises marginal productivity of capital which raises growth rate, (Barro, 1990).

He argued that the second force dominates when the size of government is small while the first force dominates when the size of the government is large. Most researchers like Grier & Tullock (1989), Guseh (1997), Henrekson (2003), Udah (2010), and Landau (1983) found an inverse relationship between the government expenditure and the economic growth in different economies of their study. On the other hand, people like Rubinson (1977), Ram (1986), Aschauer (1989), Alexiou (2007), and Jiranyakul (2007) discovered a positive relationship between government expenditure and economic growth in different economies of the world. However, economies of interest (Nigeria and Ghana) has a significant government participation in their respective economies and hence not immune to this dilemma. This research work therefore seeks to find out when the government expenditure is positively and negatively related to economic growth for policy formations in the economies of interest.

Nigerian government have had different regimes, hence different government structures and spending pattern. Each of these regimes has its peculiar policy thrusts. As the military intervened in 1983, the government expenditure increased from ₦16.99 billion in 1984 to ₦18.99 billion in 1985(11.8%); the Gross Domestic Product also increased by 13.9% during the same period. The second military coup that ushered in another military regime, the public expenditure increased substantially by 325.4% from ₦22.0 billion in 1986 to ₦93.60 billion in 1991, with a more proportionate increase in GDP by 351.4%. Between 1991 and 1992, public expenditure increased by 81.6% (from ₦129.86 billion in 1991 to ₦235.78 billion in 1994), while the GDP increased less proportionately compared to public expenditure by 69%. In the periods that marked the countdown to the inception of civilian regime (1994 – 1999), the total government expenditure increased substantially by 398.8 percent from ₦235 million to ₦1.18 trillion, while GDP increased by 254.9 percent (less proportionate to total government expenditure). The first civilian regime of 1999 – 2003, the total government Expenditure increased by 113.3% from ₦118 billion to ₦251 billion, with a more proportionate increase in GDP by 165.7%. The next civilian regime of 2003 – 2007, the total government expenditure increased by 115% from ₦251 billion in 2003 to ₦539 billion in 2007.

In the periods of 2007 – 2011, the public expenditure increased by 75% from ₦539 billion in 2007 to ₦944 billion in 2011 with a more than proportionate increase in GDP by 81.7%. Finally, from 2012 – 2014, the government expenditure grew by 12.2%, from ₦4.1trillion in 2012 to ₦ 4.6 trillion in 2014 with a more than proportionate increase in GDP from ₦40billion to ₦80.3 trillion. This sharp increase is attributed to the GDP Re-basement of 2013 in Nigeria (Central Bank of Nigeria, 2013).

However, after independence of 1957 in Ghana, during the first military coup of 1966 –1969 that led to the first military Rule in Ghana, the total government expenditure increased substantially by 43.9% from ₵19.8 million to ₵28.5 trillion, while GDP increased by 31.8% (less proportionate to total government expenditure). During the second coup (military regime) of 1972 – 1975, the total government expenditure increased substantially by 90.1% from ₵35.5million to ₵68.9 million, while GDP increased by 87.6%, (less proportionate to total government expenditure). The third coup of 1979 wasn't successful. In the fourth military government of 1981 – 1993, the total government expenditure increased substantially by 8191.5% from ₵638 million to ₵52.9 billion, while GDP increased by 5231.6% (less proportionate to total government expenditure). The first civilian government of 1957 – 1966, the total government expenditure increased substantially by 106.3% from ₵9.6 million to ₵19.8 million, while GDP increased by 72.6%. (Less proportionate to total government expenditure). During the second civilian 1969 – 1972 the total government expenditure increased substantially by 25% from ₵28.4 million to ₵35.5 million, while GDP increased by 40.7% (more proportionate to total government expenditure). In the third republic from 1979 – 1981, the total government expenditure increased substantially by 120% from ₵290 million to ₵638 million, while GDP increased by 157% (more proportionate to total government expenditure). Finally the fourth Republic of 1993 – 2014, the total government expenditure increased substantially by 207.7% from ₵55.9 billion to ₵ 172 billion, while GDP increased by 159.2% (less proportionate to total government expenditure). From the analysis of the total public expenditure of Nigeria and Ghana economies, it is evident that there has been a significant increase in the participation of the government in the economy with its inherent negative and positive effects on the growth rate of GDP in the various years.

