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EFFECTS OF IMPORT TAX EXPENDITURE ON REVENUE MOBILISATION IN GHANA

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Abstract: *This study examines the effect of tax expenditure on import tax revenue mobilization in Ghana by using the Autoregressive distributed lagged model (ARDL) model with structural breaks on a monthly time series data from January 2012 to June 2019. The innovational outlier model was applied to determine the structural breaks in the data series within the bounds testing cointegration model. The findings indicate that expenditure on interest payment, compensation of employees, and grants to other government units have a negative significant effect on import tax revenue in the long run. In addition, the results also revealed that macroeconomic variables such as inflation rate and exchange rate have a negative effect on import tax revenue in the long run. Therefore, the study concludes that tax expenditure have inverse relationship with tax revenue mobilization in Ghana. Therefore, it is recommended that government should put in place financing measures to effectively manage wage bills in order to ensure that the desired public services are delivered in most efficient and fiscally sustainable manner. Furthermore, government should be mindful of the macroeconomic environment and the various tax incentives when mobilizing import tax revenue.*

JEL Classification: H26, H27, H29

Keywords: Import tax, Tax Expenditure, Autoregressive distributed lag model

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1. INTRODUCTION

Taxes are important tools for fiscal policy which are used to generate the necessary resources for financing economic activities in a country. Taxes are used to achieve economic growth and to ensure equity in income and wealth distribution. Taxes are paid without expecting anything in return so as to contribute to nation building and to achieve socioeconomic objectives of a country (Okpe, 2000). Notwithstanding the importance of taxes to economic growth, tax revenue mobilization in developing countries is hampered by tax evasion and government tax expenditure policies which are designed to achieve other objectives aside revenue. These activities intentionally minimize the tax burden on taxpayers or on particular economic transactions resulting in a loss of tax revenue to the government and benefit to the tax payers (Fakile *et al.,* 2012, Gale & Harris, 2011; O'Hare, Schmitt & Xanthopoulos, 2013).

Tax expenditure is mostly referred to as government's estimated revenue loss that occurs due to offering tax concessions or preferences to certain class of taxpayer or activity (Burton & Stewart, 2011). Tax expenditures are provisions in the tax policy comprising of special exemptions, exclusions, deductions, credits, deferrals, and preferential rates lead to loss of tax revenue (O'Hare, Schmitt, & Xanthopoulos, 2013; Gale & Harris, 2011). Countries use tax expenditure to achieve social and economic goals such as combating poverty and inequality, employment creation and to attract foreign direct investments, among others. The revenue loss or cost may be estimated as the difference between the tax paid under a given tax law and the lower amount actually paid after the tax break (OECD, 2003). Tax expenditures are mostly preferred over direct spending to offer a government subsidy to a class of taxpayer or encourage a desired activity (Swift, 2006). Some forms of tax expenditure are tax exemptions, tax deductions, tax offsets and concessional tax rates or timing rules such as accelerated depreciation of capital assets. Tax expenditure is treated differently in budget analysis and reporting because it undergoes less periodic review as they are usually not subjected to annual direct appropriations vote in the legislature.

Further assessment of tax expenditure indicates that it tends to affect budget balance and prioritization of budget allocations as well as efficient application of fiscal resources. There is also the scope for abuse by taxpayers, government officials and legislators in the implementation of tax expenditure policies (Swift, 2006). It has also been pointed out that the growing use of tax expenditure in the form of incentives for investment in developing countries has minimized corporate income tax revenue (Bird, 2008; Klemm, 2009). Developing countries are known to be exposed to two types of tax expenditure risks, thus the multiple offensive tax regimes to attract investments as well as the tax and tariffs exemptions granted to ameliorate soaring prices of goods and services. These quests to compete for foreign direct investment through generous tax regimes which tend to deviate markedly from the standard tax system adversely affect the economies of these countries.

Ghana's tax incentive regime is provided for in the 1992 Constitution where Article 174 mandates parliament to impose all taxation and grant tax incentives and waivers to individuals and companies. One of the reasons for tax incentives, particularly in Ghana is to boost manufacturing by reducing cost of production through forward transfer of losses and import duty exemptions among others. Other rationales include honouring conditions for aid funded projects which are governed by international treaties and agreements (defer payment of import duties), honouring diplomatic privileges and granting special import conditions to promote investment. Additionally, they are meant to promote international competitiveness of non-traditional export, equitable distribution of industries across the country, making capital readily available to businesses and to boost the agricultural sector as well as to create employment among others.

In every fiscal year, concessions and benefits as well as incentives are offered to taxpayers within the tax system because of its effect on the recurring fiscal budget as a result of dwindling tax revenue performance of the country which has not received much scrutiny through the state budget processes. Analysis of Ghana's Tax Incentive regime from 2008 to 2013 revealed that total tax expenditure represented 24.54 percent of the total revenue collected for the period while

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it ranges between 1.80 percent and 5.31 percent of GDP for the period (GRA, 2015). In particular, data show that the overall tax expenditure for the year 2012 was 5.2 percent of GDP making it the 14th highest in a list of 30 countries for which tax expenditure estimates are publicly available (Oppong & James, 2016).

Trend of monthly total tax expenditure as a percent of GDP from January, 2012 to June, 2019 is shown on Figure 1. From the figure, total tax expenditure as a percent of GDP was observed to fluctuate from January, 2012 to June, 2019 and was observed to be high in December 2016 and low in February, 2017.

