Fiscal policy, private investment and economic growth: the case of Ghana

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Abstract

Purpose – This paper aims to examine the relationships between disaggregated government fiscal policy variables; private capital investment and economic growth in Ghana, as well as the similarities and differences in the impact of these variables on private investment (PI) and economic growth.

Design/methodology/approach – Cointegration and an error-correction models are used, with time series properties of the variables investigate using augmented Dickey-Fuller test and cointegration of the variables tested using Engel-Granger two step procedure.

Findings – The findings indicate that changes in government recurrent expenditure, current government capital expenditure and international trade taxes are significant for growth while changes in tax on domestic goods and services, tax on international trade and tax on income and property matter for private capital investment. The major difference between the impact of fiscal policy on PI and economic growth, however, lies in the direction of impact.

Practical implications – Based on the findings of this study, it is recommended that different policies be pursued in the promotion of PI and economic growth. Also, given the low correlation between PI and economic growth, it is recommended that the Ghanaian private sector be focused on and fully developed in order for it to perform its role as an engine of growth.

Originality/value – Growth has been shown to be influenced by government expenditure and international trade taxes while private capital investment is influenced by taxes on domestic goods and services, international trade and on income and property. Fiscal policy authorities will find these useful.

Keywords Investments, Economic growth, Financing

Paper type Research paper

Introduction

One of the central tenets of macroeconomics is that fiscal policy can be effective in stimulating aggregate demand, reviving a stagnant economy and promoting economic growth. Economic growth, according to Garfield (1995), is created over the long-run by a labour force which possesses the incentive to work and produce, and by entrepreneurs who have incentives to invest in capital stock. In other words, pursuing government polices to further these incentives translate into economic growth.

The importance of fiscal policy in growth economics has received a lot of research interest in recent decades. This deep-seeded belief that taxation, public investment and other aspects of fiscal policy can contribute to growth miracles as well as to enduring stagnation has been articulated in the context of growth models. As Easterly and Rebelo (1993) adequately put it, any economist, when asked to explain the growth performance of any economy is likely to mention fiscal policy as being a very important determinant.

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Ghana, like many other African countries, has tried many approaches to achieving acceptable rates of growth and development. With this goal in mind, the various governments have pursued various fiscal policies aimed at attaining this sustainable level of economic growth. The quest began with a push for rapid industrialization in the 1960s, with a variety of control measures and state intervention. When that line of action failed to achieve the desired results, the private sector became the targeted engine of growth. It is no secret, however, that Ghana's economy has not grown much since the early 1960s and has also not had an enabling environment with respect to private investment (PI). Over the years, the economic status of the country steadily deteriorated, especially during the 1970s and 1980s, culminating in the implementation of the Economic Recovery Programme (ERP) in 1983.

The main objective of the ERP, according to Ewusi (1987), was to carry out a comprehensive revision of economic policies to ensure efficient allocation of resources within the economy. Some of the sub-objectives of ERP were to:

- increase the role of the market mechanism in the economy;
- increase public revenues and improve the buoyancy of the tax system;
- ensure increased effectiveness of public investment; and
- encourage private sector savings and investment among other things.

The ultimate goal was to set the Ghanaian economy and its vital growth drivers on the path to recovery and attaining a sustainable level of economic growth. Consequently, taxes were increased in order to generate enough revenue to offload the large accrued deficits that had resulted from the over-expansionary fiscal policy of the early 1960s.

Having attempted to reduce the deficits by generating more tax revenue and failing, the focus turned to the reduction of government expenditure as opposed to increased taxation. This move to reduce government expenditure was also not too successful, with recurrent expenditure rising instead and doing so at the expense of development expenditure. This trend had the effect of starving key public utilities of funds and also slowing down capital formation in the public sector – a sector that not only owned the infrastructure, but also controlled a large portion of the nation's assets. Government revenue, on the other, hand continued to lag considerably behind expenditures and more so due to the adverse terms of trade for the country's exports.

A review of macroeconomic variables since 1984 and after gives indications that the policy of improving fiscal management (embodied in the ERP) has been broadly on track, with a marked improvement in the government's fiscal position. Despite this fiscal prudence, the country has not witnessed sustainable levels of PI and economic growth. For this reason, there is the need to empirically find out why and inform policy makers as to which components of government fiscal policy actually engender or hinder private capital accumulation and sustainable economic growth in a developing country like Ghana. The study also seeks to establish the relationships (positive or negative) that exist between government fiscal policy variables and PI and economic growth, determine whether PI and economic growth are correlated and influenced by the same variables and to the same degree and also determine which of the expenditure and revenue variables have the most significant influences (favourable or unfavourable) on PI and economic growth.

Literature review

Theoretical literature

According to McKay (2002), fiscal policy can be defined as covering the many different types of public expenditure and different ways of financing this public outlay. Generally, fiscal policy encompasses the changes in government spending and tax collections designed to achieve non-inflationary domestic output (McConnell and Brue, 1999).

Barro (1990) and Barro and Sala-i-Martin (1992) classify these fiscal policy instruments into:

- distortionary taxation, which weakens the incentives to invest in physical/human capital, hence reducing growth: tax on income and profits, tax on payrolls and workforce, property tax and social security contributions;
- non-distortionary taxation, which does not affect the above incentives, therefore growth, due to the nature of the utility function assumed for the private agents: tax on domestic goods and services;
- productive expenditures that influence the marginal product of private capital and hence boost growth: social security benefits, expenditure on public order-safety, expenditure on education, expenditure on health, expenditure on housing and community amenities and expenditure on transport and communication; and
- unproductive expenditures that do not affect the private marginal product of capital and consequently growth, such as expenditure on agriculture and expenditure on defense, due to the fact that they end up in the utility function and not the production function.

