GOVERNMENT EXPENDITURE AND DEFICIT FINANCING: THE GHANAIAN POST-WAR EXPERIENCE*

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ABSTRACT

In this paper, the author has tested the Buchanan-Wagner hypothesis for Ghana using post-war annual data, based on the traditional formulation by Niskanen (1978) as well as the Error-Correction model as used by Craigwell (1999) for Bardados.

The results for Ghana rejected the hypothesis. In other words, the Ghanaian experience indicated that high deficits do not necessarily encourage increased government spending; so that the population tended to take full cognizance of its tax liabilities as entailed in debt servicing.

This conclusion contrasted variously with the results in similar studies for Barbados, Pakistan and Greece; and therefore suggests that the applicability or otherwise of the Buchanan-Wagner hypothesis for developing economies may be mixed and country-specific.

The result have also shown that productivity growth in the public sector in Ghana during the survey period exceeded that of the private sector, but more important, there was the tendency for the high growth in the former to spill-over to the latter; but first, public to the sector activity had to "crowd in" or complement activities in the private sector.

INTRODUCTION

Since the Nkrumah era (1957 – 1966), and especially in 1960, government spending in Ghana has outpaced revenue. The implied deficits have been financed in various ways: through the depletion of foreign exchange reserves which was characteristic of the early sixties, by short-term loans and credits from outside, as well through outright creation of money (Ahmed, 1970, Rimmer, 1992).

Beginning 1960, three years after Independence, the momentum of capital and development expenditure in Ghana accelerated with the need to provide and expand basic socio-economic infrastructure facilities like road and telecommunications, hydro-electric power, education, health and housing. A dominant public sector enterprise and service system was thus begun with the intent to guarantee growth and development of human and non-human resources, equity in the distribution of socio-economic gains and ultimately to improve the living standards of the people.

In the manufacturing sector, for example, import substitution strategy was pursued, albeit without much success, with the intention to create jobs and utilise local material resources. But over the years, the operations of the state enterprises which were set up had become cost-ineffective. A lot of factors were responsible for such poor performance including poor management control, itself a function of indiscipline and frequent government intervention in management decisions. Such interventions tended to affect the operational control and other short-term business initiatives for management, and created an environment for bribery, embezzlement and larceny and other forms of corruption. The inefficiencies of the state enterprises were said to be the causes and symptoms of the inflationary situation in the sixties (killick, 1978). In recent times, the above situation has not changed that significantly despite increasing attempts to privatise state enterprises through the divestiture policy programme.

Table A depicts the deficit profile for Ghana for

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reviewed period. The Deficit-GDP ratio was comparatively high in 1975 and 1980 (over 10%). For each of the two years, the Deficit-Expenditure ratio was over 40%, whilst the Expenditure-GDP ratio of 27% recorded in 1975 was the highest over the period.

Notably 1975 was mid-way into the military government of the National Redemption Council which was infamous for its excessive regulations and price controls and for printing money. In June, Flight Lieutenant John Jerry Rawlings began his three-month military takeover to "house-clean" the country of its economic decadence only to return again in 1981, after the approximately two year civilian government under president Limann. Thus the period between 1978 and 1981, inclusive, may be described as one of frequent changes in the political system, with reverberated effect on the country's economic policy agenda.

As indicated in Table A, the deficit problem was improved after 1983, and indeed the last three years up to 1990 reported a surplus. But these improvements were valid only under a "broad" and thus less restricted definition of deficit which includes the expenditure and financing on external project aids. It is obvious that when the external influence is removed, using the "narrow" definition of deficit, the government deficit problem persisted for the second half of the 1980s.

Similarly, the Deficit-Expenditure ratio improved towards the close of the 1980s under the "broad" definition but not the "narrow" definition of the government budget deficit. This could not have been otherwise, but the idea is relevant in the sense that it creates the basic awareness of the differences between the two definitions of the budget deficit. Table A also shows that the Expenditure-GDP ratio was higher up to 1980 than after 1983 during which the ratio was approximately constant (14%).