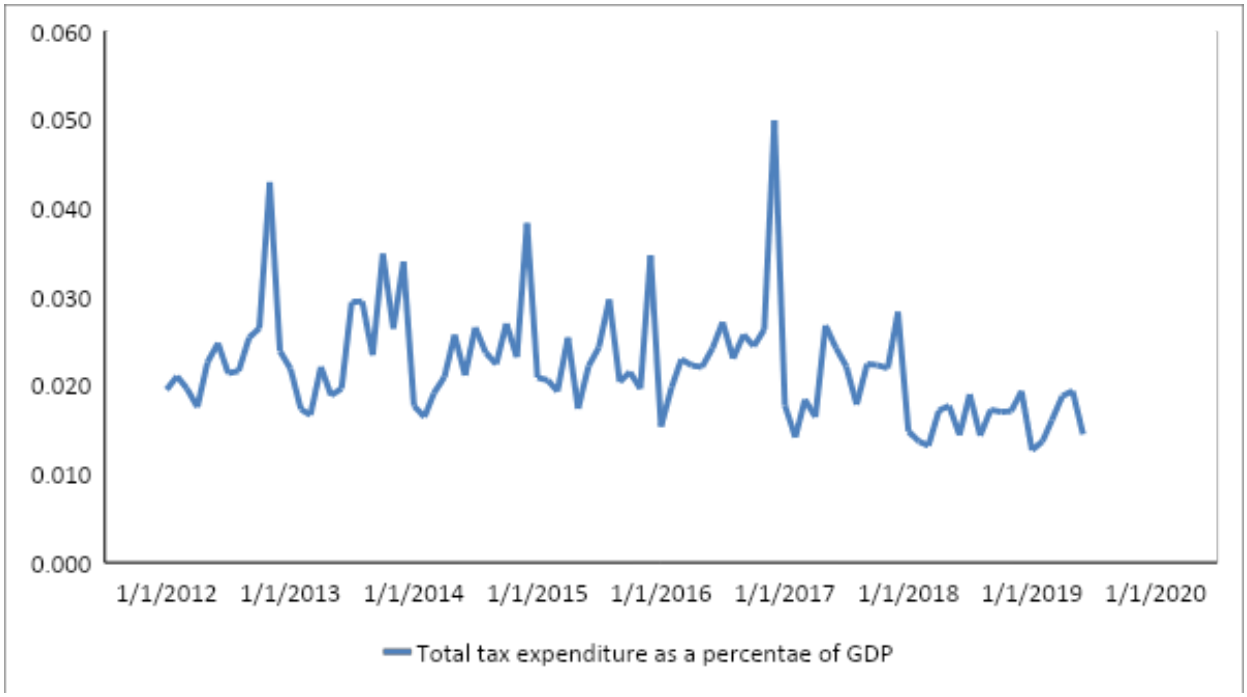

Fig 1 - Trend of monthly expenditure as a percent of GDP in Ghana from 2012 to 2019

A report by ActionAid Ghana in conjunction with Tax Justice Coalition-Ghana indicates that between January 2018 and February 2020, Ghana's parliament granted tax waivers amounting to US$901 million to corporate institutions. It is estimated that one-fifth of the amount waived could have provided 10,378 new classrooms or create additional 78,254 jobs for teachers in the

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country. While a total of US$500 million tax waivers were granted to the private sector alone in 2018, an additional US$400 million was granted between 2019 and 2020. The waivers here entails only customs and import duties, which is just a fraction of the total tax incentives granted in a year, excluding those on government institutions or goods (ActionAid Ghana, 2020). The foregoing explains why the focus of this study on import tax coupled with the numerous custom incentives outlined in the Ghana incentives inventory to reduce excise duty for increasing the use of local raw material relating to malt drinks, stout beer and cidar beer. Further, import duty exemptions of 5% for mining companies for 253 mining equipment and machinery while forestry sector developers have a concession on import duties on machinery and equipment as well as exemption from customs imports duties for plant, machinery, equipment and parts (Ghana Investment Promotion Centre, 2020).

Performance of tax revenue from imports has generally been declining with fluctuations over time and this is depicted in the monthly trend of import tax revenue mobilization as a percent of GDP from January, 2012 to June, 2019 in Figure 2.

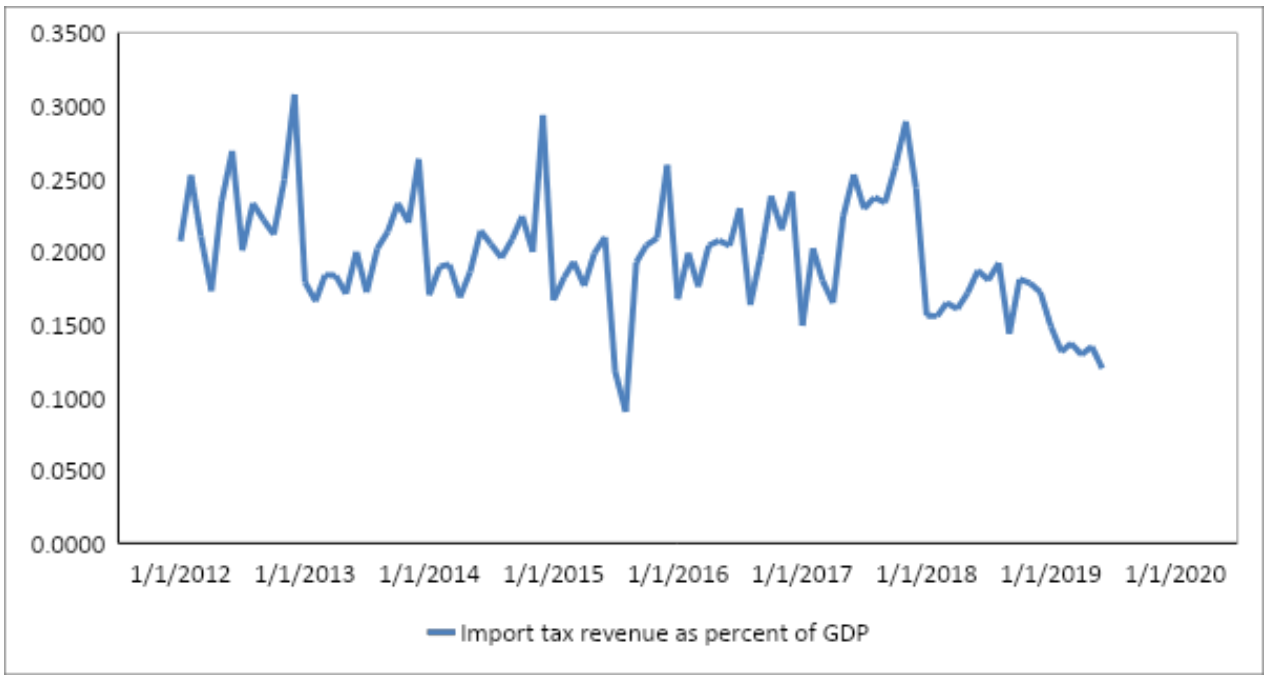

Fig. 2 - Trend of monthly import tax revenue mobilization as a percent of GDP in Ghana from 2012 to 2019

From Figure 2, import tax revenue mobilization as a percent of GDP is seen to be fluctuating in a decreasing manner from January, 2012 to June, 2019. The highest mobilisation within the period was in December, 2014 and lowest in August, 2015. In view of the dwindling trends of the revenue, some policy analysts and social commentators have argue that the loss of revenue to the state through these tax incentives and waivers is not compensated for by the level of investments and job creations that were intended by these tax policies.