Effects of fiscal policy

According to Mitchell (2005), economic theory does not automatically generate strong conclusions about the impact of government out-lays on economic performance. Indeed, almost every economist would agree that there are circumstances in which lower levels of government spending would enhance economic growth and other circumstances in which higher levels of government spending would be desirable. If government spending is zero, presumably, there will be very little economic growth because enforcing contracts, protecting property, and developing an infrastructure would be very difficult due to the absence of a government. In other words, some government spending is necessary for the successful operation of the rule of law. Economic activity is generally very low or nonexistent in the absence of government but jumps dramatically as core functions of government are financed. This does not mean that government costs nothing, but that the benefits outweigh the costs.

Positive implications of government intervention

In traditional Keynesian macroeconomics, many kinds of public expenditures, even of a recurrent nature, can contribute positively to economic growth. High levels of government consumption are likely to increase employment, profitability and investment via multiplier effects on aggregate demand. Thus, according to Keynesian macroeconomics, government spending raises aggregate demand, leading to increased output depending on the size and effectiveness of expenditure multipliers.

Negative implications of government intervention

First and foremost, the higher taxes or the further borrowing that is required to finance growing government expenditures inhibit growth. These are expected to influence economic growth negatively, because they serve as disincentives for households to invest, take risks and find jobs. Borrowing can also affect PI negatively since government accesses funds that could otherwise have been invested in the private sector, thus crowding out PI (Gallaway and Vedder, 1998).

Secondly, a large government sector increases potential profits from rent-seeking activities; this might lead to a movement of resources into more unproductive use (Fölster and Henrekson, 1997). Rent-seeking occurs when people try to obtain income by having government transfers to themselves rather than providing goods and services to others. Rent-seeking benefits, the recipient but drains the economy as a whole and economic growth suffers.

Also, continuous expansions of the government moves expenditure into less and less productive activities. Eventually, the government becomes too large and carries out activities for which it is ill-suited. When this happens, negative returns set in and retard economic growth. When government provides private goods such as food, there is no reason to expect the provision or allocation to be done more efficiently than the market sector (Sjöberg, 2003).

The purpose of the government intervention through government spending or taxing is to make the economy more stable. The overall impact therefore depends on the trade-offs between the productivity of public expenditure and the distortionary effects of taxes.

Private investment and economic growth

PI is one of the major contributors to economic growth in both developed and developing countries. This is because through investment, new technology is adopted, employment opportunities are created, and incomes grow and these ultimately lead to economic growth (Matwang'A Lusambili, 2000). According to Kweka and Morrissey (1999), government activity may directly or indirectly increase total output through its interaction with the private sector. Literature in general posits that changes in public spending and taxation affect corporate profits, and thus PI. Changes in public spending however, have a bigger impact than tax changes (Balls, 2005). Ramirez (1994) also reports that when the public capital stock is productive and complements the private capital stock, ceteris paribus, increases in public investment would have overall positive effects on factor productivity and output and ultimately, economic growth.

Empirical evidence

The effect of fiscal policy on economic growth is still an unresolved issue theoretically as well as empirically. Although, the theoretical positions on the subject are quite diverse, the conventional wisdom is that large government spending is a source of economic instability or stagnation. Empirical research, however, does not conclusively support the conventional wisdom and has yielded conflicting results.

Many studies have aimed at estimating the effects of public expenditure on economic growth (Barro, 1991; Gwartney *et al.*, 1998; Fölster and Henrekson, 2000; Al-Yousif, 2000; Gallaway and Vedder, 1998). A few of such studies (Easterly and Rebelo, 1993; M'Amanja and Morrissey, 2004) report positive and significant relation

between government spending and economic growth, while several others find significantly negative (Barro,1991; Cashin, 1995, among others) or no relation (Poot, 2000; Kormendi and Meguire, 1985; Diamond, 1989).

On the whole, however, studies of the relationship between aggregate public expenditure and economic growth have not yielded robust results, with the results of many being sensitive to small changes in model specification (Levine and Renelt, 1992; Nijkamp and Poot, 2002). Another failing of the empirical research in this area is the failure to recognize the budget constraint and as such factor the implicit costs of financing government outlays into the studies. This failing, according to Benos (2004) results in bias in the coefficient estimates.

Methodology

The deductive approach is used for this study. This approach allows for the development of a theory (theories) and hypothesis (hypotheses) and designing of a research strategy to test these as well as the anticipation of phenomena and prediction of their occurrence (Saunders *et al.*, 2000). Given that the purpose of this research is to assess the impact of government fiscal policy on PI and economic growth, fiscal policy is disaggregated into its expenditure and revenue (mainly tax) components and regressed on economic growth (growth in real gross domestic product – GDP) and PI (as a percentage of GDP). Following Barro and Sala-i-Martin (1992), the fiscal policy variables are categorised as productive or non-productive for expenditure and distortionary or non-distortionary for tax revenue. The productive expenditure is expected to enter into the production function of the private sector, increase returns to investment and thereby foster economic growth. Government expenditure that fall into this category includes spending on roads, machinery and equipment and law and order.

On the other hand, non-productive spending comprises of spending on the wage and salary bill of the public services and purchases of goods and services by the government. Wages and salaries of the public sector, the major component of non-productive expenditure, serve to put upward pressure on wages in the private sector thereby reducing returns to investment and thus affecting economic growth negatively. The major difference between productive and non-productive spending is that while productive spending ends up in the production function of the private sector, non-productive spending only ends up in the utility function.