In the recent past years, Ghana's economic performance has been explicitly defined under two core reform programmes namely, the Economic Recovery Programme (ERP) which was instituted in April 1983, and the subsequent Structural Adjustment Programme (SAP) in 1985. These programmes were instituted to help the Ghanaian economy recover from its depression, and to restructure it towards greater reliance on market forces through the realignment of relative prices to boost productivity especially in the export sector. Essentially these reform programmes pursued a restrictive monetary policy and public sector financial accountability, designed to set government expenditure and revenue targets in such a way as to achieve more equitable distribution of the benefits and costs of the structural changes.

Table A: Deficit and Government Expenditure Profile. Ghana (1955 – 1990)

Year	Deficit – GDP Ratio (%)	Expenditure – GDP Ratio (%)		Deficit - Expenditure Ratio %	
	(B)	(N)		(B)	(N)
1955	-2.0		21.2	-9.4	
1960	-6.3		23.7	-26.5	
1965	-4.8		22.7	-21.4	
1970	0.09		19.2	0.4	
1975	-11.8		27.2	-43.3	
1980	-10.8		18.8	-57.4	
1983	-2.7	-2.7	8.3	-32.5	-32.5
1985	-2.2	-3.0	14.0	-15.7	-21.4
1987	0.5	-2.4	4.3	3.4	-16.7
1989	0.7	-2.1	14.4	4.8	-14.5*
1990	0.2	-2.4	13.9	1.4	-17.2

The figures under "N" and "B" are based respectively on the "Narrow" and "Broad" definitions of deficit used in Ghana since 1983. The latter takes into account the expenditures financed by external project aids. The former does not.

Sources:
Estimates for 1955 - 1980 are compiled from Rimmer (1992), Tables 9.2, p 207).
Estimates for 1983 - 1990 are compiled from Kapur et. al., (1991, Table 1, p. 6).

In this regard, government outlays on education (including informal education), health and social welfare have been stepped up. But also government expenditure policy was targeted at small-scale farmers, the urban unemployed, retrenched public sector employees (as well as women groups) who are considered as most vulnerable social and economic group (see Kapur et. al., 1991, p. 3).

Thus in the recent past decade or so, there have been attempts to use monetary and expenditure-revenue adjustment measures to alleviate the deficit problem. This has been done through interest payment management in view of the fact that interest payment alone accounts for about one-third of recurrent expenditure. However, continuing practical realities like high inflation rate, low levels of domestic savings and investment, among others, have made it almost impossible to turn the deficits into surpluses in the "narrow" definitional sense, exclusive of external financial project aids. In other words, the government budget deficit problem appeared to have been overcome only in the "broad" and unrestricted sense.

Given this brief historical backdrop of the deficit situation, the main purpose of this paper is to test the Buchanan-Wagner hypothesis for Ghana, using post-war data for the 1955-1990 period, to serve as a guide to decision making regarding the fiscal and general macro policy objectives of the economy. In essence, the paper seeks to test the theoretical claim by Buchanan and Wagner (1977) that high deficit financing tends to result in increased public spending in real terms. This claim has been demonstrated favourably for an advanced economy like the USA (Niskanen, 1978). Less developed economies including Greece (Provopoulos, 1982), Pakistan (Khan, 1988) and Barbados (Craigwell, 1991) have also tested the hypothesis with various outcomes. The empirical results of the three developing countries are compared with the parameters estimated for Ghana in this study in order to determine whether or not the hypothesis is applicable for the post-war period.

CONCEPTUAL FRAMEWORK OF THE EMPIRICAL MODEL

The model used in the present study is not different from those used in the country cases cited earlier. These studies follow from Niskanen's (1987) model for testing the Buchanan-Wagner hypothesis for the USA. The original hypothesis to be tested states that high deficits encourage high levels of government spending. In other words, increased government is the direct result of increased government accommodation of deficits. The hypothesis is based on the rationale that government deficits tend to reduce the perceived price of public goods and services to the current generation of tax payers (and voters) who, in turn, increase demand including the demand for public goods and services.

Thus, at any point in time, the number of available units of the bundle of public goods and services depends on the perceived share of the unit cost and the actual unit cost of the public goods and services, as well as the income per capita. According to Niskanen (1978), the number of public goods and services depends on the perceived unit cost and the per capita income as in

$$X = \beta o\, S^{\beta 1} C^{\beta 1} Yy\, e^{u} \quad \ldots\ldots\ldots (1)$$

where x = The number of units of the bundle of public goods and services.

