Research Journal of Business and Economic Management
Volume 6(3), pages 37-50, August 2023
Article Number: FF1A1C851
ISSN: 2756-6676
https://doi.org/10.31248/RJBEM2023.092
https://integrityresjournals.org/journal/RJBEM
Full Length Research

Tax policy and economic growth: Evidence from Ghana

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Received 16th May 2023; Accepted 16th June 2023

ABSTRACT: The government of Ghana implemented an Economic Recovery Program (ERP) in 1983, aimed at the restoration of fiscal discipline towards increasing revenue and promoting economic growth. In spite of the fiscal reforms' growth in tax, revenue continues to lag behind that of government expenditure and compares poorly with revenue performance in other parts of the world. Economic growth in the country also settled around 5 per cent level for two decades after the introduction of the fiscal reforms. This paper examined the effect of tax policy measures on economic growth and explored the tax revenue threshold that optimizes economic growth using time series data for the period 1970 - 2020. The data sets involve GDP per capita, stock of human capital, physical capital, growth rate of working population, and six (6) tax indicators namely: import duty, excise tax, company tax, personal income tax, income and property tax, and value added tax. The results of the unit root test reveal that all the variables are stationary at levels and first difference. The bounds test signals the existence of long run relationship among the variables at 1 per cent level of significance. Employing the Autoregressive Distributed- Lag technique, the findings suggested that economic growth benefits from increases in import taxes and company taxes more than the other types of taxes both in the short and long run. However, increases in the share of value added taxes and personal income taxes were found to have deleterious effect on economic growth in Ghana. A threshold level of 14.48 per cent of tax revenue - GDP ratio was found to be optimal level of taxes that impact economic growth. The study recommends that broadening, nurturing and sustaining tax base should be the utmost target of policy to ensure significant increase in the total government revenue to promote economic growth.

Keywords: Bounds testing, economic growth, Ghana, tax policy, threshold.

INTRODUCTION

Achieving economic growth has become one of the main concerns of governments over the world, the reason being that it affects a country's future standard of living (Raynor, 2013). On the other hand, governments especially in developing countries are saddled with a growing responsibility of public goods provision due to increasing population and technological advancement (Ofoegbu *et al*., 2016). In this vein, economic growth increases the taxable capacity of a country and enables a higher share of the private sector's resources to be surrendered to government as taxes to provide public goods and services. Thus, the tax system becomes a major tool for the mobilization of a country's domestic resource and thereby promoting conducive environment for stimulating economic growth (Ayuba, 2014). The need to research into the relationship between tax policy and economic growth can therefore not be overemphasized.

Two main strands of thoughts exist in the literature on the tax policy-economic growth nexus, namely, the exogenous and endogenous school of thoughts. The former school of thought which focuses on the exogenous growth model was initiated by Solow (1956); argued that tax policy does not promote long term growth, as the key factors of economic expansion-labour and technological advancement are exogenously determined. The latter school of thought on the other hand, pioneered by Lucas (1988), King and Rebelo (1990) and Barro (1990) dwelled on endogenous models, and contended that tax policy has

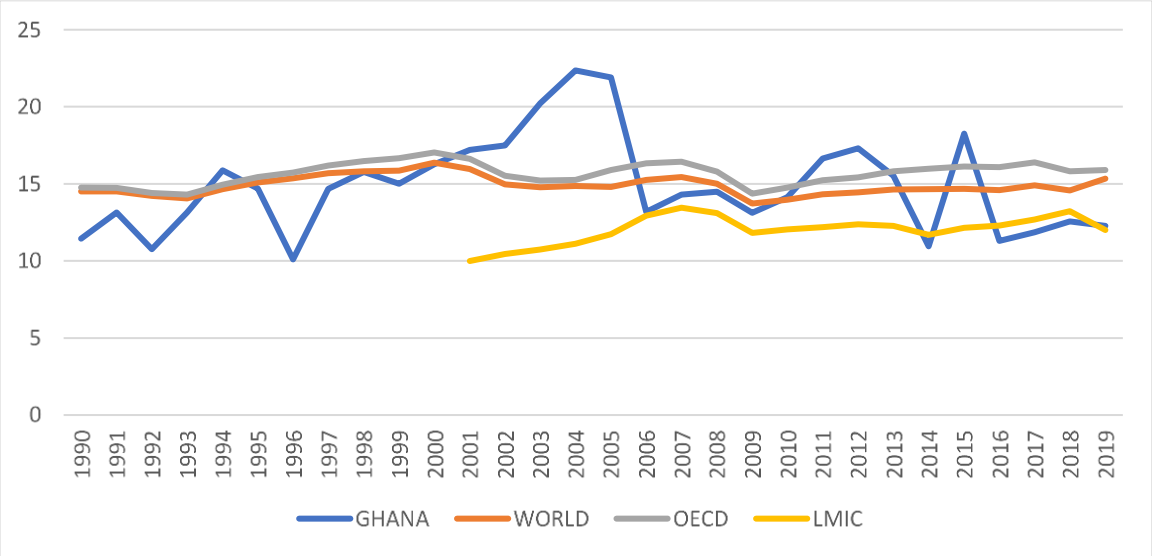

Figure 1. Tax revenue as a percentage of GDP (1990-2019) (**Source:** World Development Indicators, 2021).

an impact on economic growth and welfare and economic expansion is determined within the model. Endogenous growth models argue that labour, capital and technological progress determine the level and growth of per capita output. Taxes could alter economic decisions regarding these factors and therefore can affect economic growth (Zipfel and Heinrichs, 2012).

Ghana experienced significant improvement in tax revenue performance from almost all sources after embarking on fiscal reforms. These increases consequently contributed to the massive restoration of fiscal discipline. For instance, the budget deficit was reversed from 2.6 per cent of GDP to a surplus of 1.5 per cent in 1983 and 1991 respectively. That outcome was achieved due to the improvement in revenue generation from tax-to GDP ratio of 5.4 to 13.13% over the same period. The budget moved back again into a deficit amounting to 8.4 per cent in 1997, however, this was reduced to 0.89 per cent in 2011. As portrayed in Figure 1, tax revenue performance experienced an upward trajectory from 1990 to reach historical levels of 22.36% of GDP in 2004. Since then, tax revenue has declined continuously, so that tax-to-GDP ratio averaged 15.24% over the period 2005 to 2015. In the ensuing years, 2017 to 2018, however, the performance of tax revenue improved significantly to reach about 17 and 20 percent of GDP respectively. Figure 1 compares tax revenue performance between Ghana and four regional blocs namely, the world, ORCD countries and Lower Middle-income countries.