However, empirical studies that sought to examine the effects of these tax incentives on import tax revenue mobilization in particular are hard to find in Ghana. Therefore this study aims at examining the effects of import tax expenditure on Ghana's import tax revenue mobilisation. To specifically achieve this primary objective, the study provides trend analyses of revenue losses to all concessions by the Customs division of the Ghana Revenue Authority from 2010 to 2018 and determines the effects of the tax expenditure on import revenue by adopting an innovative Autoregressive Distributed Lag model with structural breaks approach to Cointegration regression analysis. Apart from this study contributing to the dearth of the subject in the literature particularly in Ghana, the study would be of immense help to the government policy makers and the Ghana Revenue Authority in developing appropriate tax systems that would not harm government development efforts. Tax expenditure Examining import tax expenditure for Ghana is particularly important since the mobilization of tax revenue is a top priority for Government due to high levels of public debt.

The rest of the article is organised as follows: section two reviews the related literature while section three deals with the model specification and data. The discussion of results is presented in section four and the section five concludes the study.

2. REVIEW OF RELATED LITERATURE

2.1 Theoretical Literature Review

The various economic theories that have been used to explain the factors that drive tax revenue mobilization in a country are discussed in this section. Taxation policies are studied for their macroeconomic effects on the economy and these theories attempts to explain what is expected to be done to generate more revenue from tax. The main theories discussed here is the economic theory and the cost of service theory in relation to tax expenditure.

2.1.1 Economic Theory

The effect of tax expenditure on tax revenue generation can be assessed from two main schools of thought. They are; Traditional economic school and Modern economic school. In the traditional economic school, Sherrod (2003) summarized the views of Barro (2003) and said that there was a relationship between low tax rates, low government spending and higher growth when other factors of growth are held constant. This means that the greater the proportion of marginal tax, the higher the likelihoods of higher payers of income tax redirecting most of their extra time of industrious tasks to leisure activities.

On the other hand, the modern school discovered that greater proportions of marginal tax results in higher economic growth in the long-run. This is because the government would acquire higher tax revenue which when invested in the educational sector and infrastructure development of the country, the economy will grow. According to the economic theory, marginal tax rates are necessary because they have an influence on compensation of employees to make more income. Therefore, an increase in marginal tax rates leads to individuals getting to secure few additional wages. Apart from the fact that economic theory shows a negative association between tax expenditure and tax revenue, it also proposes several determinants that will complicate measurement of the relationship. Gwartney and Lawson (2006) stated that such determinants comprises of the relationship between the short-run response to charge in marginal rates and capital and the relationship between marginal tax rates and GDP growth may also be weakened

by the pattern of tax expenditures. This theory is related to the main objective which examines the effect of import tax on tax revenue mobilization.

2.1.2 The Cost of Service Theory

Ofishe (2015) stated that the cost of service theory highlight on semi commercial associations that exist between the citizens and the government. The theory of cost of service laid emphasis on the government providing fundamental amenities and welfare supports as well as compensation of employees. This simply means that the citizens are not eligible to any benefits so any benefit they receive, the cost of service rendered must be paid by them. Some economists suggested that if the citizens of the country are charged the actual cost of the services that are rendered by the government, the idea of equity or justice in taxation will be satisfied. The cost of service principle cannot be applied to circumstances where the services are provided based on prices and are very easy to determine such as postal, railway services, supply of electricity and so on. Most of the import tax expenditure incurred by the government cannot be fixed for every person because it cannot be easily finalized. For instance, how can we measure the cost of service of the police, armed forces, judiciary, among others, to every person?

2.2 Empirical Review

Tax expenditure is transfer of public funds resulting from a reduction of tax obligations in relation to a standard, rather than direct spending (OECD, 2010). This definition relies on two conditions, which characterise tax expenditure: first, a reduction in government tax revenue and second, a deviation from the tax norm, called the benchmark tax system which must be defined. Tax expenditure is an alternative to public spending. Its assessment is a component of budget transparency. The German Federal republic evaluated first tax expenditure in 1966 followed by the United States in 1968, when the US Treasury published the first budget with tax expenditure. This practice expanded in all OECD countries with varying degrees of strictness, before

becoming global. In developing countries and Africa in particular, assessment of tax expenditures is more recent phenomenon: Morocco, South Africa, Senegal, Benin, and the member states of the East African Community (EAC) have published some evaluations since the early 2000s (Olson, 1965).

In view of the above there are few studies that have attempted to examine the effects of tax expenditure on tax revenue mobilization. For example, Swift (2006) examined the concept, size, effects of tax expenditures as well as the fiscal accountability and transparency of the tax expenditure spending in OECD countries. The study finds that tax expenditure influences the budget balance, the effectiveness and efficiency of fiscal resources, budget prioritization in allocation, and scope for abuse by taxpayers, government officials, and legislators. Thanh and Lien (2017) employed panel Granger causality test to assess the causal relationship between tax revenue and tax expenditure for 38 developed and 44 developing countries over a 16-year period (2000-2015). The study found a bi-directional causal relationship between tax revenue and tax expenditure.

Keen and Mansour (2008) examined 40 sub-Sahara African countries and found a rise in countries employing tax incentives for investment over the last decades. According to them a comparative study of 1980 and 2005 showed that only one country out of the 29 countries in 2005 offered free zones in 1980.

Barrios *et al.,* (2016) quantified the impact of tax expenditure on governments' tax revenues and on households' disposable income in 27 European countries making use of EUROMOD, the EU-wide microsimulation model. They focused on four specific categories of preferential tax treatments affecting personal income taxation related to housing, pension, education and health expenditures. They found that, the impact of tax expenditure on tax revenues and on income inequalities can be sizeable.

Wanjala and Kinua (2020) examine how tax incentives affect foreign direct investment in the East African Community bloc. The study used the random effect panel model to conduct the inquiry and concludes that Tax incentive significantly affects foreign direct investment positively in the East African Communiandty as it enhances critical areas of development such as the export, mining and the manufacturing sectors.