S = the perceived share of the unit cost of the same
C = the actual unit cost of the same.
Y = the per capita income
u = the disturbance
e = the exponential term.

In practice, it is easier to measure the product of X and C directly than to observe them separately. Thus equation (1) is re-defined to obtain the per capita spending and the total spending functions in equations (2) and (3) respectively

$$XC = \beta o\, S^{\beta 1} C^{\beta 1 - 1} Y^{\gamma} e^{u} \quad (2)$$

$$XCN = \beta o\, S^{\beta 1} C^{\beta 1 - 1} Y^{\gamma} N e^{u} \quad (3)$$

The XC is the per capita government spending obtained from XCN (= TGS), the total government spending, N is population size. In the subsequent formulations, TGX is used in lieu of XCN.

Two crucial assumptions were made by Niskanen (1978) in respect of the above. First, that the perceived share of the unit cost of public goods and services is equivalent to the per capita ratio of tax revenue to total spending. Thus,

$$S = (T/G)(I/N) \quad (4)$$

Where T = total government expenditure (TGX)

Under a Balanced Budget condition, therefore, the perceived share of the unit cost of public goods and services will decline with increased population. The second assumption measures the unit cost of public gods and services in terms of the average wage rate (W) in the private sector and the population.

$$C = a W^{\lambda} N^{\delta} \quad \ldots\ldots\ldots \quad (5)$$

$$\text{for } 0 < \lambda < 1 ; \delta > 0$$

Where λ and δ are parameters measuring, respectively the "productivity effect" and the "crowding effect". More specific, if $\lambda > 0$, then private sector growth exceeds growth in the government sector; and indeed if $\lambda = 1$, then there is no increase in government sector productivity.

Also, if $\delta = 0$, then the public services are considered as "public goods", if $\delta = 1$, then the unit cost is directly proportional to the population; and if $\delta > 1$, there is a "crowding effect" on the unit cost of providing public goods and services.

Combining equations (5) and (4) into (3) yields the total spending (TGX) function as simplified in equation (6) below

$$TGX = \beta_0 [T/G)(I/N)]^{\beta_1} [\alpha W^{\lambda} N^{\delta}]^{(1-\beta_1)} Y^{\gamma} N e^{u}$$

$$= \beta_0 \alpha^{(1-\beta_1)} (T/G)^{\beta_1} Y^{\gamma} N^{\delta(1-\beta_1)+1-\beta_1} W^{\lambda(1-\beta_1)} e^{u}$$

$$= A(T/G)^{\beta_1} Y^{\gamma} N^{\phi} W^{\theta} e^{u} \quad (6),$$

Where $A = \beta_0 \alpha^{(1-\beta_1)}$

$\phi \quad 1 - \beta_1 + \delta + \delta\beta_1$

$\theta \quad \lambda + \lambda\beta_1$

Given equation 6), the implicit per capita government spending function (PGX) is given as

$$PGX \quad A(T/G)^{\beta_1} Y^{\gamma} N^{(\phi-1)} W^{\theta} e^{u} \quad (7)$$

Following Niskanen (1978), the "level" and first-difference functional forms are used to represent the long-run and short-run dynamic effects in that order. In other words, the "level" form ignores short-term effects whereas the first-difference form does not consider long-term effects.

This is a major drawback of the "traditional approach" as suggested by Hendry and Mizon (1978), in which the long and short run effects are estimated using separate and distinct models.

Thus in the present study, the traditional approach is re-specified to capture the combined short-run and long-run dynamic effects by using the "Error-Correction" Model (ECM) based on the method used in Craigwell (1991), and dating back to Sargan and Bagarwa (1964), Hendry et al., (1984), Gazioglu (1986) and Engle and Granger (1987).