Recognising the budget constraint implies taking cognizance of the financing of these expenditure. Where tax serves as a disincentive to saving, especially in a useful form, it is considered distortionary and exerts a negative influence on economic growth. However, if the tax encourages savings (investment) for level consumption in the future, it is considered non-distortionary and exerts a positive influence on economic growth (Table I).

Variable	Expected sign
Government recurrent expenditure	Negative (−)
Government capital investment	Positive (+)
Tax on income and property	Negative (−)
Tax on domestic goods and services	Positive (+)
Tax on international trade	Positive (+)/negative (−)

Table I.
The independent variables and the expected signs

Data type and sources

The study makes use of time series data spanning 34 years for which data are available (1964-1998). The data are secondary in nature and collected from the Ministry of Finance and Economic Planning and the Statistical Service of Ghana. The data used are annual values of real GDP growth rates, government current expenditure, government capital expenditure, tax on income and property (TIP), tax on domestic goods and services (VAT, formerly sales tax) and tax on international trade. All the variables, including PI, are expressed as percentages of GDP.

The model

Conceptual framework. Economists and policymakers alike, in line with endogenous growth theory, have long believed that government tax and spending policies can have important impacts on long-run economic growth. In other words, the general view among many economists is that fiscal policy has an important role in stimulating investment and economic growth. Recent studies using endogenous growth models have also served to buttress the role of fiscal policy as a key determinant of long-run growth (Barro, 1990; Barro and Sala-i-Martin, 1992; Easterly and Rebelo, 1993).

The early empirical literature on fiscal policy and growth focused on the relationship between growth and the size of government activity. In particular, it was conjectured that government spending and its associated levels of taxation would result in a reduction in the long-run rate of growth by reducing the return on investment. A relatively recent view, however, also holds that with the right mixture of taxation and spending policies, the government can increase the quantity and productivity of aggregate investment – human and physical capital, research and technology – and thus overall economic growth (Ram, 1986; Barro, 1990; Barro and Sala-i-Martin, 1992; Easterly and Rebelo, 1993).The usual approach to testing these conjectures was to regress the rate of growth of real GDP on measures of the average level of government spending or tax.

In view of the fact that this study seeks to eliminate coefficient bias, the government budget constraint is recognized and as such both government expenditure and tax are regressed on real GDP growth and PI to assess the impact of government policy, specifically fiscal policy, on PI and economic growth in Ghana. The major assumption for the study is that the dependent and independent variables are related in a linear manner. To accomplish the purpose of the study, real GDP growth and PI, in accordance with the endogenous growth theory, are modeled as functions of government expenditure and tax revenue (equations (1) and (5)):

$$\Delta \mathrm{GDP}_t = F(\mathrm{GCURR}, \mathrm{GCAP}, \mathrm{DTAX}, \mathrm{TIP}, \mathrm{TINTR}) \tag{1}$$

where ΔGDP – growth in real GDP; GOVCURR – government recurrent expenditure; GOVCAP – government capital expenditure; TAXIP – tax on income and property; DOMTAX – tax on domestic goods and services; TAXINTR – tax on international trade.

In order to measure, the extent of coefficient biases arising from omission of variables, the dependent variables (growth in real GDP and PI) are regressed on the expenditure variables and revenue variables separately and jointly. Simply put, economic growth is first regressed on government expenditure, second, on government revenue and lastly on both government expenditure and revenue. The study employs

ordinary least squares and the regression function (for economic growth) for the study is thus specified as:

$$\Delta \mathrm{GDP}_t = \beta_0 + \beta_1 \mathrm{GCURR}_t + \beta_2 \mathrm{GCAP}_t + \varepsilon_t, \quad (2)$$

$$\Delta \mathrm{GDP}_t = \beta_0 + \beta_1 \mathrm{DTAX}_t + \beta_2 \mathrm{TIP}_t + \beta_3 \mathrm{TINTR}_t + \varepsilon_t. \quad (3)$$

Putting equations (2) and (3) together, we arrive at equation (4):

$$\Delta \mathrm{GDP}_t = \beta_0 + \beta_1 \mathrm{GCURR} + \beta_2 \mathrm{GCAP} + \beta_3 \mathrm{DTAX} + \beta_4 \mathrm{TIP} + \beta_5 \mathrm{TINTR} + \varepsilon_t. \quad (4)$$

PI is also modeled as a function of government fiscal policy variables the function therefore specified as:

$$\mathrm{PI}_t = F(\mathrm{GCURR}, \mathrm{GCAP}, \mathrm{DTAX}, \mathrm{TIP}, \mathrm{TINTR}) \quad (5)$$

where, PI – private investment as a percentage of GDP.

The regression equation is also specified as:

$$\mathrm{PI}_t = \beta_0 + \beta_1 \mathrm{GCURR}_t + \beta_2 \mathrm{GCAP}_t + \varepsilon_t, \quad (6)$$

$$\mathrm{PI}_t = \beta_0 + \beta_1 \mathrm{DTAX}_t + \beta_2 \mathrm{TIP}_t + \beta_3 \mathrm{TINTR}_t + \varepsilon_t. \quad (7)$$

Putting equations (6) and (7) together, we arrive at equation (8):

$$\mathrm{PI}_t = \beta_0 + \beta_1 \mathrm{GCURR}_t + \beta_2 \mathrm{GCAP}_t + \beta_3 \mathrm{DTAX}_t + \beta_4 \mathrm{TIP}_t + \beta_5 \mathrm{TINTR}_t + \varepsilon_t. \quad (8)$$

Unit root test and cointegration analysis

Standard econometric theory requires that the variables be stationary, if inferences from regressions are to be non-spurious. The null hypothesis for this test requires that, the coefficient of the auto-regressive parameter of the variable be equal to one and the alternate hypothesis states that it is less than one. Where non-stationarity is established using the augmented Dickey-Fuller (ADF) (Dickey and Fuller, 1981) test, the variables must be differenced (d) times to make them stationary and thus said to be integrated to the order (d). The variables are also tested for cointegration using the ADF (Dickey and Fuller, 1981) test and if the variables are found to be cointegrated, an error correction model is estimated with OLS without generating spurious results.