Trimisiu *et al.,* (2017) investigate the impact of tax incentives on industrial growth of sub-Sahara African countries, a case of Nigeria and Ghana. A linear model of Tax Revenue, Tax Incentives and Economic Growth is estimated using the Ordinary Least Square (OLS) technique with data obtained from the World Bank Data Index (WDI), Federal Inland Revenue Services (FIRS), Ghana Revenue Authority (GRA), Nigerian Investment Promotion Commission (NIPC), Ghana Investment Promotion Centre (GIPC) and Action-aid International (AAI) for a 4-year period from 2011 to 2014. The result, amongst others, indicate positive effect of tax incentives on industrial and economic growth, suggesting that increasing tax incentives to productive and priority sectors would lead to economic growth of the African economies. The study concludes that sub-Sahara African countries should grant more tax incentives to those sectors and monitor closely the administration of such incentives to avoid abuse.

It is evident from the above empirical literature that studies that seek to investigate the relationship between components of tax expenditure and import revenue mobilisation in sub-Sahara African countries, particularly in Ghana are scarce. This study therefore helps to fill the existing lacuna in the literature by employing the Autoregressive Distributed Lagged (ARDL) model with structural breaks based on the innovational outlier model capture the possible breaks that are associated with the monthly time series dataset.

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3. METHODOLOGY

3.1 Model Specification

The study adopts a model used by Mawejje & Munyambonera (2016). Mawejje & Munyambonera (2016) identified a significant relationship between public expenditure and tax revenue mobilization. Thus, tax revenue mobilization was specified as;

$$Y_t = f\left(X_t, Z_t\right) \quad (1)$$

Where Y denotes tax revenue mobilization, t represents time, X consists of tax expenditure components, and Z consists of other factors that can influence tax revenue mobilization.

The empirical estimation was modelled using Auto Regressive Distributed Lagged (ARDL) bounds with structural breaks approach. The ARDL model with structural breaks was used to test the long run relationship between import tax revenue and its regressors. The study used ARDL bounds with structural breaks because the time series data used in the study was monthly data having structural breaks and was stationary either at level or first difference. That is, the long run relationship between import tax expenditure components and import tax revenue is written as;

$$\Delta ITR_t = \alpha_0 + \alpha_1 t + \sum_{i=1}^{k-1} \pi_i \Delta ITR_{t-1} + \sum_{i=0}^{l-1} \gamma_i \Delta COE_{t-1} + \sum_{i=0}^{m-1} \theta_i \Delta GOG_{t-1} + \sum_{i=0}^{n-1} \delta_i \Delta IP_{t-1} + \sum_{i=0}^{q-1} \vartheta_i \Delta GAS_{t-1} + \sum_{i=0}^{r-1} \tau_i \Delta CEXP_{t-1}$$

(2)

While the error correction model (ECM) showing the short-run coefficients as well as long-run equilibrium is written as;

$$\Delta ITR_t = \alpha_0 + \alpha_1 t + \sum_{i=1}^{k-1} \pi_i \Delta ITR_{t-1} + \sum_{i=0}^{l-1} \gamma_i \Delta COE_{t-1} + \sum_{i=0}^{m-1} \theta_i \Delta GOG_{t-1} + \sum_{i=0}^{n-1} \delta_i \Delta IP_{t-1} + \sum_{i=0}^{q-1} \vartheta_i \Delta GAS_{t-1} + \sum_{i=0}^{r-1} \tau_i \Delta CEXP$$

(3)

Where α_0 is drift, ε_t is the white noise error term, $\pi, \gamma, \theta, \delta, \vartheta\vartheta, \tau, \sigma, \emptyset, \partial$ are the short run coefficients of the model, Δ is the first difference operator,$k, l, m, n, q, r, s, t, v$ are the lag

lengths, ECM is the error correction model, t is the trend component and $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6, \beta_7, \beta_8$ are the long run or short run coefficients of the model.

3.2 Data Sources

The study used a secondary data from January 2012 to June, 2019 consisting of monthly observations of all the variables under study. The choice of the period is as a result of availability of data particularly on the import tax expenditure. The variables were derived from Statistical Bulletins from the Bank of Ghana and the yearly report of the Ministry of Finance, Ghana.

3.3 Variables Description and *apriori* expectations

The variables of interest in this study were import tax revenue as dependent variable, with components of tax expenditure such as compensation to employees (COE), use of goods and services (GAS), interest payments (IP), capital expenditure (CEXP), and grants to other government units (GOG). Macroeconomic variables such as inflation rate (INF) and exchange rate (EXR) are used as control variables. The expenditure on grants to other government units was measured as the total amount of money spent on national health insurance fund, education trust fund, road fund, petroleum related fund, district assembly common fund, transfer to the national oil company from oil revenue, and the retention of internally-generated funds. It is expected to have a negative effect on import tax revenue mobilization.

The expenditure on compensation to employees refers basically to the total gross (pre-tax) wages paid by employers to employees for work done in an accounting period, such as a quarter or a year. It was measured as the total amount of money spent on wages and salaries, social contributions, pensions, gratuities, and social security. It is expected to have a negative effect on import tax revenue mobilization.

A capital expenditure is a payment for goods or services recorded, or capitalized, on the balance sheet instead of expensed on the income statement. The capital expenditure was measured as the total amount of money spent on domestic and foreign financed. It is important for the government to maintain existing government property, plant & equipment, and invest in new developmental projects for economic growth. It is expected to have a negative effect on import tax revenue. The expenditure on use of goods and services was measured as the total amount of money spent on goods such as purchase of bullets, guns, school uniforms, among others and services such as military, teaching, among others. It is expected to have a negative effect on import tax revenue.

Inflation rate (INF) is defined as the annual percentage change in the consumer price index (CPI). It is expected to have a negative effect on import tax revenue mobilization.
Exchange Rate (EXR) is computed as a weighted average of bilateral exchange rates that have been adjusted for relative price levels. That is;

$$EXR_t = e_t \times \frac{c_t}{c_t^*} \quad (4)$$

where e_t is the nominal bilateral rate which is expressed as the number of foreign currency units per home currency unit (dollar/cedi), c is the price level of the home country, and c^* is the price level in the foreign country. It is expected to have a negative effect on import tax revenue mobilization.

3.4 Estimation Techniques

3.4.1 Unit Root Test with Structural Breaks

Perron (1989) suggested that, most of the time series data on monthly or quarterly basis have structural breaks and this result in problems when establishing the stationarity of time series variables. According to Perron (1989) the existence of a structural break in time series variables will show non-stationary of time series variables which in fact are stationary and vice versa. The

occurrence of structural breaks is mostly due to change in policy direction, war, regime change, external shocks among others. The break type during the unit root test is estimated using either the innovational outlier model with one structural break or additive structural model with one structural break.