Given the linear transformation (in double-logarithm) for equation (6) as

$$\text{Ln TGX} = A1 + \beta_1 \text{Ln}(T/G) + \gamma \text{Ln } Y + \phi \text{ Ln } N + \theta \text{ Ln } W + u \text{ ------ (8)}$$

Where $A_1 = \text{Ln } A$;

then, the first-difference of (8) including an intercept is given as

$$\Delta \text{ Ln TGX} = A_2 + \beta_1 \Delta \text{ Ln}(T/G) + \gamma \Delta \text{ Ln } Y + \phi \Delta \text{ Ln } N + \theta \Delta \text{ Ln } W + \Delta u \text{ ---------- (9)}$$

When equation (8) is transformed by one period (year) lag, and the result is combined with equation (9) in a vertical (column) summation (the intercepts ignored temporarily) the Error-Correction Model is obtained as defined in equation (10, b).

$$\Delta \text{ Ln TXG} = \beta_1 \Delta \text{ Ln}(T/G) + \phi \text{ Ln } N + \gamma \Delta \text{ Ln } Y + \theta \Delta \text{ Ln } W - \text{Ln}(TGX) - 1 + \beta 1 \text{ Ln}(T/G) - 1 + \gamma \text{ Ln}(N) - 1 + \theta \text{ Ln}(W) - 1 + v \text{ ------ (10, a).}$$

By re-arranging,

$$\Delta \text{ Ln TGX} = \beta_1 \Delta \text{Ln}(T/G) + \phi \text{Ln } N + \gamma \Delta \text{ Ln } Y + \theta \Delta \text{ Ln } W - \tau [\text{Ln}(TGX) - 1 - \{\beta 1 \text{ Ln}(T/G) - 1 + \phi \text{ Ln}(N) - 1 + \gamma \text{ Ln}(N) - 1 + \theta \text{ Ln}(W) - 1\} + V \text{ -------- (10, b).}$$

where $v = u + \Delta u$; and $= 1$

The expressions in the bracket, which incorporate the previous levels of the variables, represent the correction rule and hence the error correction term.

It is assumed that the (previous) levels of the variables are co-integrated of order 1, i.e 1 (1), and that the first differences of the variables, the error correction term and the disturbance V term are all integrated 1(0) (see Pearce, 1992, p. 131; Craigwell, 1991, p. 376).

Before presenting the results in the next section, it must be stated that the validity of Niskanen's (1978) original model used here depends on the conditions: that the population is unaware that the future tax liabilities are caused by the current deficit; that the population discounts the future tax liability at a rate higher than the interest rate on the public debt; and that the population (of a lifetime more than the liabilities for the future generation.

These conditions are grossly at variance with the Ricardian Equivalence Principle which proposes that the population takes full cognisance of its tax liabilities entailed by debt financing (Barro, 1974).

The results of the regressions estimated in this study are presented in Tables A1 through A4, and are provided at the Appendix. But Table 1 and 2 which compare the parametric results of similar studies with the present study are provided in this section.

Equations (6), (7) and (10, b) were estimated by OLS and AR (1) methods using post-war annual data for Ghana from 1955 to 1990. Data were obtained from IMF publications, sourced mainly from International Financial Statistics (IFS) as well as Government Finance Statistics (GFS). The logarithmic transformation was used on both the levels and the first-difference forms of the specified relationships. For operational purposes, all the value-variables were expressed in real terms (at 1985 constant prices); and the real per capita GDP was used to represent real per capita income.

The minimum wage rate index (1985 = 100) was used as a proxy for the W, the average wage rate in the private sector. The interpretation of the sector - productivity effect thus needed to take this modification into account. Data on private sector wages for Ghana are hard to assemble, and very hard to obtain with accuracy especially for a sample spanning over three decades. However, the minimum wage rate set by the government, usually serves as a useful guide for establishing wages in the private sector as well. Data on the minimum wage were obtained from Kojo Ewusi (1971), the World Bank (1984) and Rimmer (1992). Generally, wages are higher in the private sector than the public sector.

Tables A1, A2 and A3 (see the Appendix) indicate that the per capita government expenditure function provided a better fit than the total government expenditure function, though essential, both functions yielded almost identical coefficients. The R-squared for the first-difference functions in Table A3 were unexpectedly rather low, which may be possibly due to the inherent extreme (perfect) case of autocorrelation of the disturbance term.

The Error-Correction Model results (see Table A4 at the Appendix) also yielded only fair estimates for the R-squared and the adjusted counterpart. Also, both the OLS and AR(1) estimates yielded close to identical results.