These historic analysis however proves empirical evidence. Implying both large and small government sizes experiences the swing of positive and negative relationships between economic growth and the government expenditure. However one can infer that neither the total government intervention, nor the lack of government intervention leads to maximization of the economic activities in an economy. Hence, one may ask, *what level of government intervention would lead to the optimal economic growth?* In a nut shell, a certain combination of the free market forces (classical view) and government existence (Keynesian view) is needed to achieve the optimal economic=mic growth. The level of the size of government that would maximize economic growth in this combination was popularized by Armey (1996).

Armey (1996) posited the existence of an optimal size of government in every economy. He explained that growth in government size would enhance economic growth up to a certain threshold, after which growth in the size of government hinders economic growth. The threshold, according to him, is the growth – optimizing size of the government (point B in the chart below). This growth – optimizing size of the government could be determined in every country and if this level is determined and maintained, economic growth will be maximized. This research work therefore is set out to investigate the existence of the Armey curve hypothesis in Nigeria and Ghana. If Armey curve hypothesis is empirically validated to exist in

Nigeria and Ghana, this work will definitely push further to find their Relative Maxima (optimizing size of the government).

II. Theoretical literature

1. Wagner's law

Adolph Wagner, a German Economist (1883) formulated the law of increasing state activity commonly referred to as Wagner's law. This theory emphasizes economic growth as the fundamental determinant of public sector growth. Explicitly, the Wagner's law state that as per capita income in a country grows, the relative size of the public sector also grows. The increase in per capita income is associated with an increase in the demand for public services such as transport and communication networks, waste disposal, etc. hence, this demand for public services, new functions are continually being undertaken and old ones are being performed efficiently and on an expanded scale that increases the spending of the government. Thus, social progress brought an increase in state activity which in turn meant more government expenditure. Wagner recognized three functions of the state: Providing administration and protection; ensuring stability; and providing for the economic and social welfare of the society as a whole.

2. Peacock and Wiseman displacement effect

Peacock and Wiseman (1967) acknowledged that government expenditure depends broadly on revenue raised by taxation and that taxation sets a constraint on government expenditure. They theorized the "displacement effect", where they explained that social upheavals or disturbances such as famine or national crises would lead to an increase in public expenditure, since the government may convince tax payers that higher taxes are necessary to prevent a national disaster. They maintained that after the crisis had subsided, government expenditure could even remain at the new post-crisis level, the reason being that tax payers would become accustomed to the higher levels of taxation and accept them as part of life (Black, Calitz & Steenekamp, 1999).

3. Musgrave and Rostow's development model

Musgrave (1969) & Rostow (1971) explained how government expenditure tends to increase when an economy develops from a subsistence economy to an industrialized economy. At the early stage of development, they said, the private sector is relatively small; hence, government may have to participate actively to provide basic infrastructures that would make the environment conducive for economic development. In the middle stage, the government will continue to supply investment goods while the private sector takes off due to external effects of the investment undertaken during the first stage. In the final stage, the government's expenditure expressed in percentage of GDP, usually decreases. At this matured stage, the high per capita income leads to a high demand of public services such as education, health, pipe borne water, and transport services compelling government to provide such services through budgetary allocation.

4. The Meltzer-Richard hypothesis

Meltzer & Richard (1981) developed a general equilibrium model in which majority voting determine the magnitude of income distribution and as a result the share of government expenditure in the economy. The extent of redistribution rises when the mean-to-median ratio of the income distribution increases since the median voter will then gain more from redistribution (Bredemeier, 2010). According to them, the fundamental reason for the increase in government expenditure can be attributed to an extension of the franchise of citizens which brings about a change in the Median (decisive) voter.