3.4.2 Innovational Outlier model with one structural break (IO1)

The Innovational Outlier model (IO) developed by Perron (1997) shows either gradual change in the intercept only or both the intercept and slope of the trend function. The gradual change in the intercept is denoted by IO1 whereas the gradual change in both the intercept and slope of the trend function is denoted by IO2. The Innovational Outlier Model allowing one time change in intercept only (IO1) is written as;

$$z_t = \alpha + \delta DX_t + \theta t + \beta D(\mathrm{T}_b)_t + \eta z_{t-1} + \sum_{j=1}^{m} p_j \Delta z_{t-j} + \mu_t \quad (5)$$

The Innovational Outlier Model allowing one time change in both intercept and slope (IO2) is written as;

$$z_t = \alpha + \delta DX_t + \theta t + \varphi DT_t + \beta D(\mathrm{T}_b)_t + \eta z_{t-1} + \sum_{j=1}^{m} p_j \Delta z_{t-j} + \mu_t \quad (6)$$

Where $\alpha, \beta, \delta, \theta, \varphi, \eta, p$ are coefficients

$1 < T_b < T$, T is time, t is time trend

$D(T_b)_t = \begin{cases} 1, \text{if } t = T_b + 1 \\ 0, \text{otherwise} \end{cases}$ is time of structural break

$DX_t = \begin{cases} 1, \text{if } t > T_b \\ 0, \text{otherwise} \end{cases}$ is intercept

$DT_t = \begin{cases} \text{t, if } t > T_b \\ 0, \text{otherwise} \end{cases}$ is slope

α is the intercept

μ_t is white noise error term

3.4.3 Additive Outlier model with one structural break (AO)

The Additive Outlier model (AO) developed by Perron (1997) shows a rapid one time change in the slope of the trend function. The Additive Outlier Model permitting one time change in slope (AO) is written as;

$$z_t = \alpha + \theta t + \varphi DT_t^* + \eta z_{t-1} \sum_{j=1}^{m} p_j \Delta z_{t-j} + \mu_t \quad (7)$$

Where $\alpha, \theta, \varphi, \eta, p$ are coefficients

t is time trend

α is the intercept

μ_t is white noise error term

$DT_t^* = 1(t > T_b)(t - T_b)$

3.4.4 Sequential Bai-Perron Tests for Structural Breaks

Most studies disregard the presence of structural breaks which results in failing to reject the null hypothesis of non-stationary. This makes the effect of structural breaks to be ascribed to the presence of unit root. Bai and Perron (2003) have developed a model which test for structural breaks and it tests the null hypothesis of m breaks against the alternative that additional break exist. Models with m breaks have estimated breakpoints referred to as $\hat{t}_1, \hat{t}_2, ..., \hat{t}_m$ which are derived from reducing the global sum of square residuals. This method partitions the time intervals $\hat{t}_1, \hat{t}_2, ..., \hat{t}_m$ to test every $(m+1)$ part for the presence of an additional break. That is, the structural breakpoint in the model is determined by partitioning the sample space into two spaces and utilizing the least squares over every portioned sample space.

The sequential Bai-Perron tests for structural breaks apply $(m+1)$ tests of the null hypothesis of no structural change against the alternative hypothesis of a single change. When $\hat{t}_0 = 0 \text{ and } \hat{t}_{m+1} = t$, the test is applied to every segment containing the observations $\hat{t}_{j-1}+1 \text{ to } \hat{t}_j \ (j = 1, 2, ..., m+1)$. A model with smaller sum of squared residuals of the overall minimum value of all segments where an extra break is added as compared to the sum of squared residuals from the m break model rejects the model with $(m+1)$ breaks.

3.4.5 ARDL bounds test for cointegration

Most studies employ cointegrating analysis in order to avoid spurious results and it permits them to distinguish between short-run and long-run relationship between the variables employed. Existence of variables which have unit roots that are integrated of the same order clearly indicates the presence of long-run equilibrium. Cointegration creates an additional causal term (error correction term) for a variable to have an influence on the other variables. The main aim of the cointegration test is to enforce constraints on the parameters which better the value of the estimates when those constraints are properly accounted for. Long-run equilibrium analysis emphasizes on the cointegration of variables in a model which the study is aiming to investigate between tax expenditure and import tax revenue mobilization.

The study employed the Autoregressive Distributed Lagged (ARDL) bounds testing approach Pesaran *et al.,* (2001) to examine the long run relationship between dependent variable and its regressors. Let consider the vector autoregressive model of order k - VAR(k):

$$\eta(M)(z_t - \mu) = \varepsilon_t \qquad (8)$$

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Where M is the lag operator, $\eta(M) = I - \sum_{j=1}^{k} \eta_j M^j$ is a matrix lag polynomial with I representing the identity matrix, $z_t = \left[m_t \; m_t^* \right]'$, $\mu = \left[\mu_m \; \mu_{m^*} \right]'$ is a vector of constant terms and $\varepsilon_t = \left[\varepsilon_{m,t} \; \varepsilon_{m^*,t} \right]' \sim N(0, \Omega)$ is the vector error process.

The VAR model in Eqn. (4.7) can be expressed as a vector error correction model (ECM) as

$$\Delta z_t = \alpha + \beta z_{t-1} + \sum_{j=1}^{k-1} \Gamma_j \Delta z_{t-j} + \varepsilon_t \tag{9}$$

Where $\alpha = -\beta\mu, \Gamma_j = -\sum_{i=j+1}^{k} \eta_i (j = 1, 2, ..., k-1)$ represent short run response coefficient matrices and $\beta = -(I - \sum_{j=1}^{k} \eta_j)$ is the long run multiplier matrix.

To implement the ARDL bounds testing approach, we start by defining z_t as an I(1) dependent variable, y_t as a vector of I(p) regressors where $0 \le p \le 1$. Δz_t is modeled as a conditional ECM as;

$$\Delta z_t = \alpha_0 + \alpha_1 t + \beta_z z_{t-1} + \beta_y y_{t-1} + \sum_{j=1}^{k-1} \Gamma_j \Delta z_{t-j} + \sum_{j=1}^{r-1} \gamma_j \Delta y_{t-j} + \varphi \Delta y_t + \varepsilon_t \tag{10}$$

Where

α_0 is the drift

t is the trend component

β_z and β_y are the long-run coefficient matrices for z_{t-1} and y_{t-1}

Γ_j and γ_j are the short run coefficient matrices for Δz_{t-j} and Δy_{t-j}

ε_t is the white noise disturbance term.