Table 1 presents a comparison of the results of the traditional model a la Niskaken (1978), estimated for Ghana in this study with similar estimates for the Barbados (Craigwell, 1991), Pakistan (Khan, 1988) and Greece (Provopoulos, 1982).

The reasons for selecting the three countries for comparison with present case study for Ghana are as follows. First, these countries present areas where similar studies have been done in the recent past decade. Secondly, Pakistan and Barbados are under the same classification of developing countries with Ghana. Like Ghana, the per capita income for Pakistan is low (less than US$ 500.00), though that country is much bigger in size (area) and population. Barbados is a small island in the West Indies and therefore has the advantage of a greater per capita income (over US$ 6000) for its tourist-oriented econ-

omy. Finally, the inclusion of Greece is justified on the grounds that it is less developed and not an advanced industrialised country, even though its economy is structured and modelled along the pattern of the OECD group of countries to which it belong.

Indeed the author needed to compare the Ghanaian experience (i.e. post parametric estimation) with an intermediate country like Greece, which is relatively highly industrialised, albeit not as advanced and industrialised as the economy of the USA or the UK. Even if one discounts the fact that parametric estimates for Greece are already available to be used, the comparison with Greece is considered to be more useful in that it presents the option of a gradual but steady approach to growth and development as against a comparison with the extreme advance economies of the USA and UK.

As indicated in Table 1, the negative and inelastic tax effect on public spending for Ghana compared favourably with the other country studies, especially with Greece. But, unlike these countries, the tax effect estimate for Ghana was not based on statistical significance.

The positive income effect estimate for Ghana was inelastic and not very significant. Tables A1, A2 and A3 at the Appendix, however, show that a highly fair level of statistical significance for that decision factor (the income effect) was achieved for the AR(1) specification. In comparison, the income effect for Greece as well as Barbados was inelastic; whereas the same effect for Pakistan was consistently elastic.

Table 1: *Country-Comparison of Estimates of Direct & Indirect Effects on Total Expenditure of Public Goods & Services*

Types of Function	This study (Ghana)*	Craigwell (1991) (Barbados)	Khan (1988) (Pakistan)	Provopoulos (1982) (Greece)
The "Level": Direct Effects				
(β1)	-0.280	-0.91	-0.75	-0.16
(γ1)	0.401	1.80	1.89	0.72
Indirect Effects				
(δ1)	1.321	8.72	0.92	0.91
(θ1)	0.328	-4.03	2.48	2.34
The First-Difference Direct Effects				
(β0)	-0.370	-0.69	-0.58	-0.28
(γ0)	0.627	0.084	1.14	0.34
Indirect Effects				
(δ1)	0.757	1.19	0.69	0.77
(θ1)	-0.711	-7.64	3.93	3.30

* *Source: Estimation (1955 - 1990)*

For the indirect effects, the estimates for Ghana show that there is a "crowding effect" on the unit cost of providing public goods and services in the short-run but not in the long-run. In the other studies, the "crowding effect" was exhibited throughout.

For the "productivity effect", an inelastic and positive estimate was obtained for Ghana, indicating that public sector productivity growth exceeded productivity growth in the private sector in the short run. This result is similar to those reported for Greece and Pakistan (with the public and private sectors interchanged for a reason that has been explained earlier), but the productivity effect estimated for Ghana was different from that for the Barbados. However, like the result for the Barbados (and again with the public and private sectors interchanged), the productivity effect estimated for Ghana was elastic, suggesting that the high productivity growth in the public sector in Ghana was likely to spill-over into the private sector in the long run.

Table 2: ***Comparison of OLS Estimates. The Direct and Indirect Effects on Total Expenditure of Public Goods and Services for Ghana & Barbados (The Error-Correction Model)***

	The "Level" Form		**The First-Difference Form**	
	This Study (Ghana)*	***Craigwell* (1991) (Barbados**	**This Study (Ghana)***	**Craigwell (1991) (Barbados)**
Direct: ***Tax Effect***				
(β1)	0.022	-0.69	-0.124	-0.72
Income Effect				
(γ)	-0.267	0.76	0.609	0.33
Indirect: ***Productivity Effect***				
(λ)	0.603	2.26	0.503	2.04
Crowding Effect				
(δ)	-0.148	-1.42	-2.498	-1.96