Test of robustness

According to Bose *et al.* (2003), failure to recognise the budget constraint in growth regressions may give rise to biases in coefficient estimates. In the light of this, only the independent variables that remain significant and maintain their signs after the third regression, using equations (4) and (8) are certified as having a robust relationship with economic growth or PI.

Empirical results and analysis

Test of unit root

The test for stationarity of these variables is done using ADF test. The choice between intercept and trend for the test was informed by visual inspection of line graphs of the data and Akaike Information Criteria (AIC). The implication of non-stationarity of the variables in levels means standard regression analysis may produce spurious results.

Generally, most series are made stationary by differencing the data in the first instance. Once the variables are stationary (after first differences in this case) OLS estimation may be carried out without generating spurious results. The drawback to this approach, however, is the possibility of losing long-run information in the variables.

According to Girijasankar and Chowdhury (2002), this loss of long-run information by estimating in first differences can be overcome by applying the cointegration technique, which shows the long-run relationship between two or more non-stationary variables. Enders (1995) posits that for the variables to be cointegrated, the two or more sequences must be integrated of the same order and have a stationary residual sequence. In dealing with variables integrated of different orders, Hendry (2005) states that if the underlying economic theory is correct, then the variables in the levels part must be cointegrated and therefore a linear combination of the I(1) levels of the variables must be I(0). The study variables, though integrated of different orders, are thus estimated without fear of generating spurious results (Table II).

Cointegration analysis

Cointegration represents the tendency of variables to drift together over time, implying the existence of a long-run relationship. To test for cointegration, the ADF test of unit root is conducted on the residuals of the various equations under study estimated in their levels. The results indicated that the residuals of the GDP, GCAP and GCURR, DTAX, TINTR and TIP are cointegrated both separately and jointly. The residuals of the GDP, GCAP and GCURR regression are stationary at 5 per cent level of significance with an ADF statistic of -3.613261 against a critical value of -2.9527 while the GDP, DTAX, TINTR and TIP residuals are stationary at 1 per cent with an ADF statistic of -4.397962 against a critical value of -3.6422. When the variables are estimated jointly, the residuals still retain their cointegrating relationship with an ADF test statistic of -5.270800 compared to a critical value of -3.6422 at 1 per cent.

Variable	ADF (level)	ADF (1st difference)	Order of integration
GDP	-3.751230	–	I(0)
DGDP	-3.67422^{***}		
PI	-0.334661	-4.816763	I(1)
DPI_2	-2.6148^{*}	-3.6496^{***}	
GCAP	-1.974600	-5.258478	I(1)
DGCAP	-3.2109^{*}	-4.2712^{***}	
GCURR	-2.280921	-5.856649	I(1)
DGCURR_2	-2.6148	-3.6496^{***}	
DTAX	-0.479266	-5.258478	I(1)
DDTAX_2	-1.6211^{*}	-3.6496^{***}	
TINTR	-2.480459	-3.762989	I(1)
DTINTR_2	-2.6148^{*}	-3.6496^{***}	
TIP[a]	0.402532	-2.327987	I(1)
DTIP_2	-1.6211^{*}	-1.9517^{**}	

Notes: [a]Test of unit root conducted with neither intercept nor trend. Significance at: *10; **5; ***1 per cent, respectively

Table II.
Results of the unit root tests for the dependent and independent variables

Parsimonious error-correction modeling of GDP function

According to Engle and Granger (1987), cointegrated variables must have an error-correction representation. Kweka and Morrissey (2000) support this in their assertion that the existence of cointegration allows for the analysis of short-run models that identify adjustment to the equilibrium level through the error-correction model (ECM) representation. To arrive at a parsimonious model, a systematic step-by-step model reduction was carried out in which insignificant variables were dropped until the AIC and SBC began to rise, indicating that the remaining variables are important in explaining the dependent variables even though some may still be individually insignificant.

Thus, the error-correction specification of the GDP function is now given as:

$$\Delta \mathrm{GDP}_t = \beta_0 + \beta_1 \mathrm{GCURR}_t + \beta_2 \mathrm{GCAP}_t + \mathrm{E\_ECMG}_t(-1) + \varepsilon_t, \tag{9}$$

$$\Delta \mathrm{GDP}_t = \beta_0 + \beta_1 \mathrm{DTAX}_t + \beta_2 \mathrm{TIP}_t + \beta_3 \mathrm{TINTR}_t + \mathrm{R\_ECMG}(-1) + \varepsilon_t, \tag{10}$$

$$\Delta \mathrm{GDP}_t = \alpha_0 + \alpha_1 \mathrm{GCURR} + \alpha_2 \mathrm{GCAP} + \alpha_3 \mathrm{DTAX} + \alpha_4 \mathrm{TIP} + \alpha_5 \mathrm{TINTR} + \alpha_6 \mathrm{F\_ECMG}_t(-1) + \varepsilon_t. \tag{11}$$

In estimating the GDP-expenditure function (equation (9)), three lags of the independent variable were included alongside the short variables (represented by the first differences). This lag length was considered appropriate for this study as lag lengths beyond this only resulted in loss of data but added no significant value to the model. To arrive at a parsimonious model, all the variables that served to affect the appropriateness of the model (inferred from a lower AIC and SBC) were omitted. The variables were omitted until the AIC and SBC began to rise after omission of a variable.