Ordinary least square estimation is used to test the cointegration between z_t and y_t in eqn (10) by computing an F-statistic for the joint significance of the coefficients of the lagged levels, so that $H_0 : \beta_z = 0, \beta_y = 0$.

Pesaran *et al*. (2001) verified that the asymptotic distribution of the F-statistic is non-stationary under the null hypothesis irrespective of whether the regressors are I(0) or I(1). They provided two adjusted critical values that represent the lower and upper bounds of significance. A long-run relationship exists if the F-statistic exceeds the upper critical value. That is, we reject the null hypothesis of no cointegration if the F-statistic falls exceeds the upper critical value. After setting the maximum lag order to two, the optimal lag order to be incorporated in the unrestricted error correction model and ARDL model is based on the Akaike Information Criterion (AIC).

3.5 Diagnostic Test for the Residuals

Diagnostic test for the residuals are mostly conducted to examine the model's goodness of fit. The diagnostic tests used in the study were the serial correlation test of residuals, normality and heteroscedasticity test in relation to the residuals. The White Heteroscedasticity test is employed on the regression model to check that the variance of the residual is homoscedastic or heteroscedastic. Also, Jarque-Bera Normality test is used to check whether the data is normally distributed or not. Finally, the Breusch-Godfrey Serial Correlation LM Test was applied for checking autocorrelation.

4.0 RESULT AND INTERPRETATION

This section presents the results of the study. It presents the descriptive statistics of the study variables, results of Sequential Bai-Perron test for structural breaks, results of structural break point unit root test, results of the ARDL bounds test for cointegration with structural breaks,

error correction model for Auto Regressive Distributed Lag (ARDL) model with structural breaks, results of ARDL long run cointegration with structural breaks, pairwise Granger causality test, residual diagnostic test and conclusion.

4.1 Descriptive Statistics

Table 4.1 presents the descriptive statistics of all the variables used in this study. The results in Table 4.1 show that the estimated mean and standard deviation of natural logarithm of import tax revenue is 8.461 and 0.191 respectively. Also, mean and standard deviation of natural logarithm of expenditure on interest payments (IP) is 8.827 and 0.320 respectively. The mean and standard deviation of natural logarithm of expenditure on compensation of employees (COE) is 9.021 and 0.1590 respectively.

The mean and standard deviation of natural logarithm of expenditure on goods and services used (GAS) is 8.043 and 1.011 respectively. The mean and standard deviation of natural logarithm of capital expenditure (CEXP) is 8.626 and 0.244 respectively. The mean and standard deviation of natural logarithm of grants to other government units (GOG) is 8.750 and 0.195 respectively. The average inflation rate (INF) is 13.0%. The rate ranges between 8.64% and 19.2% with standard deviation of 3.328%. The average inflation rate is high which may cause a decline in the importation of goods into the country, therefore, affecting the tax import revenue generated. The mean and standard deviation of exchange rate (EXR) is 3.460 and 1.120 respectively.

Table 4.1: Descriptive Statistics of the Series

Statistic	Mean	Std. Dev.	Min	Max
ITR	8.461	0.191	8.094	8.775
CEM	9.021	0.1590	8.704	9.277
GAS	8.043	1.011	8.165	9.025
GOG	8.750	0.195	8.367	9.119
IP	8.827	0.320	7.933	9.328
CEXP	8.626	0.244	7.918	9.128
EXR	3.460	1.120	1.648	5.373
INF	0.130	0.033	0.086	0.192

Source: Author's Compilation from EVIEWS 2010 Output

4.2 Results of Sequential Bai-Perron Test for Structural Breaks

The Bai-Perron's breakpoint test which was used to test for multiple break points is shown in Table 4.2. The break-test options are given for a trimming value of 0.15 with a maximum number of 5 breaks. From Table 4.2, the optimum number of breakpoints (i.e the one connected to the minimum BIC score or the maximum Log – Likelihood score) observed in the model was 1 and the break was in September, 2014. The study used the break in September 2014 for the analysis.

Table 4.2: Bai-Perron multiple breakpoint test

Break Test	F-Statistic	Scaled F-Statistic	Critical Value
0 vs. 1**	4.073	28.510	21.87
1 vs. 2	3.652	25.565	24.17
2 vs. 3	1.369	9.582	25.13

** is significant at 5% level
Source: Author's Compilation from EVIEWS 2010 Output

4.3 Results of Structural Break Point Unit Root Test

The study tested for the unit root of the individual time series in order to avoid spurious regression problems. Table 4.3 shows the results of structural break point unit root test for the study variables. From Table 4.3, the Augmented Dickey Fuller (ADF) test statistic for testing the structural break point of import tax revenue at level and first difference are -3.390 (P-value = 0.4711) and -7.967 (P-value <0.01) respectively. This shows that, the import tax revenue with structural breaks in May, 2018 was found to be non-stationary at level while the import tax revenue with structural breaks in July, 2017 at first difference was found to be stationary.

Also, the ADF test statistic for testing the structural break point of CEM at level and first difference are -5.563 (P-value <0.01) and -6.594 (P-value <0.01) respectively. This shows that CEM with structural breaks in November, 2013 and July, 2014 at level and first difference respectively was found to be stationary.

Furthermore, the ADF test statistic for testing the structural break point of GAS at level and first difference are -9.002 (P-value <0.01) and -10.402 (P-value <0.01) respectively. This shows that GAS with structural breaks in April, 2013 and October, 2015 at level and first difference respectively was found to be stationary.

Moreover, the ADF test statistic for testing the structural break point of GOG at level and first difference are -3.741 (P-value = 0.2816) and -8.726 (P-value <0.01) respectively. This shows that, GOG with structural breaks in June, 2013 was found to be non-stationary at level while GOG with structural breaks in May, 2013 at first difference was found to be stationary.

The ADF test statistic for testing the structural break point of IP at level and first difference are -10.071 (P-value <0.01) and -7.050 (P-value <0.01) respectively. This shows that IP with structural breaks in May, 2013 and May, 2018 at level and first difference respectively was found to be stationary.