* *Source: Estimation (1955 - 1990)*

As indicated in Table 2, the tax elasticity of the demand for public goods and services estimated for Ghana was highly inelastic compared to that for Barbados. The latter was not only inelastic but showed a consistently negative relationship. Since the tax parametric effect for Ghana was not based on statistical significance, the conclusion contrasts with that of Craigwell (1991) for Barbados, and therefore suggest a rejection of the Buchanan-Wagner hypothesis for Ghana. In other words, Craigwell's (1991) conclusion that large government deficits contributed to excessive government spending in Barbados is not empirically validated for Ghana as shown by the results of this study.

The Error-Correction model however produced a comparable positive and inelastic income ef-

fect for the short-run situation. The short-run income effect for Ghana appeared much more important in magnitude than Craigwell's (1991) estimate for Barbados. But the long-run income effect was negative and statistically not significant. The implication is that public spending in Ghana tended to respond to income changes on a temporary, ad-hoc basis rather than on a permanent, lasting basis.

These results are not unexpected generally on two main counts. First, prior to 1983, and especially in the 1970s, the economy of Ghana experienced a downward trend. There was deterioration in the effectiveness of public expenditure management, which was the result of an overly-centralised expenditure control and tax collection systems. Government was therefore hampered in its ability to attain expenditure goals. Thus since April 1983, under the Economic Recovery Programme (ERP) which set in a structural change, there have been bold attempts at generating increases in government revenues for expenditure purposes. Revenue collection has been decentralised and budgetary procedures rationalised mostly with technical assistance from the IMF and the World Bank. However, while revenue targets have been met in absolute terms, higher than expected inflation has led to higher nominal GDP and therefore a lower Revenue-GDP ratio, suggesting that the tax structure may not be very responsive to inflation (Kapur et al., 1991, p. 37).

Secondly, measurement of fiscal deficit in Ghana is classified into two forms, namely, "narrow" deficit and "broad" deficit. The later includes expenditure financed by external project aid, grants and loans and the former excludes all the above (Kapur et al., 1991, p. 37). It is the "broad" and unrestricted budget deficit that has shown some reduction in recent years, reporting some surplus in 1987 and after. Indeed, and to a significant extent, this deficit has been influenced by external aid and concessionary loans, thus assisting government to reduce its recourse to domestic borrowing. The point to note, in respect of the above, is that the long term impact of external loans, notwithstanding their utility, is not defined under the "narrow" concept of budget deficit.

These reasons, coupled with declining export prices and revenues for primary produce such as cocoa, probably explains why the long-run component of the estimated government expenditure function for Ghana did not yield highly statistically significant coefficient for the tax-expenditure variable.

From the Error-Correction Model, the indirect, "productivity effect" was positive and inelastic for Barbados. The result for Ghana would seem to suggest that private sector productivity growth exceeded productivity growth in the public sector. However, as mentioned earlier, the government minimum wage rate was used in place of the average wage rate in the private sector for the W variable. Thus, it is logically consistent to interchange the two sectors, in this regard, for the purpose of interpretation.

There is plausible reason to suggest the prevalence of relatively higher growth in the public sector in Ghana where the economy is dominated by public sector activity in industry and services. Until quite recent years the enabling environment for formal private sector growth in terms of missing (i.e. lost) markets and opportunities in the economy had not been created. But with the establishment of the Ghana Stock Exchange in 1991, the on-going public sector reforms to privatise inefficient, mismanaged and in some cases even well-managed State Owned Enterprises (SOEs) under the government's Divestiture Programme, the setting up of the Exchange Bureaus I 1988 and the establishment of a new and private-sector biased Investment Code, frantic and bold efforts are underway to step-up private sector activity in Ghana in the formal sense.

The estimate for measuring the indirect "crowding effect" for the Error-Correction Model was statistically significant in the long run but not in the short run. The direction of change was consistently negative. Notably, both features were also reported by Craigwell (1991) for Barbados for the 1954-1986 period. Just as in that study, the result for Ghana suggests that an increase in population over the long-run period tended to curtail the unit cost of a unit bundle of public goods and services. But unlike

Craigwell (1991), however, the magnitude of change in the Ghanaian situation was less substantial. The negative estimate reported for the "crowding effect" is indicative of the public sector's tendency not to "crowd-out" the private sector.