5. Baumol's unbalanced productivity growth

William Baumol (1967) developed a microeconomic model of unbalanced productivity growth. He used it to show that government expenditure may also increase disproportionately because of an increase in the price of inputs used by the public sector relative to those employed in the private sector. He divides the economy into two broad sectors: a progressive sector, characterized by technologically progressive activities such as innovation, capital formation, and economies of scale, all of which contribute towards a rise in the level of output. In this sector, a cumulative increase in productivity of employees is justified by increases in wages and salaries. The second sector is the non-progressive sector. The inherent characteristics of the non-progressive sector are its accommodation of sporadic changes in productivity. This raises the expenditure of the non-progressive sector and hence, public expenditure.

6. Brown and Jackson's microeconomic model

The purpose of microeconomic models of growth in government expenditure is to study the factors influencing the demand and supply of public goods and services. Brown& Jackson (1990) developed a microeconomic model so as to derive the levels of publicly provided goods and services. The factors that may influence the demand and supply of public goods and hence the levels of government expenditure are: changes in the sizes of the population and its structure, and the quality of goods demanded by the median voter.

III. Empirical literature

Barro (1991) in a cross country study of 98 countries for a period spanning from 1960 to 1985, using average annual growth rates in real per capita GDP and the ratio of real government consumption to real GDP concluded that the relationship between economic growth and government consumption is negative and insignificant.

Building on Barro's endogenous growth model, Hsieh & Lai (1994) attempted to untangle the nature of relationship between government expenditure and economic growth. They used a multivariate time series analysis, with particular attention paid on causal patterns and the shape of impulse-response function in the context of vector auto regression. Their empirical result revealed the inconsistency in establishing that there is a positive or a negative relationship between government size and economic growth.

Adopting a Granger Causality approach, Conte & Darrat (1988) investigated the causal direction between public sector growth and real economic growth rates for the OECD countries. Their

result showed that government growth has had mixed effects on economic growth in the various countries, positive for some countries and negative for others. Hence there was no discernible impact of government size growth on the real economic growth rate.

Guseh (1997) in a study on the effects of government size on the rate of economic growth conducted an OLS estimation using time series data over the period of 1960 – 1985 for 59 middle-income developing countries. The yielding evidence suggested that growth in government size has negative effect on economic growth, but the negative effects are three times as great in non-democratic socialist systems as in democratic market systems.

Abrams & Wang (1999) attempted to investigate the relationship between government size and the unemployment rate using a structural error correction model in twenty OECD countries. He found that government size, measured as total government outlays as a percentage of GDP, played an instrumental role in affecting the steady-state unemployment rate, i.e. unemployment rate rises.

Ramayandi (2003) investigation on the impact of government size on economic growth in Indonesia showed a negative relationship. Based on the Error Correction Model result obtained, the researcher concluded that the negative association will persist in both the long-run as well as in the short-run.

Jiranyankul (2007) examined the direction of influence between government expenditures and economic growth in Thailand using the granger causality test. He found that there is no co integration between government expenditure and economic growth. A unidirectional causality from government expenditure to economic growth exists. However, the causality from economic growth to government expenditures is not observed. Furthermore, estimation results from the Ordinary Least Square (OLS) confirm the strong positive impact of government spending on economic growth during the period of investigation.

Yamamura (2010) explored the question of how government influences generalized trust using the ordered probit methodology. It is found that government size is not associated with generalized trust for non-workers, while government size is negatively associated with generalized trust for workers. This suggests that workers, through their work experience, might confront the greater bureaucratic red-tape coming from "larger government" leading to negative externality effects on the trustful relationship in the labour market.

Chen, Chen & Kim (2011) employed the quantile regression methodology to investigate the relationship between government size and economic growth using a panel data set for 24 OECD countries. Their findings was that the magnitude of the effect of government size on economic growth varies through the quantile; when economic growth is low, increasing the size of the government may have a positive effect and stimulate economic growth. However, as the economic growth increases, government size will have a negative effect on economic growth.