The ADF test statistic for testing the structural break point of CEXP at level and first difference are -4.868 (P-value = 0.018) and -5.824 (P-value <0.01) respectively. This shows that CEXP with structural breaks in August, 2015 and April, 2017 at level and first difference respectively was found to be stationary.

The ADF test statistic for testing the structural break point of EXR at level and first difference are -3.080 (P-value = 0.6594) and -14.590 (P-value <0.01) respectively. This shows that, EXR with structural breaks in April, 2015 was found to be non-stationary at level while EXR with structural breaks in March, 2014 at first difference was found to be stationary.

Finally, the ADF test statistic for testing the structural break point of INF at level and first difference are -4.924 (P-value = 0.0162) and -10.035 (P-value <0.01) respectively. This shows that INF with structural breaks in February, 2016 and March, 2017 at level and first difference respectively was found to be stationary.

Table 4.3: Structural break point unit root test of the variables

Series	T-Statistics	P-value	Break Date
ITR	-3.390	0.4711	May, 2018
CEM	-5.563	<0.01***	November, 2013
GAS	-9.002	<0.01***	April, 2013
GOG	-3.741	0.2816	June, 2013
IP	-10.071	<0.01***	May, 2013
CEXP	-4.868	0.018**	August, 2015
EXR	-3.080	0.6594	April, 2015
INF	-4.924	0.0162**	February, 2016
D(ITR)	-7.967	<0.01***	July, 2017
D(CEM)	-6.594	<0.01***	July, 2014
D(GAS)	-10.402	<0.01***	October,2015
D(GOG)	-8.7262	<0.01***	May, 2013
D(IP)	-7.0502	<0.01***	May, 2018
D(CEXP)	-5.824	<0.01***	April, 2017
D(EXR)	-14.590	<0.01***	March, 2014
D(INF)	-10.035	<0.01***	March, 2017

*** and ** show the level of significance at 1% an 5% level respectively
Source: Author's Compilation from EVIEWS 2010 Output

4.4 Results of the ARDL Bounds Test for Cointegration with Structural Breaks

Table 4.4 reveals the results of the test of the ARDL bounds. The initial stage of the ARDL process is to investigate whether the variables are cointegrated or not. The ARDL bounds test is used to test the existence of long run relationship among the variables under study by carrying out an F-test for the joint significance of the coefficients of the variables. The import tax revenue was used as the dependent variable and it is regressed on the explanatory variables. The F-statistic is used to test the joint null hypothesis that there is no long run relationship between import tax revenue and the explanatory variables.

From Table 4.4, the computed F-statistic (4.731) is higher than the upper bound critical value of 3.34 at 10% significance level, is higher than the upper bound critical value of 3.68 at 5% significance level and higher than the upper bound critical value of 44.43 at 1% significance level. Since the computed F-statistic of 4.731 is higher than the critical values, this implies that

the null hypothesis of no cointegration is rejected meaning that there exists a long run co-integrating relationship among the variables. Hence we can estimate the equilibrium relationship between import tax revenue and the components of tax expenditure.

Table 4.4: ARDL Bounds Testing Approach

	Critical Value			
Significance level	Lower Bound	Upper Bound	F-Statistic	k
10%	2.26	3.34		
5%	2.55	3.68		
2.5%	2.82	4.02	4.730700	8
1%	3.15	4.43		

Source: Author's Compilation from EVIEWS 2010 Output

4.5 Results of ARDL Short Run Cointegration with Structural Breaks

The study used the ARDL model with structural breaks to develop the short term error correction model. Table 4.5 displays the estimates of the error correction term and results on the estimation of the short run parameters linking components of tax expenditures and import tax revenue. To obtain a model of the error correction mechanism, the study regressed differenced series of the components of tax expenditures and import tax revenue on its own lags as well as well as the one period lagged residuals from the cointegrating vector. That is, apart from the explanatory variables, the ARDL cointegrating model also includes an intercept, trend and a structural break dummy variable with break date being September, 2014. The structural break dummy assumes 0 for observations before September, 2014 and 1 for observations relating to September, 2014 and after.

The Error Correction Model (ECM) which is one period lagged residuals from the cointegrating vector controls the dynamic behavior of the equation. The one period lagged ECM captures the short run changes of the system whereas the coefficient of ECM shows the speed of change to achieve equilibrium in the event of shocks to the system. Table 4.5 shows the results of the short run ARDL cointegrating. From Table 4.5, the ECM coefficient is negative and significant, which verify the existence of a long-run relationship between the explanatory variables and import tax

revenue. The estimated coefficient one lagged period of ECM was -0.540 suggesting a quick speed of change back to the long run equilibrium.

Table 4.5: Results of the Error Correction Model for Selected ARDL (1, 2, 0,1, 0, 3, 4, 0, 0)

Variables	Coefficient	Std. Error	t-Statistic	P-value
D(IP)	-0.046	0.059	-0.778	0.4392
D(IP(-1))	-0.132	0.062	-2.120	0.0378**
D(CEM)	-0.036	0.167	-0.217	0.0286**
D(CEXP)	-0.031	0.028	-1.115	0.0090***
D(GAS)	0.011	0.007	1.484	0.0426**
D(GOG)	0.066	0.060	1.103	0.2740
D(GOG(-1))	-0.075	0.052	-1.437	0.1556
D(GOG(-2))	0.103	0.055	1.858	0.0676
D(EXR)	-0.093	0.053	-1.765	0.0022***
D(EXR(-1))	-0.294	0.067	-4.480	0.0000***
D(EXR(-2))	-0.119	0.067	-1.784	0.0792
D(EXR(-3))	-0.076	0.056	-1.352	0.1810
D(INF)	-0.007	0.331	-0.020	0.0040***
D(BREAK)	0.028	0.043	0.660	0.0114**
D(TREND)	0.002	0.003	0.720	0.4743
ECM(-1)	-0.540	0.110	-4.927	0.0000***

*** and ** show the level of significance at 1% and 5% level respectively
Source: Author's Compilation from EVIEWS 2010 Output

The findings suggest that deviation from the long term import tax revenue path is corrected by 54.0 percent over the next month, significant at 1% significance level. This gives evidence of mean reversion to a non-spurious short-run relationship and therefore stationary residuals, meaning that the components of tax expenditures and tax import revenue are cointegrated.