The regression output shows that approximately 71 per cent of variations in real GDP growth can be explained by government expenditure. Except for government capital at lag 3, all the variables did not have the expected signs. From the output (Table III), changes in government short-run capital expenditure exhibits a negative relationship with growth rate of real GDP, though this is not significant at any of the conventional levels. This negative relationship could be attributed to the possibility of short-run government expenditure being utilised for non-profitable ventures or the expenditure being expended on activities that are not capable of stimulating demand in the appropriate sectors of the economy. The DW statistic of 2.103370 also suggests strongly that there is no autocorrelation among the residuals.

According to Keynesian macroeconomics, government spending boosts economic growth by stimulating aggregate demand. This proposition can be said to hold for this study considering that growth in government current expenditure at lag 3 (expected to be growth retarding) exhibits a positive relationship. From the regression output,

Variable	Coefficient	Std. error	*t*-Statistic	Prob.
C	0.535057	0.759158	0.704803	0.4872
D(GCAP)	−0.738661	0.612775	−1.20544	0.2389
D(GCURR(−2))	1.344244	0.386213	3.480577	0.0018
D(GCAP(−3))	1.501402	0.476436	3.151318	0.0041
E_ECMG(−1)	−0.848842	0.147199	−5.76664	0.0000
R^2	0.709368	*F*-statistic	15.86508	
Durbin-Watson statistic	2.10337	Prob. (*F*-statistic)	0.000001	

Table III.
Results of the ECM of the GDP-expenditure function

a 1 per cent change in the growth rate of government current expenditure (as a share of GDP) at lag 2 results in a 1.3 per cent change in the rate of growth in real GDP at 1 per cent significance level.

The *F*-statistic indicates that government current and capital jointly determine real GDP growth and this is so at 1 per cent. From Table III, the absolute value of the speed of adjustment (denoted by E_ECMG(−1)) is approximately 0.85, implying that 85 per cent of whatever deviations occur in government expenditure in the past year would return to the long-run equilibrium level in the current year and that this correction pattern is stable, with stability being inferred from the less than unity value of the coefficient of the E_ECMG(−1). This finding is also significant at 1 per cent.

In estimating the GDP-revenue function (equation (10)), five lags are used. This is in line with the researches that have been conducted in the area of fiscal policy that posit that it takes an average of five years for all effects of fiscal policy to dissipate. The output from equation (10) (Table IV) indicates that about 77 per cent of variations in GDP is explained by the share of taxes with respect to GDP. The *F*-statistic is significant at 1 per cent, signifying the power of the variables, jointly, in determining the variations in the real GDP growth rate.

Though TIP has the expected negative sign, it is not significant at any of the conventionally acceptable levels. This can be looked from the perspective that a sizeable number of the nation's population are in the informal sector and for that matter are not captured by TIP. This could account for the statistical non-significance despite the correct theoretical sign.

Tax on international trade exhibits all two signs as expected. The positive sign is significant at 5, 10 and 10 per cent in the short-run and at lags of three and four, respectively. At lag of five, the sign turns negative, and is significant at 10 per cent. Barro and Sala-i-Martin (1992) classify tax on international trade as other revenues, the implication being that its effect on economic growth is not clear-cut. Depending on which components of international trade are taxed, the effect can be positive or negative. When the tax is on imported durable goods, it distorts prices and serves to discourage acquisition of durable physical capital and the net effect is negative. On the other hand, when the tax is on consumables, the effect is similar to the effect of indirect taxes; consumers save more in the current period to maintain the same level of consumption in the next period. The negative coefficient of the tax on international trade at lag 5 could also be indicative of the time it takes for consumers and producers to adjust to any unfavourable changes in taxes on international trade.

Variable	Coefficient	Std. error	*t*-Statistic	Prob.
C	−0.211111	0.816341	−0.25861	0.7985
D(TINTR)	1.593159	0.687714	2.316603	0.0307
D(TIP(−1))	−1.824472	1.505249	−1.212074	0.2389
D(TINTR(−3))	1.173831	0.606177	1.936451	0.0664
D(TINTR(−4))	1.210314	0.656442	1.843749	0.0794
D(DTAX(−5))	1.896308	0.798506	2.374821	0.0272
R_ECMG(−1)	−1.15136	0.179205	−6.4248	0
R^2	0.771607	*F*-statistic	10.13527	
Durbin-Watson statistic	1.656315	Prob. (*F*-statistic)	0.000016	

Table IV.
Results of the ECM of the GDP-revenue function

Taxes on domestic goods and services exhibit a very positive relationship with growth. The coefficient is almost two and significant at 5 per cent. The output indicates that a 1 per cent change in the rate of growth of the share of consumption taxes to GDP causes real GDP growth rate to change by 1.896 per cent. This, however, is in the long-run at lag 5.

The coefficient for the error-correction term for equation (10) is significantly negative and has an absolute value greater than one. The negative sign can be inferred as confirming the existence of a long-run relationship but also indicative of an unstable error-correction pattern for taxes due to the greater than unity value.

Equation (11) is also modeled using error-correction. Equation (11) is the joint estimation of the expenditure and revenue functions. Lags of three were used for both sets of variables on the detection of autocorrelation among the residuals when lags beyond three are used.