Generally, the performance of Ghana's tax revenue is low compared to other regions of the world, such as sub-Saharan Africa (SSA) and the Organization for Economic Co-operation and Development (OECD) countries, whose average for the period 2005 to 2015 is 16.30 and 16.19 percent of GDP respectively (Alabede, 2018). It is also evident from Figure 1 that Ghana's average tax revenue performance of 14.86 percent is slightly below the world's average of 14.89 percent over the period 1990 to 2019. However, Ghana's average outperforms that of the Lower Middle-Income Countries' (LMIC) of 12.02 percent over the period 2001 to 2019[1].

Further, the rising and falling of the various tax revenue of Ghana and how it has affected the growth rate in the country is evident in Figure 2. The highest contribution of tax-to-GDP ratio within the time frame for the various taxes as indicated in the Figure 2 are : Income and property tax (INP)-to-GDP rises to a maximum of 35.35% in 2013, Import duty(IMPDU)–to-GDP increased to 8.25% in 1990; In 1981, excise tax-to-GDP increased to 26.23%, personal income tax (PAYE)-to-GDP increased to 5.14% in 1981, company tax (COTAX)-to-GDP increased to 5.14% in 2020 and value added tax (VAT)-to-GDP increased to 9.004% in 2001. The contribution of the taxes at these peaks can be attributed to the measures implemented to improve tax administration and compliance by the government. However, the persistent falling trends in the taxes leading to deteriorating nature of economic growth in Ghana (Figure 2) may be due to tax evasion and avoidance, inefficiency in the tax administration system, leakages in revenue collection and inability to revise the tax rate and as a result discourage investment.

[1]Lack of data for the other regional blocs such as Sub-Saharan Africa accounts for their exclusion from the analysis. The same reason explains why the graph for LMIC starts from 2001.

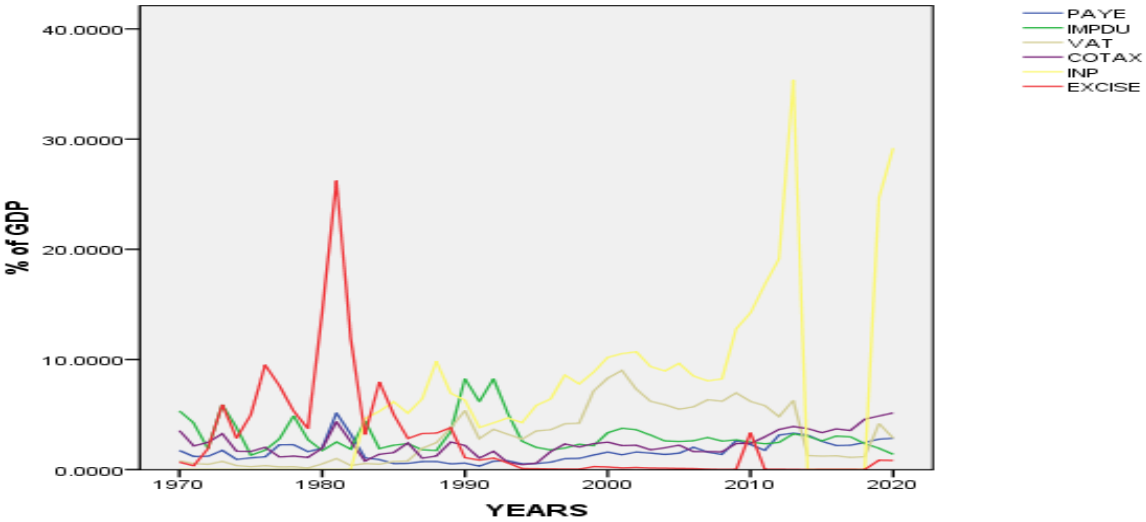

Figure 2. Tax revenue as a percentage of GDP (1970-2020) (**Source:** Bank of Ghana & World Development Indicators, 2021).

Ghana, just like most developing economies depends heavily on tax revenue to fund government expenditure in the quest to promote economic growth. However, for tax revenue to play this role adequately, the correct choice of taxes among the different types should be made and therefore demands a thorough examination of the relationship between the different types of taxes and their effect on economic growth. Generally, tax revenue mobilization has been impeded by challenges such as tax evasion and avoidance, other corrupt practices and a growing informal sector. To overcome these challenges, most developing countries embarked on tax reforms and of which Ghana was no exception. Ghana's tax reforms[2] have undergone broadly three main overlapping stages, namely: restoration of the tax base, strengthening production incentives and enhancing efficiency and equity in the tax administration (Kusi, 1998). In spite of these fiscal reforms, the growth in tax revenue lags behind government expenditure in Ghana and compares poorly with other regional blocks. Over the period 2005 to 2015, for instance, Ghana's tax-to-GDP averaged 15.24% compared to sub-Saharan Africa (SSA) and the Organization for Economic Co-operation and Development (OECD) countries, whose average for the same period stood at 16.30 and 16.19 percent of GDP respectively (Alabede, 2018). Meanwhile, despite the modest gain in revenue collection, growth rates[3] in Ghana have settled around 5 per cent level for two decades after the introduction of the fiscal reforms in the mid-1980s. Such an outcome raises pertinent questions about the effects taxes have on economic growth.

Despite the growing interest in the growth effects of tax policy, there are limited empirical evidence on the subject area for developing countries in general and for Ghana in particular (Kneller *et al*., 1999; Widmalm, 2001; Ugwunta and Ugwuanyi, 2015; Macek, 2015; Stoilova, 2017; Kalas *et al*., 2018). Results of such studies which are largely OECD-based studies and generally panel-based studies cannot be applied to a specific country case like Ghana. In fact, cross-sectional studies do generate pooled estimates that fail to disentangle results for any specific country. In addition, empirical studies on the tax policy-economic growth nexus lack consensus in their results; such that whilst some studies consider tax policy as growth enhancing (Barro, 1990; Scarlett, 2011; Kneller *et al*., 1998; Chimilila, 2018; Maganya, 2020), others consider it as growth impeding (*Koch et al*., 2005; Onduru, 2003; Macek., 2015), yet other studies find no association between them (Harberger, 1964; Madsen and Damania, 1986). Furthermore, most studies fail to conduct threshold analysis to explore the optimal level of taxes that impact economic growth. Thus, the lack of consistencies in the empirical literature and the knowledge gap arising from the dearth of empirical studies on Ghana have left open the tax policy-economic growth debate for further research on the country. Therefore, this study is motivated by its attempt in reconciling the different positions, closing the knowledge gap by examining the effect of different types of taxes on economic growth within the framework of endogenous growth models, while conducting a threshold

[2]Tax reforms deals with improving the welfare through making marginal changes in the structure and design of the tax system. It occurs as a result of introducing new taxes & then abolishing old ones. Changes in the tax mix. Radical transformations in administrative guidelines and practices as well as varying the tax rate brackets or make changes in the tax base.