CONCLUSION

This paper has tested the Buchanan-Wagner hypothesis for Ghana using post-war annual time series data for the 1955-1990 period. Both the traditional approach a la Niskanen (1978), and the ECM approach based on Craigwell's (1991) formulation for Barbados were used to estimate the government expenditure function for Ghana.

When compared with similar results already available for other developing countries like Greece, Pakistan and Barbados, the empirical results for Ghana may be summarised in two major conclusions as below.

First, it is concluded, on the basis of the long run highly inelastic and statistically not significant direct effects due to the tax and income variables, that the Buchanan-Wagner hypothesis is not applicable for Ghana. In other words, increased government spending in Ghana for the post-war years up to 1990, is not the direct result of increased government deficits. The rejection of the Buchanan-Wagner hypothesis thus implicitly suggests the relative acceptance of the Ricardian Equivalence Principle which is based on the proposition that the population of tax payers and voters take full cognisance of their future tax liabilities as being entailed in debt servicing. This means that the debt effect for the period under review was equivalent to the tax effect in such a way that the latter exerted a zero impact on government spending. This is what the empirical results indicate for Ghana. Notably, however, for the last decade (i.e. post–1990), interest payments alone have constituted about one-third of government recurrent expenditure.

Secondly, the results showed that the indirect estimates were positive (non-zero) for the "productivity effect", and inelastic in the long-run but highly elastic in the short-run for the "crowding effect. It is thus concluded that the public sector productivity growth in Ghana exceeded the productivity growth in the private sector for the sample period. But though public sector activity is dominant, it did not tend to "crowd out" the private sector in the long run although in the short run, a (financial) crowding effect is very likely to occur. in fact, the private sector has to date been given increasing priority under the reforms programmes of the ERP and the SAP.

While these conclusions are relevant for policy decision making, they are also subject to the accuracy and reliability of the availability of the available data, which for most developing countries, constitute a major problem area.

Aside from the data constraint, there are also controversies on subtle concepts. These include possible variations in the intensity of intergenerational altruism; differences in the strategic behaviour of the individual family relations; differences in the nature and extent of liquidity constraints (on spending and hence the velocity of money in circulation) and the existence of various forms of uncertainties on households optimisation decisions. As a result of all these, it is not practically possible for the alternative Ricardian Equivalence Principle to hold exactly but rather approximately (Seater, 1993). All the above notwithstanding, however, the results of this study reasonably reflect the Ghanaian experience for the post-war period up to 1990.

APPENDIX

Table A1: ***The Elasticity Estimates of The "Level" Function. Total Government Expenditure for Ghana (1955 – 1990)***

Variables & Summary Statistics	OLS	AR1 (CORC)	AR1 (HILU)
Constant	-0.0575	-0.3666	0.0762
	(-0.0121)	(-0.0681)	(0.0141)
Ln (T/G)	-0.2803	-0.2587	-0.2652
	(-1.9940)	(-1.3135)	(-1.3299)
Ln Y	0.4019	0.8177	0.8132
	(0.9768)	(1.9143)	(1.9195)
Ln N	1.5169	0.6045	0.5073
	(3.7427)	(0.9165)	(0.7306)
Ln W	0.9449	0.5589	0.5321
	(8.0861)	(3.1979)	(3.0080)
R (squared)	0.78	0.46	0.43
R (squared – adjusted)	0.75	0.39	0.36
D – W	1.084	2.050	2.089
SER	0.259	0.221	0.221
F (k-1, n-k)	27.410	6.376	5.735
n	36	35	35
q (final value)		0.6645	0.7000
t-value		(5.2617)	(5.7980)

t- ratios are in parenthesis; SER is the Standard Error of the Regression; n is the number of observations and k is the number of parameters including the intercept. The CORC is the Cochrance-Orcutt (1949) iterative technique and HILU is the Hildreth-Lu (1960) grid technique for "rho" transformation.