From Table V, the R^2 shows that approximately 92 per cent of variations in real GDP growth are attributable to changes in the growth of the share of government intervention in the economy. In this equation, government capital exhibits a negative and statistically significant relationship with economic growth. This situation holds for the short-run and at lag 2 and when it does exhibit the expected positive sign (at lag 3), it is statistically insignificant. As indicated previously, this result could be an indication that the money is not expended on removing existing bottlenecks in the economy and thus promoting investment and economic growth. The negativity of the coefficients of changes in government capital expenditure in the short-run and at lag 2 could also be indicative on the time it takes for capital spending to show itself in the output and profit function of the productive sectors of the economy. It can therefore be concluded, from the output, that government capital spending constitutes a diversion of funds from profitable private production to non-productive sources, with the net effect being negative.

Government recurrent expenditure has the expected negative sign for the short-run and at lag 1 but a positive sign at lag 3. The negative sign as posited by theory is the result of government spending putting upward pressure on wages in the private sector

Variable	Coefficient	Std. error	*t*-Statistic	Prob.
C	−0.038289	0.516086	−0.074192	0.9417
D(GCAP)	−1.187368	0.561879	−2.113209	0.0497
D(GCURR)	−0.796334	0.248271	−3.207522	0.0052
D(GCURR(−1))	−0.877368	0.378281	−2.319355	0.0331
D(GCAP(−2))	−1.046462	0.363868	−2.875942	0.0105
D(GCURR(−2))	1.411608	0.408301	3.457276	0.0030
D(GCAP(−3))	0.778000	0.501351	1.551808	0.1391
D(DTAX)	1.608138	0.632572	2.542220	0.0210
D(TINTR)	2.536608	0.542859	4.672685	0.0002
D(TIP)	−1.860701	0.994045	−1.871848	0.0785
D(TIP(−1))	3.174610	1.329451	2.387910	0.0288
D(TIP(−2))	−3.427386	1.477472	−2.319764	0.0331
D(TINTR(−3))	1.132753	0.511892	2.212873	0.0409
FI_ECMG(−1)	−0.891809	0.168653	−5.287835	0.0001
R^2	0.917424	*F*-statistic	14.52858	
Durbin-Watson statistic	1.927012	Prob. (*F*-statistic)	0.000001	

Table V.
Results of the ECM of the fiscal policy-GDP function

thereby reducing returns to private production and retarding economic growth. Other studies also indicate that though government current expenditure is generally expected to have a negative sign, the sector in which this expenditure is concentrated may matter for its net effect on growth. According to Poot (2000), government expenditure on education, even of a recurrent nature is positive on growth since it constitutes investment in human capital, one of the most important determinants of growth. The positive coefficient at lag 3 could also be indicative of the time it takes for enough knowledge to be acquired in order to yield positive dividends.

On the revenue side, TIP has the expected sign in the short-run and at lag 2 and a contrary sign at lag 1. The differences in the coefficient signs over the short, intermediate and long-run may be the result of the adjustment process in PI decision making. Tax on domestic goods and services exhibits a short-run relationship with real GDP growth rate. It has the expected positive sign and is significant at 5 per cent. Tax on international trade has a positive sign and is significant at 1 and 5 per cent for the short- and long-run (lag 3), respectively. This could be an indication that most of the taxes on international trade are levied on consumables as opposed to durables, thus netting the effect similar to that of indirect taxes.

The error-correction term in this function is significant at 1 per cent. The negative coefficient confirms the long-run relationship between changes in the real GDP growth rate and changes in government fiscal policy. From the output Table V, it can be inferred that 89 per cent of all disequilibrium in the previous period is adjusted for in the current period and this adjustment process is stable.

Test of robustness of relationship between variables

In order to test for the robustness of the estimated relationship, each group of independent variables (expenditure and tax revenue) were modeled separately and jointly. The test of the strength of the relationship is based on the coefficients maintaining their signs and statistical significance when modeled separately and jointly to changes in the rate of growth of real GDP. On the basis of this criterion, changes in short-run government capital expenditure, government recurrent expenditure at lag 2, short-run changes in tax on international trade can be said to exhibit very robust relationships with the rate of real GDP growth.

Estimating the private investment (PI) function

Cointegration analysis. The ADF test is conducted on the residuals generated from the regression equation of the variables in levels. The test statistics indicate that the residuals of the PI-revenue equation are stationary, i.e. I(0) at 5 per cent with a test statistic of -2.317312 as against a critical value of -1.9514, while the residuals of the PI-expenditure and PI-fiscal policy equations are not stationary. The ECM is therefore invoked in the estimation of the PI-revenue equation. On the other hand, the PI-expenditure and PI-fiscal policy equations are estimated in their first difference with lags of the independent variables (three in this case) but with no error-correction term.

The equations are thus specified as (Table VI):

$$\Delta \mathrm{PI}_t = \beta_0 + \beta_1 \Delta \mathrm{GCURR}_t + \beta_2 \Delta \mathrm{GCAP}_t + \varepsilon_t, \quad (12)$$

$$\Delta \mathrm{PI}_t = \delta_0 + \delta_1 \Delta \mathrm{DTAX}_t + \delta_2 \Delta \mathrm{TIP}_t + \delta_3 \Delta \mathrm{TINTR}_t + \delta_4 \mathrm{R\_ECMP}(-1) + \varepsilon_t, \quad (13)$$

$$\Delta \mathrm{PI}_t = \alpha_0 + \alpha_1 \Delta \mathrm{GCURR} + \alpha_2 \Delta \mathrm{GCAP} + \alpha_3 \Delta \mathrm{DTAX} + \delta_4 \Delta \mathrm{TIP} + \alpha_5 \mathrm{TINTR} + \varepsilon_t. \quad (14)$$

The estimated coefficients of equation (12) show gross inconsistencies with respect to the expected signs. Government capital expenditure is consistently negative in all three coefficients, though it is only significant in one, at lag 3. At lag 3, it is significant at 5 per cent. The consistently negative relationship may be due to the long-term nature of responses to capital outlays. Government recurrent expenditure is no different with respect to the inconsistencies. This type of government expenditure exhibits both positive and negative coefficients in the same equation. The expected negative sign is however not significant at any of the conventional significance levels. The significant positive coefficient of recurrent government expenditure only serves to buttress the proposition by traditional Keynesian macroeconomics that recurrent government expenditure stimulates aggregate demand and impacts growth positively in the long-run. Though the *F*-statistic is significant, implying that government capital and recurrent expenditure jointly determine changes in PI, at 33 per cent, the explanatory power (R^2) of the independent variables is less than satisfactory and so is the value of the *F*-statistic. It can thus be inferred that government spending, both capital and recurrent, do not have a strong association with PI (Table VII).