Mehrara & Keikha (2012) used a threshold regression model to ascertain the relationship between government size and economic growth in Iran. The results show that linear methods are not capable to explain the relationship between government expenditure and economic growth. The findings indicated government expenditure has positive effect on growth, but after crossing a threshold, this effect turns reversed.

Mudaki & Masaviru (2012) examined the effect of the composition of public expenditure on economic growth in Kenya. In the study, they investigated the impact of public spending on education, health, economic affairs, defense, agriculture and communication on economic growth for the period 1972 – 2008 using OLS technique of estimation. The duo found expenditure on economic affairs, transport, and communication to be weakly significant while expenditure on education was highly significant; expenditure on agriculture was found to be significant though negative while outlays on health and defense were insignificant. Their findings were, however, not conforming to a priori.

Nketiah-Amponsah (2009) in his work Public spending and economic growth: evidence from Ghana, using both aggregated and disaggregated time series data from 1970 to 2004 found out that expenditures on health and infrastructure promote economic growth, while those on education had no significant impact in the short run. In addition, the political economy variables-namely the nature of governance (democracy) and political instability (years of changes in government and military dictatorship)-proved significant in explaining Ghana's economic growth over the study period.

Government expenditure and economic growth dynamics in Ghana by Adu et al (2014b) testing the existence of the Wagnerian hypothesis in Ghana, employing series from 1970 to 2010 via the ARDL model and granger causality test found out that in the long run, government expenditure has a positive and significant impact in the economic growth of Ghana but however, it is negative to economic growth in the short run. They validate the existence of Wagner's hypothesis in Ghana as the government expenditure of Ghana plays no significant role for the private investments and activities in Ghana. They therefore recommend fiscal discipline and control to avoid crowding out effects in of Ghanaians' private investments by that of the government.

Adu & Akcah (2014a) in their paper, revisiting government spending and economic growth analysis in Ghana, using time series of 1970-2010 and employing ARDL model. The study found out that both in the short run and long run, government capital expenditure is significant and negatively related to the economic growth of Ghana while recurrent expenditure of the government had a positive relationship with economic growth, though not significant in the short run. The study advocates fiscal discipline and efficiency in the disbursement of capital fund to trigger positive effects on the economy of Ghana.

Richard (2009) adopted a Barro-type production function to chart out a growth model that accounts for the productivity of government spending and also adopts Wagner's hypothesis to account for endogeneity resulting from fiscal expansion. The result shows that government expenditure was unproductive in Nigeria.

Mba & Olugu (2011) investigate the interaction between government expenditure and economic growth in Nigeria for the period 1961 – 2011 using a Granger Causality test method. The causality test between recurrent expenditure and Gross Domestic Product revealed a unidirectional causality running from government expenditure to economic growth. Also, causal relationship between capital expenditure and GDP is unidirectional with growth running from GDP to capital expenditure.

Taiwo & Abayomi (2011) conducted a study to empirically examine the effects as well as the trends of government spending on growth rates of real GDP in Nigeria using the Ordinary Least Square of Estimation. The study reveals that there is a positive relationship between real GDP as against recurrent and capital expenditure.

In the same vein, Ditimi, Adebayo, & Philip (2011) examined the linkage between the components of government spending and economic growth in Nigeria. The findings of the study showed that expenditure on agriculture had a significant influence on economic growth while expenditure on education, health, transport and communication had insignificant influence on economic growth.

Nasiru (2012) analysed the relationship between government expenditure (Disaggregated into capital and recurrent) and economic growth in Nigeria. Employing the bound test approach to co-integration based on unrestricted Error Correction Model and pair wise causality tests; he discovered that there exists no long-run relationship between government expenditure and economic growth. The causality test revealed that government capital expenditure granger causes economic growth while no causal relationship was observed between government recurrent expenditure and economic growth.