[3]GDP growth is the standard indicator for measuring the economic growth of a nation.

analysis to explore optimal level of taxes that impacts economic growth.

The significance of the study is that estimation of individual tax type on growth would help fiscal authorities to identify those tax types which are distortionary or otherwise and therefore aim at directing their efforts at the more productive ones to improve upon tax revenue mobilization in Ghana. Conducting a threshold analysis will help tax administrators and policy makers know the optimal level of taxes that will impact economic growth for the country.

THEORETICAL AND EMPIRICAL LITERATURE REVIEW ON TAX POLICY AND ECONOMIC GROWTH

One of the recurring questions in macroeconomics is how changes in tax policy affect economic activities. Generally, it is assumed that taxes negatively affect economic growth, as higher taxes introduce distortions in the economy and result in loss of efficiency (Feldstein, 2006). As such, several theories have been propounded over the years in the quest to understanding the fiscal policy-growth nexus.

Earlier, Keynes (1936) posited that reducing direct taxation particularly, personal income tax would act as a catalyst for transferring greater spending power of the taxpayer. This would then facilitate an increase in the consumption expenditure, increase savings and then enhance investment ventures as well as promoting economic growth. However, any attempt to increase tax collected from direct taxation may serve as a disincentive to work.

According to endogenous growth theory, tax policy can affect both the level and the growth rate of output per capita. A detail representation of the mechanism through which tax policy influences growth can be found in Barro (1990) and Barro and Salai-i-Martin (1995). The authors employed a Cobb – Douglas-type production function with government providing goods and services as an input to depict the positive impact of productive government spending. Endogenous growth model further argues that long–term steady state is determined by the accumulation of reproducible capital. Thus, any tax policy that distorts the motivations to accumulate physical and human capital will permanently reduce the growth rate. It is expected that taxes on capital and accumulation of capital like corporate and income taxes would have adverse growth effects (Rebelo, 1991).

Moreover, public-policy endogenous growth models identify four main components of government budget namely, i) distortionary taxes, which dampen incentives investment in physical and human capital, and thereby causing a decline in economic growth. Examples are taxes on income, profits, payroll, and on property as well as social security contributions; ii) non-distortionary taxes, they do not affect saving and investment incentives. The examples are taxes on domestic goods and services; iii) productive expenditures, such as spending on housing, health, transport and communication defense and general public services. This category of spending affects the private production process as intermediate inputs and capable of raising the steady-state growth of an economy by raising the marginal productivity of capital and labour; and iv) unproductive expenditures that provide direct benefit to households but do not enter the private production function, and thereby leaving growth rate unaffected. Examples are spending on social security and welfare, recreation and provision of economic services (Barro, 1990; Barro and Sala-i-Martin, 1992; Devarajan *et al*., 1996; Kneller *et al*., 1999; Angelopoulos *et al*., 2007 and Ferreiro *et al*., 2008).

There are several empirical works that have assessed the impact of tax policy on economic growth. Initial empirical studies in the subject area aimed at assessing the impact of tax policy on growth using specified growth models. Thus, in the 1980s, most empirical studies employed neoclassical growth models to assess the tax policy-growth nexus. Studies by Lucas (1985) and Skinner (1988), for instance, whiles using neoclassical models, found no association between taxes and output growth in the long run. Some reasons given were that a steady-state growth of output is determined by some exogenous factors such as population growth and technological progress. Nevertheless, growth rates will be affected during the transitional path between the two-steady state equilibria.

Studies in the latter part of the 1990s and the past decades have taken different dimensions. The study by Scarlett (2011) used autoregressive distributed-lag model to estimate the impact of tax policy on economic growth using quarterly time series data from 1990 to 2010 for Jamaica. Also, a granger causality test was used to ascertain the directional correlation between the explanatory variables and growth of the economy. The results point out that increasing revenue from indirect taxes is more conducive for growth of the economy in the long run. Nevertheless, increasing the share of taxes from personal income, precisely pay as you earn has the utmost detriment on GDP per capita over time.

The study by Havi and Enu (2014) examined the relative importance of monetary policy and fiscal policy on economic growth in Ghana, for the period 1980 to 2012 and using the OLS estimation technique. The results-from the study revealed that monetary and fiscal policies impact the Ghanaian economy positively. However, monetary policy is more powerful in promoting economic growth in Ghana. Meanwhile another study on Ghana by Takumah and Njindan (2015) explored the causal influence of tax revenue on economic growth in Ghana. The Toda-Yamamoto test-was employed instead of the canonical Granger causality test to avoid pre-testing bias. The period for the study spanned 1986Q1 to 2014Q4. The study found strong evidence of unidirectional causal flow from tax

revenue to economic growth in Ghana.

Simionescu and Albu (2016) investigated the effect of standard VAT rate on GDP growth in five Central and European countries using panel data model-random effect, fixed effect and dynamic panel. The results suggest that VAT and GDP growth are positively correlated. However, the study by Kolahi and Noor (2016), which also analyzed the effect of VAT on GDP growth in nineteen (19) selected developing countries, used panel data estimation techniques and employed the generalized moment's method. The results suggested that VAT revenue and GDP growth are positively related, but VAT had a negative impact on capital accumulation growth.

Moreover, Chimilila's (2018) study examined the long-term impact of domestic resources mobilization (DRM) on economic growth in Tanzania using the ARDL model, error correction model and impulse response functions. Results of the study indicate that DRM has a positive significant long- term impact on economic growth. Implying that increases in DRM boosts government ability to finance its budget for an enhanced growth. The short-run effect was however found to be negative and statistically significant indicating distortionary effects of taxes. In the same year, Kalas *et al*. (2018) used a panel regression technique to investigate empirically, the effect of taxes on GDP growth in the Serbian and Croatian. The random effect model result shows that corporate income tax and social security contributions have a positive and statistically significant impact on GDP growth.

Similarly, Maganya (2020) examined the effect of taxation on economic growth in Tanzania between 1996-2019 using the ARDL bounds testing approach to cointegration. The findings indicated that domestic goods and services taxes are positively correlated to GDP growth and statistically significant. This finding is consistent with Ibn Khaldun's theory of taxation. However, income taxes were found to be negatively related to economic growth and statistically significant. The study by Ofori-Abebrese *et al*. (2020) estimated the optimal tax rate that maximizes the growth of the economy in Ghana using quarterly data from 2007 to 2017. The study employed Scully's model and concluded that for the economy to grow at an average rate of 8.88% instead of the recent 6.25%, the optimal tax rate should be raised from the existing 15.30 to 27.69%.