The output from the estimation of equation (13) shows an explanatory power of 55 per cent. It can be inferred then that about 55 per cent of variations that occur in changes in PI is attributable to changes in the amount of tax collected as a share of GDP. The Durbin-Watson statistic shows that there is no autocorrelation among the residuals. The tax variables jointly determine the changes in the PI share of GDP. A 1 per cent change in the short-run share of tax on domestic goods and services causes PI to change by a rate of 0.905 per cent. A 1 per cent change in tax on international trade on the other hand serves to decrease the rate of growth of PI by 0.62 per cent. The error-correction

Table VI.
Results of the short-run parsimonious model of PI-expenditure function

Variable	Coefficient	Std. error	*t*-Statistic	Prob.
C	2.149059	0.985147	2.181461	0.0384
D(GCAP)	−0.660819	0.396621	−1.666124	0.1077
D(GCURR(−1))	0.509847	0.246021	2.072373	0.0483
D(GCAP(−2))	−0.450988	0.326513	−1.381224	0.1790
D(GCURR(−2))	−0.344702	0.227626	−1.514332	0.1420
GCAP(−3)	−0.519129	0.236720	−2.193007	0.0374
R^2	0.328049	*F*-statistic	2.538662	
Durbin-Watson statistic	2.626709	Prob. (*F*-statistic)	0.053382	

Table VII.
Results of the parsimonious ECM of PI-revenue function

Variable	Coefficient	Std. error	*t*-Statistic	Prob.
C	0.254490	0.362688	0.701677	0.4894
D(DTAX)	0.905819	0.300461	3.014762	0.0058
D(TIP(−1))	2.174705	0.702185	3.097053	0.0048
D(TINTR(−3))	−0.619788	0.269839	−2.296883	0.0303
D(TIP(−3))	1.181223	0.701263	1.684423	0.1045
R_ECMP(−1)	−0.075612	0.121927	−0.620140	0.5408
R^2	0.550975	*F*-statistic	6.135243	
Durbin-Watson statistic	1.983276	Prob. (*F*-statistic)	0.000772	

term is not statistically significant even though it has a negative coefficient and the absolute value is less than one (Table VIII).

Approximately, 66 per cent of changes in the rate of growth of PI can be explained by changes in government tax and expenditure share in GDP. The DW indicates the absence of serial correlation among the residuals. The power of the independent variables to jointly determine rate of growth of PI, the *F*-statistic, is significant at 1 per cent. Except for TIP, all the variables have the expected coefficient signs. That notwithstanding, most of the expenditure variables were not significant at any of the conventionally accepted significance level. Except for government capital at lag 3 which was significant at 10 per cent, all the others were ambiguous. Of the revenue variables, TIP also has a coefficient sign contrary to what was expected. However, since the positive sign and statistical significance are retained across specification, it will thus be inferred that TIP is favourable to PI. This could because the population falling within the income and property tax net are indifferent to tax with respect to their investment decisions. An alternative inference could be that tax rate in the country are relatively low thus they do not serve as disincentives to capital accumulation. Tax on international trade is significant at 10 per cent and has a negative coefficient. Ghana is a country that imports a significant proportion of machinery to aid its manufacturing sector. Taxes on these could well distort their cost functions and make the indigenous producers relatively uncompetitive in the market. The resultant effect will be losses to the producers and subsequently, a reduction in capital accumulated.

Test of robustness of relationship

As per the criterion given in the third section, tax on domestic goods and services, TIP and taxes on international trade were found to have a very robust association with PI. Tax on domestic goods and services and TIP were significantly positive across the separate and joint estimations while tax on international trade at lag 3 was consistently negative and significant across the separate and joint estimations.

Comparative analysis of GDP and private investment

A look at the correlation matrix (Table IX) shows that for Ghana, the relationship between PI and economic growth (real GDP growth), though positive, is relatively weak at about 0.318278. Given this correlation, it is not surprising to note that across all the estimations, the two do not exhibit any similarities in terms of independent variable influence.

Variable	Coefficient	Std. error	*t*-Statistic	*t*-Prob.
C	0.164898	0.346573	0.475797	0.6389
D(GCURR)	−0.174193	0.137216	−1.26949	0.2175
D(GCAP(−1))	0.392324	0.326807	1.200475	0.2427
D(GCURR(−2))	−0.309802	0.208804	−1.4837	0.1521
D(GCAP(−3))	0.467707	0.269812	1.733458	0.097
D(DTAX)	0.990089	0.327653	3.021757	0.0063
D(TIP(−1))	2.358485	0.672943	3.504732	0.002
D(DTAX(−3))	0.578564	0.300037	1.928307	0.0668
D(TINTR(−3))	−0.839867	0.289783	−2.89827	0.0083
R^2	0.658202	*F*-statistic	5.295697	
Durbin-Watson statistic	2.21638	Prob. (*F*-statistic)	0.000881	