4.6 Results of ARDL Long Run Cointegration with Structural Breaks

The results of the ARDL long run co-integrating relationships with structural breaks between import tax revenue and the explanatory variables are presented in Table 4.6. Hence the long run coefficients with structural breaks equation which was estimated using ARDL (1, 2, 0,1, 0, 3, 4, 0, 0) and selected using Akaike Information Criterion (AIC) is shown in Table 4.6. From Table 4.6, there is a negative significant relationship between IP and import tax revenue in the long run. A percentage increase in IP leads to 0.223 percent decrease in import tax revenue in the long run. This suggests that an increase in IP decreases import tax revenue in the long run.

Also, CEM has a negative significant effect on import tax revenue in the long run. This means that a percentage increase in CEM leads to 0.067 percent decrease in import tax revenue in the long run. This suggests that an increase in CEM decreases import tax revenue in the long run. This findings show that, even though government compensation to employees is important for the efficient delivery of public services which are crucial for the functioning of economies and the general prosperity of societies, it reduces the tax revenue mobilized.

Furthermore, GOG has a negative significant effect on import tax revenue in the long run. This means that a percentage increase in GOG leads to 0.188 percent decrease in import tax revenue in the long run. This suggests that an increase in GOG decreases import tax revenue in the long run. Moreover, EXR has a negative significant effect on import tax revenue in the long run. This means that a percentage increase in EXR leads to 0.050 percent decrease in import tax revenue in the long run. This suggests that an increase in EXR decreases import tax revenue in the long run. Finally, INF has a negative significant effect on import tax revenue in the long run. This means that a percentage increase in INF leads to 0.012 percent decrease in import tax revenue in the long run. This suggests that an increase in INF decreases import tax revenue in the long run.

Table 4.6: Results of Estimated ARDL (1, 2, 0,1, 0, 3, 4, 0, 0) Long Run Equation with Structural Breaks

Variable	Coefficient	Standard Error	t-Statistic	
Constant	5.502	4.012	1.371	0.4503
IP	-0.223	0.212	-1.052	0.0065***
CEM	-0.067	0.308	-0.218	0.0281**
CEXP	-0.167	0.092	-1.805	0.0756
GAS	0.020	0.014	1.368	0.1761
GOG	-0.188	0.196	-0.961	0.0400**
EXR	-0.050	0.087	-0.579	0.0048***
INF	-0.012	0.614	-0.020	0.0000***
BREAK	0.052	0.077	0.674	0.1750
TREND	0.004	0.005	0.759	0.4503

*** and ** show the level of significance at 1% an 5% level respectively
Source: Author's Compilation from EVIEWS 2010 Output

4.7 Residual Diagnostic Test

Table 4.7 shows the residual diagnostic tests carried out to check whether the model satisfies classical linear regression model assumption. The diagnostic tests conducted comprises of tests for serial correlation, heteroscedasticity and normality of the disturbance term. The Breusch-Pagan Godfrey test was applied to investigate whether the variance of the residual is heteroscedastic, the Jarque-Bera Normality test was employed to investigate whether the residual is normally distributed or not and the Breusch-Godfrey Serial Correlation LM Test was used to investigate the presence of autocorrelation.

From Table 4.7, the Jacque-Bera normality test which investigated the normality of the residuals showed a test statistic of 0.214 with a P-value of 0.8983 showing that the residuals are normally distributed. The F-Statistic of Breusch-Pagan Godfrey heteroskedasticity test was 1.006 with P-value = 0.468 which reveals that all the explanatory variables jointly have an effect on import tax revenue. Finally, the F-Statistic of Breusch-Godfrey Serial Correlation LM Test has F-statistic of 0.269 with Prob. F (2,63) = 0.765 which reveals that the residuals are not serially correlated. Hence, the residuals stability test confirms that they independently jointly have an influence on import tax revenue.

Table 4.7: Residual Diagnostic Test

Diagnostic Test	Test Statistics	P-Value
Breusch-Godfrey Serial Correlation LM	0.269	0.7647
Breusch-Pagan Godfrey Heteroskedasticity test	1.006	0.4681
Jacque-Bera test	0.214	0.8983

*** and ** are significant at 1% and 5% level respectively.
Source: Author's Compilation

4.8 Stability Test

Table 4.8 shows the functional form stability test using Ramsey RESET test. The Ramsey RESET test is a statistic used for testing functional form misspecification. That is, it is used to

test for misspecification of the relationship between import tax revenue mobilization and tax expenditure values in the model. The null hypothesis of the Ramsey RESET test is that the model has no omitted variables. The F-statistics of Ramsey RESET test was 2.011 with Prob. F (1,66) = 0.1608 which reveals that the functional form is correct and the model does not suffer from omitted variables. Hence, the Ramsey RESET stability test confirms that there is no misspecification of the relationship between tax expenditure and import tax revenue.

Table 4.8: Ramsey RESET stability Test

Stability Test	Test Statistics	P-Value
Ramsey RESET test	2.011	0.1608

Source: Author's Compilation from EVIEWS 2010 Output

5. CONCLUSION AND RECOMMENDATION

The study reveals a good understanding of effects of the components of tax expenditure such as interest payments, grants to other government units, and compensation of employees and macroeconomic factors such as exchange rate and inflation rate on import tax revenue mobilization in Ghana. Using the Innovational ARDL technique with structural breaks for monthly data from January, 2012 to June, 2019 the study finds that total tax expenditure and import tax revenue mobilization as a percent of GDP both fluctuate from January, 2012 to June, 2019. Also, the interest payment, compensation of employees, and grants to other government units has a negative significant effect on import tax revenue in the long run. In addition, inflation rate and exchange rate have negative effects on import tax revenue in Ghana in the long run while the deviation from the long term import tax revenue mobilization path is corrected by 54.0 percent over the next year as the Error Correction term depicts in the short-run estimates.

The study therefore concludes that tax expenditures such as compensation of employees have an inverse relationship with tax revenue mobilization as well as the macroeconomic factors such as inflation rate and exchange rate whose fluctuation has impacted import revenue adversely. In

view of the main conclusions, the study recommends that the government should put in proactive measures for the appropriate financing and effective management of wage bills to ensure that the desired public services are delivered in a cost-effective and fiscally sustainable manner. Additionally, the study recommends that the government should keep in mind the macroeconomic environment and tax expenditures such as interest payments, grants to other government units, and compensation of employees in particular when mobilizing import tax revenue. Specifically, the study suggests that the exchange rate policies and structural policies such as price liberalization need to be well coordinated to ensure broad based macroeconomic stability and mobilization of import tax revenue in Ghana.

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