Table A2: *The Elasticity Estimates of The "Level" Function. The Per Capita Government Expenditure for Ghana (1955 – 1990)*

Variables & Summary Statistics	OLS	AR1 (CORC)	AR1 (HILU)
Constant	-0.0539	-03721	0.0668
	(-0.0113)	(-0.0692)	(0 0124)
Ln (T/G)	-0.2800	-0.2584	-0.2648
	(-1.9919)	(-1.3135)	(1.3284)
Ln Y	0.4017	0.8185	0.8141
	(0.9765)	(0.9171)	(1.9222)
Ln N	0.5160	-0.3965	-0.4920
	(1.2731)	(-0.6012)	(0.7101)
Ln W	0.9445	0.5586	0.5321
	(8.0833)	(3.1973)	(3 009)
R (squared)	0.88	0.60	0.57
R (squared – adjusted)	0.86	0.55	0.51
D–W	1.083	2.052	2.090
SER	0.259	0.221	0.221
F (k-l, n-k)	56.533	11.465	9.920
n	36	35	35
q (final value)		0.6648	0.7000
t-value		5.2659	5.7980

t-ratios are in parenthesis: SER is the Standard Error of the Regression. n is the number of observations and k is the number of parameters including the intercept. The CORC is the Cochrane-Orcutt iterative technique and HILU is the Hildreth-Lu grid technique

Table A3: ***Changes In Elasticities. The First-Difference Functions of Government Expenditure for Ghana (1955 – 1990)***

Variables & Summary Statistics	Total Expenditure	Per Capita Expenditure
Constant	0.1051	0.1057
	(1.1844)	(1.1920)
ΔLn (T/G)	-0.3704	-0.3700
	(-1.9021)	(1.9014)
ΔLn Y	0.6276	0.6281
	(1.6094)	(1.6118)
ΔLn N	-2.8552	-3.8761
	(-0.9648)	(-1.3108)
ΔLn W	0.4768	0.4773
	(2.5440)	(2.5487)
R (squared adjusted)	0.24	0.25
D – W	2.192	2.193
SER	0.236	0.236
F (k-1, n-k)	3.715	3.926
n	35	35
(implied "rho")	(1.0)	(1.0)

t-ratios are in parenthesis. SER is the Standard Error of the Regression, n is the number of observations and k is the number of parameters including the intercept. The D-W is the Durbin-Watson statistic for testing autocorrelation

Table A4: *Coefficient of the "Error-Correction" Model. Total Government Expenditure for Ghana (1955 – 1990).*

Variables & Summary Statistics	OLS	ARI (CORC)	ARI (HILU)
Constant	4.0907 (0.9562)	3.6775 (0.6689)	3.4602 (0.5975)
Ln (TGX)	-0.5691 (-3.7500)	-0.5934 (-3.6943)	-0.6266 (-3.8188)
Ln $(T/G)_{-1}$	0.0226 (0.1705)	0.0140 (0.1008)	-0.0001 (-0.0013)
Ln Y_{-1}	-0.2679 (-0.6813)	-0.2154 (-0.4019)	-0.1798 (-0.3188)
Ln N_{-1}	0.8253 (2.0766)	0.8633 (2.0613)	0.9188 (2.0996)
Ln W_{-1}	0.6172 (3.5932)	0.6349 (3.5332)	0.6649 (3.5927)
Δ Ln (T/G)	-0.1248 (-0.6715)	-0.1342 (-0.6963)	-0.1448 (-0.7439)
ΔLn Y	0.6096 (1.4630)	0.6430 (1.2249)	0.6478 (1.2418)
Δ Ln N	-1.0621 (-0.4000)	-1.0143 (-0.3683)	-1.0122 (-0.3692)
Δ Ln W	0.4407 (2.5098)	0.4343 (2.3745)	0.4311 (2.3485)
R (squared)	0.62	0.61	0.62
R (squared-adjusted)	0.48	0.47	0.48
CIDW	1.949	1.874	1.893
Rho (final value)		0.040	0.100
t-value		0.237	0.586
SER	0.196	0.199	0.200
F (k-l, n-k)	4.46	4.27	4.35
n	35	34	34

CIDW is the Co-Integrated Durbin-Watson statistic

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WORLD BANK (1984), Ghana: Policies and Program Adjustment (Washington D. C.) Table 9.5