Table VIII. Results of the estimation of the PI-fiscal policy function in first differences

Table IX.
Correlation matrix of dependent (GDP, PI) and independent variables

	GDP	PI	GCURR	GCAP	DTAX	TINTR	TIP
GDP	1.000000	0.318278	−0.094768	−0.037175	0.209812	0.187362	0.043271
PI	0.318278*	1.000000	0.231420	0.213549	0.657877	0.126133	0.533789
GCURR	−0.094768	0.231420***	1.000000	0.585125	0.138812	0.625283	0.163669
GCAP	−0.037175	0.213549	0.585125***	1.000000	−0.164242	0.741673	0.497660
DTAX	0.209812	0.657877	0.138812	−0.164242***	1.000000	−0.215327	0.233768
TINTR	0.187362	0.126133	0.625283	0.741673	−0.215327	1.000000	0.390177
TIP	0.043271	0.533789	0.163669	0.497660	0.233768*	0.390177**	1.0000

Notes: Significance at: *10; **5 and ***1 per cent, respectively
Source: Computed from data collected

In instances, where some of the independent variables have been significant across the two dependent variables, their signs are in opposite directions. This is further buttressed by some of the figures in Table IX. A case of interest is government expenditure. While GDP exhibits a negative relationship with all forms of government expenditure, PI is of the opposite direction and of a different magnitude. This difference in magnitude seems to hold across all the variables except for tax on international trade, even then, the regression output (Tables III, V, VI and VIII) indicate divergent directions in the long-run thereby serving to weaken the postulated relationship.

Summary of major findings

PI and economic growth were found to have a positive relationship. However, this relationship was far from being perfectly correlated. In other words, policies to encourage PI may not necessarily be growth enhancing (the correlation coefficient was 0.318278).

Moreover, these two variables were also not influenced in a similar manner, be it the mathematical sign or the size of the coefficients of the significant explanatory variables. For instance, in the third equation (the joint specification), which is also the test of robustness, the rate of real GDP growth was influenced in a negative manner by the rate of change in all forms of government spending in the current period. After two years, the effect still remained negative for government capital expenditure but positive for government recurrent expenditure. After three years, the effect of government capital expenditure becomes insignificant. The net effect that was deduced was that government capital spending has a negative influence on economic growth and instead, government recurrent expenditure has a positive effect, though not immediate but after two years.

For PI, the effect of government recurrent spending becomes insignificant after two years while changes in capital expenditure are insignificant in the short-run and turn significantly positive only after three years. This impact is almost a complete reversal of the impact of government spending on economic growth.

On the revenue side also, there were differences in the impact of taxes, especially tax on international trade: the impact was significantly positive for economic growth but significantly negative for PI, all at lag 3. Another difference between these two macroeconomic variables stems from the existence of a long-run relationship between government fiscal policy variables and the rate of economic growth but not between the rate of change in private capital investment and the rate of growth of government fiscal policy variables. All in all, it cannot be concluded that one set of policies be engineered to concurrently promote both PI and economic growth.

Policy recommendations

In light of the differing effects of government fiscal policy, variables on PI and economic growth and the far from perfect positive correlation between the two dependent variables under study, policies to enhance economic growth, for example, must be different from though not inimical to PI and vice versa.

From the study, it can be concluded that government capital spending is not done in profitable areas of the economy or as Wetzel (2000) put it, the spending is not done to remove existing bottlenecks in the economy and improve productivity with regards to capital investment. Moreover, some empirical studies have also shown that

government capital expenditure in infrastructure has the highest impact (positive) on private capital investment since it increases returns to private capital (Moshi and Kilindo, 1999). Based on this perspective, government capital spending in Ghana should be geared towards infrastructure development: improving property rights, maintaining law and order and restructuring the justice system in order to favour and protect productive investments as it could also be growth enhancing in the long-run.

The findings of the study also indicate that changes in government capital expenditure does not impact immediately but rather has a positive significant impact only after three years with all such spending in periods before being insignificant. The policy recommendation therefore is that government must not pursue *ad hoc* policies aimed at appeasing the electorate in the immediate period since overspending on such projects only diverts resources away from productive sectors and causes a decline in the economy as a whole.

Government recurrent spending, on other hand, is negative and insignificant for PI. Without taking the statistical insignificance into consideration, the negativity of the coefficients could be because the public sector is overly large and inefficient, thus consuming a large amount of the nation's resources but not returning enough to make up. Consequently, government must pursue policies to prune the public sector and make it more efficient so as to reduce its negative effect on PI.

Tax on international trade, made up on taxes on imports and exports, has a negative effect on PI. This could be attributed to the negative effect of tax on imports of durable or capital goods: the tax serves to discourage investment in durable goods as the investors are "penalized" (taxed). For this reason, the taxation of international trade must be restructured in order to encourage the importation of manufacturing plants and equipment. This however, may not have a significant influence on long-run economic growth because the sign and impact of this variable is not the same with respect to the rate of real GDP growth; in this case it is positive and statistically significant. Taxes on income and property had a positive effect on PI. The non-linear relationship postulated by Hermes and Lensink (2001) could be at work here. According to Hermes and Lensink (2001), TIP has a humped shape with PI. The import of this is that the effect of income tax on PI is positive up to a maximum point after which higher taxes exert a negative influence. It can thus be said that TIP is still below this maximum point, as such the policy recommendation is that government can increase taxes and widen the tax net to the point where the extra revenue harnessed is totally offset by the costs of high taxes. This must however be done with an eye out for the negative influence this might have on long-run economic growth. In the meantime, tax on domestic goods and services can be increased since the economy seems to have the capacity to absorb whatever shock that may arise thereof.

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