Okoye *et al*. (2021) examined effects of distortionary and non-distortionary taxes on economic growth in Nigeria and Ghana using ex post facto research design. The findings revealed a non-significant positive effect of profit tax and a 10% positive significant effect of customs and import duties on GDP growth rate. Further, MacCarthy *et al*. (2022) assessed taxes and economic growth nexus in Ghana using Johansen Co-integration technique, vector error correction model and granger causality test. The result found support for a positive and significant nexus between economic growth and direct tax revenue but a significant and negative relationship between indirect tax revenue and economic growth.

In conclusion, the review of both theoretical and empirical studies reveals the existence of a plethora of studies on the tax policy-economic growth nexus, though empirical studies on the subject matter on Ghana are limited. However, the results from empirical studies are mixed. The disagreements in the findings of empirical studies, coupled with the knowledge gap arising from the dearth of empirical evidence on Ghana open up the study area to further empirical scrutiny. More so, majority of existing empirics in the study area adopted cross country with cross-section data analysis. However, cross-sectional studies generate pooled estimates, whose results cannot be applied to specific countries. The current study is therefore a country-specific study that uses times series data, purported to circumvent the setbacks of cross-country analysis. The current study's contribution to knowledge is in the area of examining the effect of different types of taxes on economic growth in Ghana, computing a threshold of tax revenue for optimizing economic growth, where findings in this regard may lead to a change in tax policy and may arouse interest in similar studies for other jurisdictions.

Overview of recent macroeconomic performance

The fiscal performance in Ghana prior to Economic Recovery Programme in 1983 was very much disappointing, and also most macroeconomic projections over the period 1970 to the early part of the 1980s were generally not achieved. The period witnessed several years of negative growth and significant fiscal policy changes or reversals. The lowest growth rate of -12.4 per cent was experienced in 1975- year characterized with the oil–price shock and policy reversals from a market – oriented stance to an inward-looking protectionist regime.

Ghana recorded the highest growth of 14.4 per cent in 2011 (Figure 3). This was as a result of inclusion of oil revenues as well as the strong export performance of cocoa and gold. Despite the phenomenal stride in economic growth in 2011, the country failed to maintain the momentum, as growth rate declined 7.2 per cent in 2012. The fall in real GDP growth rate translated into a decrease in the real per capita GDP growth rate from 14.4 per cent in 2011 to 7.2 per cent in 2012. But Ghana's overall macroeconomic performance further worsened in 2014 to 2015 with a high twin-deficits lingering. The period was characterized by increasing government debt and inflation, a sharp depreciation of its currency as well as weaker pace of economic growth. Macroeconomic issues continued to be driven by a large wage bill and increasing interest costs. The fiscal deficits also declined slightly only to a projected value of 9.4 per cent of GDP in 2014 from 10.4 per cent of GDP in 2013. In spite of the slight increase in the revenue, interest cost increased from 4.6 per cent of GDP to 6.2 per

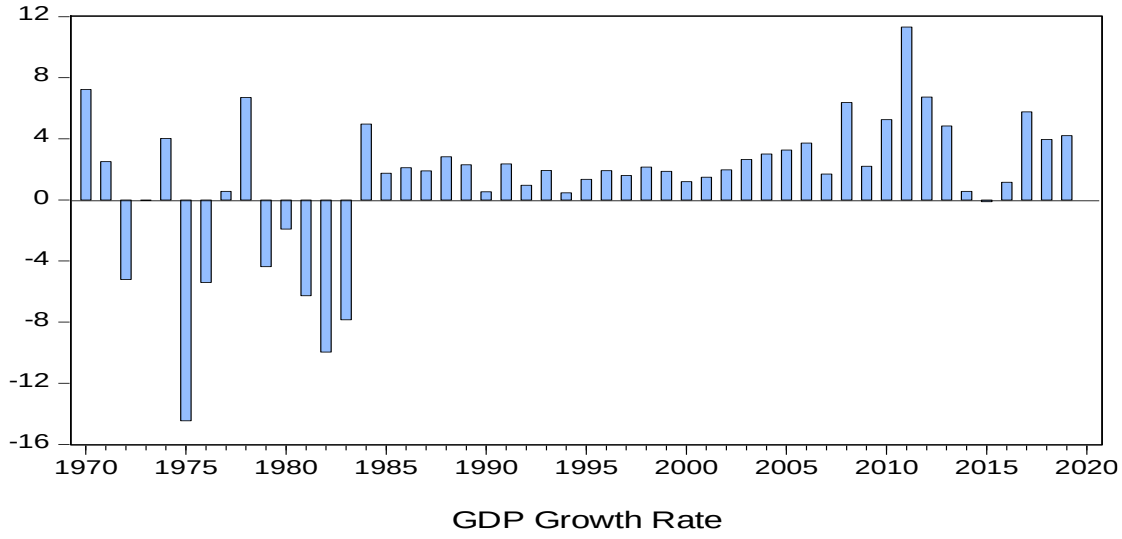

Figure 3. Ghana's economic growth rate, 1970 -2020.

cent. As a result, the government continues to add to its stock of public debt to finance the fiscal deficit.

DATA AND METHODOLOGY

Data

The impact that changes in Ghana's tax structure have on economic growth is assessed with the use of annual data from 1970 to 2020. This is based on the availability of data within the time scope of the study. The data set involve GDP per capita, stock of human capital, physical capital, growth rate of working population, and six (6) tax indicators namely: import duty (customs duty), excise tax, company tax/corporate income tax, personal income tax, income and property tax, and value added tax (or consumption tax or sales tax). These data sets are obtained from Ghana Revenue Authority, Bank of Ghana, Ghana Statistical Service, World Development Indicators and Government of Ghana Budget Statements. In line with literature, the proxy use for economic growth is GDP per capita, gross capital formation as a share of GDP is used as a proxy for physical capital. Secondary school enrolment percentage of gross is used as a proxy for human capital. The proxy use for population growth is population ages, 15-64yrs percentages of total. The tax policy variable is defined as a percentage of tax revenue that is raised from a given tax (Arnold *et al*., 2011). The tax measure basically provides an indication of the level of taxation as well as the action of the fiscal authority.