Ekeocha & Oduh (2012) conducted a study to determine the optimal size of federal government in Nigeria. The result of the study suggests that the optimal level of federal government expenditure is approximately 23% of her Gross Domestic Product.

Olaleye, Edun, Bello & Taiwo, (2014) worked on government expenditure and economic growth: an empirical analysis of the Armey curve in Nigeria proposed the optimal government expenditure that maximizes economic growth is 11% of her GDP using time series data from 1983 to 2012.

IV.   Methodology

In order to test the relationship between the general government expenditure and economic growth that is theoretically characterized by an inverted U – shaped Curve (as proposed by Armey, 1996), we use a concave parabolic (quadratic) function from the origin (without intercept) which posits the relationship that runs from government expenditure squared, and government expenditure, to economic growth. A Concave Parabolic model from the origin denotes zero economic growth at zero level of government expenditure, as depicted by Armey curve (1996). It is important to note that a parabolic functions can be convex or concave. Mathematically speaking, if the coefficient of the highest power of a parabola is positive, the graphic representation of the function will be convex and vice versa. Given the concave nature of the Armey curve, we are expectant that the coefficient of the highest power of the parabolic model be negative as to show and prove the concavity of the Armey curve (Concave Parabolic) Model.

The broad objective of this work is to test empirically the existence of Armey curve hypothesis in Ghana and Nigeria. Therefore, this work will use the actual parabolic Model (Armey curve Model) from the origin as used by Armey (1996) to empirically validate its existence in the two countries of interest. Hence, we have the relations:

$$EG_t = \beta GE_t + \gamma GE^2{}_t + \mu \ldots (1)$$

$EG_t = Economic\ Growth. It\ will\ be\ proxied\ with\ the\ ouput\ of\ the\ economy$

$(norminal).\ This\ is\ plotted\ on\ the\ Y-axis. It\ is\ proxied\ by\ the\ norminal$

$output\ of\ an\ economy\ because\ it\ depicts\ growth\ in\ an\ economy\ as\ its\ output$

$increases\ over\ time.$

$GE_t = Government\ Expenditure.\ According\ to\ Armey, this\ is\ the\ percentage$

$of\ Government\ expenditure\ to\ the\ Economic\ output\ which\ is\ plotted\ on\ the$

$X-axis, ranging\ from\ zero\ to\ hundred\ percent$

$GE^2{}_t = the\ squared\ value\ of\ the\ government\ expenditure. This\ variable$
$determines\ the\ concavity\ or\ convexity\ of\ the\ Armey\ curve.$

$\beta, \gamma = Parametric\ values$

$\mu = the\ white\ noise\ term$

To find the optimal (Relative Maxima) or Relative Minima of a quadratic function can be done in two ways. However, they are expected to produce the same result. These methods are:

1. **Graphical Method**: this method plots the series in a two plan coordinate points, find the apex point of the curve and trace it to both axes to find the optimizing size of the government and also its produced optimum economic growth.
2. **Calculus Method**: this methodology takes the critical point and equate it to zero, so as to find the optimizing size of the government and thus produce the optimal economic growth (output).

This work will employ the methodology of calculus (Differentiation) to find the optimizing size of the government thus:

$$EG_t = \beta GE_t + \gamma GE^2{}_t$$

Step1: impose the concavity axiom.

$$EG_t = \beta GE_t - \gamma GE^2{}_t$$

Step2: take the critical point of the function (first derivative) and set it equal to zero.

$$\frac{\Delta EG_t}{\Delta GE_t} = 0$$

$$\frac{\Delta EG_t}{\Delta GE_t} = \beta - 2\gamma GE_t$$

$$0 = \beta - 2\gamma GE_t$$

$$GE^*_t = \frac{\beta}{2\gamma} \equiv \pm\frac{a}{2b}$$

V.   Result presentation and discussion

TABLE 1

Regression Result.