Model specification

The model underpinning the study is based on within the framework of endogenous growth model. In this model, GDP per capita is expressed as a function of Gross Capital Formation (GCF), Secondary School Enrolment (SSE), Growth Rate of Working Population (GWP) and the Tax Policy Variables (TP). Thus, personal income tax (PAYE), import duty (IMPDU) (ie customs duty), excise tax (EXCISE), value added tax (VAT) (ie. consumption tax/Sales tax), income and property tax (INP), and company tax /corporate tax (COTAX).

$$GDPPC_t = \beta_0 + \beta_1 GCF_t + \beta_2 SSE_t + \beta_3 GWP_t + \beta_4 TP_t + \varepsilon_t \quad (1)$$

From equation (1), following the study by Akhor and Ekundayo (2016) and Arnold *et al*. (2011), the log–linear empirical model for the study is specified as:

$$lnGDPPC_t = \beta_0 + \beta_1 lnGCF_t + \beta_2 lnSSE_t + \beta_3 lnGWP_t + \beta_4 lnTP_t + \varepsilon_t \quad (2)$$

Where β_1 , β_2 , β_3 and β_4 represent partial elasticity of the variables in the model with respect to GDP per capita. t is the time and ε is the error term.

Estimation techniques

The study employs the Auto Regressive Distributed Lag (ARDL) approach to co-integration propounded by Pesaran *et al*. (2001) to examine the impact of changes in the tax policy measures on economic activity. It is chosen over other estimation techniques because of its advantages. First, the ARDL technique is applicable irrespective of whether the series are stationary at: levels (I(0)), first difference (I(1)) or fractionally integrated. Also, with the ARDL technique both the long and short-run

impact of tax policy measures on economic growth are assessed at the same time. Again, though the results from estimation process from Engle and Granger (1987) procedures are not consistent and efficient with small sample size, the ARDL bound test accommodates small sample series (Narayan, 2005; Odhiambo, 2015) and at the same time the ARDL gives consistent and efficient estimate from the long and short run coefficients results whenever using small sample size (Pesaran and Shin 1999). Moreover, the ARDL bounds test can accommodate a greater number of variables than the vector autoregressive (VAR) model. Besides, the ARDL model easily accommodates different optimal lag structure for varied variables based on its flexibility which is not applicable in other co-integration techniques (*Islam et al*., 2020) and hence the study adopts this technique.

Following DiNardo and Johnston (1997), the generalized ARDL (p, q) is specified in the form:

$$\Delta GDPPC_t = \alpha_0 + \sum_{i=1}^{p} \alpha_{1i}\ \Delta GDPPC_{t-1} + \sum_{i=0}^{q} \alpha_{2i}\ \Delta GCF_{t-1} + \sum_{i=0}^{q} \alpha_{3i}\ \Delta SSE_{t-1} + \sum_{i=0}^{q} \alpha_{4i}\ \Delta GWP_{t-1} + \sum_{i=0}^{q} \alpha_{5i}\ \Delta TP_{t-1} + \beta_1 GDPPC_{t-i} + \beta_2 GCF_{t-i} + \beta_3 SSE_{t-i} + \beta_4 GWP_{t-i} + \beta_5 TP_{t-i} + \varepsilon_t \quad (3)$$

Where, all the variables are described as before, Δ = the difference operator; α_0 = constant, $\alpha_1 \ldots \alpha_5$: parameters of the short run dynamics, $\beta_1 \ldots \beta_5$ = The long run relationship, $\varepsilon \sim iid(o, \sigma)$ = the error term (white noise).

The long run relationship is established using the F-statistics to test the significance of the one lagged level variables. The joint significance of the model to be tested from equation (3) is:

H_0: $\beta_1 = \beta_2 = \ldots = \beta_{5i} = 0$ and H_1: $\neq \beta_1 \neq \beta_2 \ldots \neq \beta_{5i} \neq 0$. (4)

The ARDL provides two extreme critical values which are the upper and lower bound critical values. The upper bound takes all variables to be *I*(1), while the lower bound assumes them as *I*(0). The bound test decision proposes that, there is co-integration among the variables if the computed F-statistic is greater than the upper critical value. If the F-statistic falls between the lower and the upper critical values, then the test is inconclusive whilst there is no co-integration if the F-statistic is less than the lower critical value (Narayan, 2005). The long run relationship among the variables would be examined using ARDL decision criteria by Pesaran and Shin (1999) and extended by Pesaran *et al*. (2001).

Since the ARDL model specifies both the long run and short run impacts, the study can estimate the long run parameters after the long run relationship has been ascertained among the variables. Thus:

$$GDPPC_t = \alpha_0 + \beta_1 GDPPC_{t-i} + \beta_2 GCF_{t-i} + \beta_3 SSE_{t-i} + \beta_4 GWP_{t-i} + \beta_5 TP_{t-i} + \varepsilon_t \quad (5)$$

From the model in equation (5), the short run dynamics coefficients may be expressed by finding the error correction model related with the long run estimates.

$$\Delta GDPPC_t = \alpha_0 + \sum_{i=1}^{p} \alpha_{1i}\ \Delta GDPPC_{t-1} + \sum_{i=0}^{q} \alpha_{2i}\ \Delta GCF_{t-1} + \sum_{i=0}^{q} \alpha_{3i}\ \Delta SSE_{t-1} + \sum_{i=0}^{q} \alpha_{4i}\ \Delta GWP_{t-1} + \sum_{i=0}^{q} \alpha_{5i}\ \Delta TP_{t-1} + \varphi \varepsilon_{t-1} + \varepsilon_t \quad (6)$$

Where: φ is the speed of adjustment; ε_{t-1} represents the error correction factor and $\alpha_{1i} \ldots \alpha_{5i}$ are the short run coefficients to be estimated. The coefficient(φ) on the convergence variable (ε_{t-1}) is anticipated to be negative and significant. The negative sign indicates that with any deviation from the long run, the variable would definitely return to equilibrium.

Finally, to investigate the optimal tax revenue ratio that contributes to GDP growth, we specify a threshold model following Tong (1990) and Hansen (2011). The threshold regression of interest is specified as follows:

$$GDPPC_t = \beta_5 + \beta_6 l.GDPPC_t + \beta_7 TaxRev_t + \varepsilon_t \ if\ -\infty < TaxRev \leq q; GDPPC_t = \beta_{20} + \beta_{21} l.GDPPC_t + \beta_{22} TaxRev_t + \varepsilon_t \ if\ q < TaxRev \leq \infty \quad (7)$$

Where: GDPPC remains as defined earlier, $TaxRev$ is the tax revenue per GDP ratio and q is the threshold value.

PRESENTATION AND DISCUSSION OF RESULTS

Unit Root Test for stationarity

To ascertain the time series property of the various variables in the study, a unit root[4] analysis was carried out using the Augmented Dickey Fuller (ADF) and Phillips-Perron (PP) unit root tests. This is done to ensure that the variables are not integrated of any order greater than one to meet the Auto Regressive Distributed Lagged (ARDL) conditions. The results of the unit root test reveal that all the variables are stationary at levels and first difference as presented in Table 1

Co-integration Test

A test for long run relationship using bounds test[5] among variables was conducted. This is done by comparing the computed F-statistics with the lower and upper critical

[4]The existence of unit root for y_t implies that a shock in the variable `has a permanent impact on y_t

[5] The bounds test is employed to determine the significant of the explanatory variables in the model. So if the test statistic is greater than the critical value we then conclude that the independent variables are significant to be used in the model.

Table 1. Results of Augmented Dickey Fuller (ADF) and Phillips-Perron (PP) unit root test at levels and first difference.

Variables	Augmented Dickey Fuller test			Phillips-Perron test			Order of Integration
	t-statistics	critical value at 5%	P value	Adj.t- statistics	critical value at 5%	P value	
GDPPC	-4.659459	-2.921175	0.0004	-4.659459	-2.921175	0.0004	I(1)
GWP	-3.001113	-2.922449	0.0417	-2.806628	-2.922449	0.0647	I(1)
GCF	-3.987373	-2.921175	0.0031	-3.985094	-2.921175	0.0031	I(1)
SSE	-4.641882	-2.921175	0.0004	-4.689776	-2.921175	0.0004	I(0)
VAT	-5.154316	-2.922449	0.0001	-5.263190	-2.922449	0.0001	I(1)
PAYE	-6.767949	-2.922449	0.0000	-6.828613	-2.922449	0.0000	I(1)
INP	-5.856158	-2.928142	0.0000	-6.864171	-2.922449	0.0000	I(1)
IMPDU	-5.733185	-2.922449	0.0000	-5.745786	-2.922449	0.0000	I(1)
COTAX	-10.57923	-2.922449	0.0000	-13.55138	-2.922449	0.0000	I(1)
EXCISE	-9.690791	-2.922449	0.0000	-10.02337	-2.922449	0.0000	I(1)

Source: Authors' computation.

Table.2. Results of bounds test cointegration.

Critical Value Bounds of the F - statistics (Intercept & Trend)					
90% Level		95% Level		99 % Level	
I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
2.192	3.285	2.467	3.614	3.028	4.305
Calculated F-statistics: 5. 777480***					
Number of explanatory variables: K= 9					

Source: Authors' computation. *** indicates 1 % significance level.

bound values. The results of the bound test for the presence of long run correlation between GDP growth and the determinants of growth variables are confirmed based on the calculated F-statistics of 5.777, which lies above the upper critical bound of 4.305, thus signaling the existence of long run relationship between the variables at 1 per cent level of significance (Table 2).

Long-run analysis of tax policy and economic growth

The estimated long run coefficient is based on Schwarz Bayesian Criterion of the ARDL model (2,1,2,1,1,0,2,2,1,2) as in Table 3. The results of the diagnostic test section are shown in Table 4 and reveal that the model passes the tests for serial correlation, functional form, normality and heteroscedasticity.

Based on the above long run results using ARDL model, import duty (IMPDU) has a t-statistic of 6.3444 with a positive coefficient of 28.0867 and a p-value of 0.000 which is less than 5% level of significance. The result indicates that an increase in the share of revenue via import duty (IMPDU) has a positive and significant impact in the long-run at 1 per cent level on economic growth. In this regard, a unit increase in the share of import duty will result in an increase of 28.0867 units in economic growth in the long run. This result suggests that import duties have the tendency of increasing the revenue base of the government, as most Ghanaian prefer imported goods to home-made goods. The increase in the revenue base allows government to carry out programmes and projects that could spur economic growth. This finding is in tandem with the result of studies carried out by Yanikkaya (2002), Dejong and Ripoll (2005), Scarlett (2011), Okafor (2012), and Odhiambo and Olushola (2018) among others, all of whom reported positive and significant relationship between customs duty and economic growth. However, this finding is inconsistent with the findings of Dritsaki and Katerina (2005), Sameti and Rafie (2010), and Onduru (2003) who opined that customs duty has a significant negative effect on economic growth.

Further, corporate income tax (COTAX) has a value of t-statistic 4.4256 with a positive coefficient of 11.8471 and p-value of 0.000 indicating 1% level of significance. This means corporate income tax (COTAX) is positively related to economic growth. This finding confirms the result obtained by Ekpung (2014), and Herbert *et al*. (2018). The reason behind a positive relationship could be rationalised as follows. Usually when firms are made to pay corporate taxes, they also stand to benefit from various tax benefits,

T**able 3.** Results for long run estimates of the ARDL model

Variable	Coefficient	Standard Error	t-statistic	P-Value
GWP_t	1.9372	1.2720	1.5230	0.141
SSE_t	-0.089512***	0.031193	-2.8697	0.008
GCF_t	-0.17996***	0.059215	-3.0392	0.006
$COTAX_t$	11.8471***	2.6769	4.4256	0.000
$EXCISE_t$	1.3108	1.1973	1.0948	0.284
$IMPDU_t$	28.0867***	4.4270	6.3444	0.000
VAT_t	-23.3355***	4.1291	-5.6515	0.000
$PAYE_t$	-2.3836	5.6892	-0.41897	0.679
INP_t	1.9889***	0.46683	4.2604	0.000
CONSTANT	-70.7047	63.6997	-1.1100	0.278
TREND	-1.9353***	0.63988	-3.0244	0.006

Source: Authors' Compilation; * p<0.10, ** p<0.05, *** p<0.010.

Table 4. Diagnostic test results.

Test Statistics	LM Version	F Version
Serial Correlation	CHSQ(1) = 0.24094[.624]	F(1,23) = 0.11365[.739]
Functional Form	CHSQ(1) = 6.8450[.009]	F(1,23) = 3.7346[.066]
Normality	CHSQ(2) = 0.93761[.626]	Not applicable
Heteroscedasticity	CHSQ(1) = 0.0073100[.932]	F(1,47) = 0.0070127[.934]

Source: Authors' computations.

such as tax credit on investment, an accelerated depreciation for tax purchases that are more rapid than the true economic depreciation and tax deductibility of interest cost. These tax saving opportunities could exceed the taxes paid by firms, resulting into net incentive that could increase investment and then lead to higher growth. Corporate taxes could also spur private investment indirectly and further lead to economic growth, if they are used to finance public spending (such as roads, water, energy) that raises the productivity of investment (Sachs and Larrain, 1993). This finding, however, contradicts the findings from other studies such of Mankiw *et al.* (1992), Arnold (2008), Gordon (2004), Ferede and Dahlby (2012), and Macek (2015), which argue that corporate taxes are distortionary taxes that distort investment and therefore discourage economic growth. Lowering corporate tax rate would therefore encourage more entrepreneurial activity.