Country	Variables	Coefficients	T-stat.	Prob.
Nigeria	GE_t	1650287	4.80	0.0000
	GE^2_t	-68342.5	-4.13	0.0000
Ghana	GE_t	1.31e+09	1.27	0.210
	GE^2_t	-6.68e+07	-0.76	0.452

Source: stata12 computation

To examine the existence of Armey curve hypothesis in Nigerian and Ghanaian economies will be done as follows:

$NIGERIA$: $EG_t = 1650287 GE_t - 68342.5 GE^2_t$

$GHANA$: $EG_t = 1.31e09 GE_t - 6.68e07 GE^2_t$

From the parabolic models of Nigeria and Ghana shown above. It is evident and therefore empirically proven that Armey Curve hypothesis exit in Nigeria and Ghana. This is inferred by the negative sign of the squared values of government expenditure in both countries, hence a concave parabolic model.

Moreover, it is important to note that this Armey Curve in Nigeria is statistically significant as its coefficients are all statistically significant. On the other hand, though it exists in Ghana but it is therefore not statistically significant as its coefficients are not statistically significant.

To find the optimizing size of these governments (Relative Maxima), we under take the steps in chapter three.

Step1: state the concave parabolic model

$NIGERIA$: $EG_t = 1650287 GE_t - 68342.5 GE^2_t$

$GHANA$: $EG_t = 1.31e09 GE_t - 6.68e07 GE^2_t$

Step2: take the critical point of the function (first derivative) and set it equal to zero.

$$\frac{\Delta EG_t}{\Delta GE_t} = 0$$

$$Nigeria: \qquad \frac{\Delta EG_t}{\Delta GE_t} = 1650287 - 136685 GE_t$$

$$0 = 1650287 - 136685 GE_t$$

$$GE^*_t = \frac{1650287}{136685}$$

$$GE^*_t = 12.1 (3.s.f)$$

$$Ghana: \qquad \frac{\Delta EG_t}{\Delta GE_t} = 1310000000 - 133600000 GE_t$$

$$0 = 1310000000 - 133600000 GE_t$$

$$GE^*_t = \frac{1310000000}{133600000}$$

$$GE^*_t = 9.8 (2.s.f)$$

In summary of the optimizing government size results, recall that the government expenditure used in this work are percentages of the government expenditure to its Gross Domestic Product (GDP). To maximize the economic growth of Nigeria, the government of Nigeria should spend 12.1% of its Gross Domestic Product (GDP) while the government of Ghana should spend 9.8% of its Gross Domestic Product (GDP). When this is done, optimal economic growth of both economies are assured.

To ascertain the yielding Gross Domestic Product (output) of these optimizing sizes of the government, we substitute these optimizing size of the government back in their respective models thus:

$$NIGERIA: \qquad EG_t = 1650287[12.1] - 68342.5[12.1^2] = 9.962 \; trillion$$

$$GHANA: \qquad EG_t = 1.31e09[9.8] - 6.68e07[9.8^2] = 6.422 \; million$$

VI.   Summary and policy recommendations.

In nutshell, the government aggregate expenditure should not be sentimental but objective based both in Nigeria and Ghana. Moreover, being objective based is both a necessary condition to optimizing the output of the economies. Above the objectivity is a financial mandate constraint. If every government has a particular amount to spend per annum, it will guide it through allocation funds for projects. Even though there might be many objective based projects to carry out in a year, the mandate of a limit of what to spend will assist the government in finding out more impressing and vital decisions to undertake, thus ranking the objective based projects in a scale of necessity and vitality. Some governments therefore also advocates austerity measures, to cut down public spending drastically and still achieve economic growth.

In recommendation, the governments of Nigeria and Ghana should stick to this optimizing size of the government, enforce it and maintain a suitable environment which will produce a great or highest gross domestic product for these countries. The institutions in these economies should also be made strong and not weak to stand against the deficiencies inherent in the

public sector and still give room for the private sectors to execute their activities as the government regulates, maintain law and order and enforces property rights.

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