Also, income and property tax (INP) has a value of t-statistic 4.2604 with a positive coefficient of 1.9889 and p-value of 0.000 which indicates 1% level of significance. The result signifies that income and property tax promotes economic growth in the long run. Contrarily, it is evident that in the long run consumption tax (Sales/VAT) has a t-statistic of -5.6515 with a negative coefficient of -23.3355 and a p-value of 0.000 which indicates 1% level of significance. The results suggest that a unit increase in the share of consumption tax would lead to a 23.335 units fall in GDPPC. This is because as taxes on consumption increase, savings and investments will fall, thereby causing a contraction in economic growth. This inverse relationship between consumption tax and economic growth is corroborated by findings of Milesi-Ferretti and Roubini (1995), Widmalm (2001), Jelilov *et al*. (2015), and Akhor and Ekundayo (2016). This finding, however, does not appeal to theory. Theory has it that since sales/VAT are non-distortionary taxes they were expected to promote economic growth.

The signs of the coefficients of the human and physical capital are both negative and significant in the long run, though counter intuitive. Population growth rate is positive but insignificant in the long run.

Short -run analysis for tax policy and economic growth

The coefficient of the error correction term is -1.6487; it is statistically significant at 1 per cent level and rightly signed. The magnitude of the coefficient signifies that 16.50 per cent of the deviation from the equilibrium level of the dependent variable is corrected in each year as in Table 5.

The short run results from Table 5 indicate that a unit increase in the share of import duty (IMPDU) causes an

Table 5. Results of short -run coefficients estimation using ARDL model

Variable	Coefficient	Standard Error	t-statistic	P-Value
$dGDPPC_{t-1}$	0.37113***	0.12313	3.0141	0.005
$dGWP_t$	-11.0287	9.5159	-1.1590	0.255
$dSSE_t$	0.0018524	0.029125	0.063600	0.950
$dSSE_{t-1}$	0.080364**	0.030292	2.6530	0.012
$dGCF_t$	-0.10530	0.070809	-1.4872	0.147
$dCOTAX_t$	7.8009**	2.9711	2.6256	0.013
$dEXCISE_t$	2.1610	1.9392	1.1144	0.273
$dIMPDU_t$	18.1673***	5.6258	3.2293	0.003
$dIMPDU_{t-1}$	-12.0799**	6.0836	-1.9856	0.056
$dVAT_t$	-3.3621	5.2792	-0.63687	0.529
$dVAT_{t-1}$	36.1945***	7.5129	4.8176	0.000
$dPAYE_t$	-26.2312***	9.1644	-2.8623.	0.007
$dINP_t$	1.1772	0.71029	1.6574	0.107
$dINP_{t-1}$	1.3183*	0.72969	1.8067	0.080
TREND	-3.1906**	1.1810	-2.7015	0.011
ecm(-1)	-1.6487***	0.17994	-9.1624	0.000
R-Squared = 0.88841				
R-Bar-Squared = 0.77683				
S.E. of Regression = 2.2954				
Log-likelihood = -92.7553				
F(16,32)= 11.9424 [0.000]				
DW-statistic = 2.0628				

Source: Authors' Compilation. * p<0.10, ** p<0.05, *** p<0.010.

increase of 18.1673 units in real GDP per capita at 1 percent significant level in the short run. In this regard, tax policies directed towards import duty would be beneficial not only to increase government revenue but also increase economic growth. The finding is in line with the study by Ariyo (1997) and Kusi (1998). Thus, in Ghana, increases in import duties encourage economic growth both in the short run and long run.

Also, consumption tax (Sales/VAT) has a t-statistic of 4.8176 with a positive coefficient of 36.1945 and a p-value of 0.000 which indicates 1% level of significance. This means that an increase in the lagged value of value added tax (VAT) on real GDP per capita would result in a corresponding increase of 36.1945 units in economic growth. The finding confirms similar work carried out by Maganya (2020). This outcome is expected because value added taxes belong to the class of non-distortionary taxes and therefore not terribly harmful to economic activities. As consumption taxes, they do not affect labour market incentives, but rather provide incentives for saving, and investment, which ultimately encourages capital formation and economic growth.

Similarly, income and property tax (INP) has a t-statistic of 1.8067 with a positive coefficient of 1.3183 and a p-value of 0.080 which indicates 10% level of significance. The result indicates that lagged value of income and property tax encourages economic growth. Thus, a unit increase in the lagged value of income and property tax results in 1.138 units increase in economic growth in Ghana. Arnold (2008) found that property taxes and particularly recurrent taxes on immovable property are relatively the most growth-friendly among other taxes.

Further, corporate income tax (COTAX) coefficient has a positive and significant impact on economic growth in the short run. Thus, a unit increase in corporate tax results in 7.8009 units increase in economic growth in Ghana. Corporate tax is thus a major determinant of economic growth both in the short and long run in Ghana. The benefits of tax saving opportunities over tax liabilities have been identified as the major reason for the positive association between them. This finding corroborates the findings by Kalas *et al*. (2018).

However, personal income tax (PAYE) has a t-statistic of -2.8623 with a negative coefficient of -26.2312 and a p-value of 0.007 which indicates 1% level of significance. The result suggests that increase in the share of personal income tax (PAYE) discourages economic growth in the short run. Particularly, a unit increase in personal income

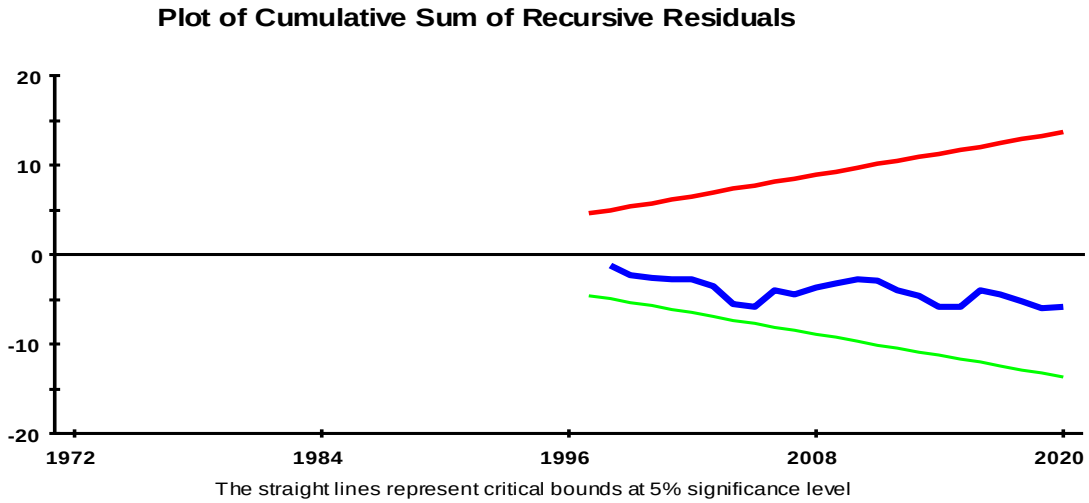

Figure 4. Plot of cumulative sum of square of recursive residuals.

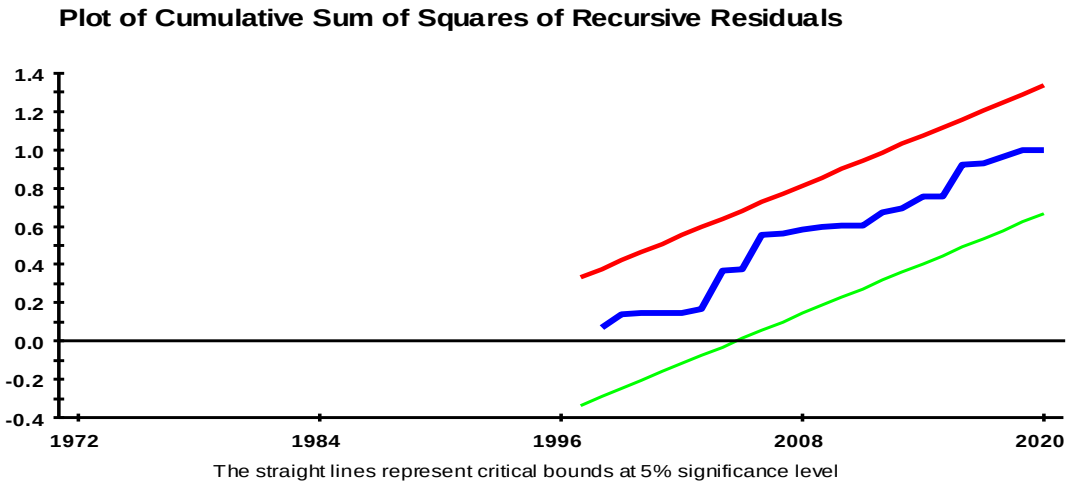

Figure 5. Plot of cumulative sum of recursive residuals.

tax reduces economic growth by 26.2312 units in the short run at a 1 per cent significant level. Increasing personal income tax creates disincentive to work and savings and reduces growth by discouraging entrepreneurship. This finding is supported by studies such as Macek (2015) and Arnold *et al*. (2011).

In the short run, the coefficients of physical capital and population growth rate are negative and insignificant. However, the lagged value of human capital is positive and significant. Particularly, a unit increase in the lagged value of human capital causes economic growth to increase by 0.080364. The other key growth variables display insignificant impact on per capita GDP. Furthermore, the R-squared value of 0.88841 and the R-bar squared measures the fitness of the model.

Diagnostic and stability tests results

Figures 4 and 5 respectively illustrate the results of (CUSUM) and (CUSUMSQ) tests. The results portray the absence of any instability of the coefficients since (CUSUM) and (CUSUMSQ) plot statistically fall within the critical bound of the 5 per cent confidence interval of the parameter stability.

Finally, the results on the threshold analysis are presented in Table 6. The results revealed a double threshold with value 14.48 percent. This threshold splits the sample into two regions. Region 1 corresponds to the portion of the sample in which the tax revenue as a percentage of GDP is less than or equal to the 14.48 percent. Region 2 shows the portion of the sample in which

Table 6. Tax threshold results.

Parameters	GDP per capita growth (annual %)
Region1	
L.GDP per capita growth (annual %)	0.0861 (0.58)
Tax Revenue (% of GDP)	0.715*** (3.51)
Constant	-6.511*** (-3.19)
Region 2	
L.GDP per capita growth (annual %)	0.000582 (0.74)
Tax Revenue (% of GDP)	0.718** (2.10)
Constant	0.799*** (0.58)
No. of thresholds	1
Threshold Value	**14.48**
N	49
SSR	572.4
AIC	132.4
BIC	143.8

t statistics in parentheses * p<0.10, ** p<0.05, *** p<0.010.

the tax revenue ratio is greater than 14.48 percent. In the low tax revenue ratio region, it was observed that the tax revenue ratio is persistent such that 71.5% of tax revenue ratio grows at 14.48 percent or below. In Region 2, the coefficient of tax revenue ratio was significant and highly persistent. This result indicates that the least threshold of tax revenue that promotes economic growth is 14.48, all other things being equal. The result is however below the benchmark minimum threshold for developing countries ratio of 15-20 percent of tax revenue-GDP (International Monetary Fund, 2005).

Conclusion and Recommendations

The tax system in Ghana since 1983 has undergone major reforms, aimed at enhancing revenue generation as well as maximizing the efficacy of collection. The reforms, not withstanding, growth in tax revenue lags behind government expenditure and compares poorly with other regional blocks. Growth rates have also settled around 5 per cent level for two decades after the introduction of the reforms. The study examines the effect of different types of taxes on economic growth in Ghana and conducting a threshold analysis to explore optimal level of taxes that impacts economic growth.

The results show that any policy action intended to increase VAT would have a negative and significant impact on per capita GDP over time. This suggests that composition of consumption tax needs to be re-examined and re-organized to contribute to economic growth. The VAT rate should not be increased arbitrary but rather broadening the tax base should be the utmost target of policy. Similarly, the finding for personal income tax underscores the need to pursue policies that aim at changing the negative insignificant effect of the personal income tax in the long run and negative significant effect in the short run to positive levels in order to promote economic growth. A policy suggestion is that the authorities should adopt measures such as gradually moving away from income-based taxation, which discriminate against work, saving and investment to import tax by broadening its base. In the same vein, an increase in the share of property tax leads to a corresponding increase of economic growth in the short run.

Taxes on imports were found to be positive in both the short-and long-run regressions. The study recommends that government should tackle seriously, the challenges of porous borders, smuggling, security and shortage of adequately trained personnel at the agencies responsible for the assessment, collection and administration of customs duty in Ghana. Government must find innovative means to increase revenue mobilization to promote economic growth, as a threshold of 14.48 percent indicate that any tax revenue per GDP beyond this benchmark encourages economic growth in the country.

In conclusion, the authorities should identify tax policy that conforms to the society's commitment to the rule of law. That is, the system should ensure that the citizen's right to be taxed is protected in the designing of the tax policy and its implementation. In other words, tax policy measures must be set up on a wide and transparent consultation. This is because countries that are able to mobilize tax resources through broad–based tax

structures with efficient administration as well as enforcement will be likely to enjoy faster growth rates than the counterpart countries with lower overall tax collection assessed inefficiently.

CONFLICT OF INTEREST

The author declares no conflicts of interest.

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