

Evaluation of the Nexus between Indirect Tax Revenue and Economic Performance of West African Commonwealth Countries

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ABSTRACT:

This study evaluates the impact of indirect tax revenue on the economic performance of West African Commonwealth countries: Ghana, Nigeria, Sierra Leone, and The Gambia. The study employed GDP growth rate and per capita income as measures of economic performance. Data on indirect tax revenues and measurement of economic performance were obtained electronically from the websites of the International Center for Tax and Development and the World Bank. The study employed ordinary least squares regression and found that indirect taxes have a positive and significant impact on both GDP growth rates and per capita income in West African Commonwealth countries. The study concludes that indirect tax revenue is relevant for improving the economic performance of West African Commonwealth countries. The study therefore recommends that tax administration in these countries should focus more on increasing tax revenue through indirect taxes, which are difficult to evade, and that mechanisms to enhance accountability within the system should be put in place.

KEYWORDS: Tax revenue, economic performance, economic growth, indirect tax revenue, per capita income

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INTRODUCTION

Government administration is essential to the management of national affairs, just as government revenue is a major factor in its success. Tax has remained a major source of government revenue at all times, accounting for more than 90% of total national revenue in some countries within the European Union (Stoilova & Patonov, 2012). It is the surest means of generating government revenue, as it is not susceptible to depletion or international price changes, unlike mineral resources.

Tax is a compulsory levy imposed on people by the government of their land of residence or income generation, through which the government raises revenue and controls the economic and social welfare of its people. Although various governments around the world have distinct means of raising revenue due to varying opportunities available to them, the generation of government revenue through taxation is always useful and applied. Government administrations also exercise control over their people's economic and social activities through tax policies and laws instituted and enforced in the land. Taxes are imposed on income, property, and goods and services as they are exchanged within the economy. The taxes imposed on the incomes and property of persons differ from those imposed on goods and services, as they are exchanged for money and other values. So, taxes can be classified as direct or indirect. Nmesirionye et al. (2019) defined indirect taxes as expenditure taxes remitted by intermediaries to the government after they have collected them from their customers upon payment for goods or services rendered. Therefore, indirect taxation is broad-based and very difficult to evade, as it is imposed on the cost of goods and services that citizens desire. Boelhouwer (2010) posits that economic indices of nations provide evidence of national progress or otherwise, as they reduce the size of national data without losing the information they carry, thereby

promoting communication and accountability. Tax revenue contributes to the wealth available to the government of the day to execute its policies, so the methods of governments' revenue generation and spending should naturally affect the economic and social development of nations (Ortiz-Ospina & Roser, 2019). However, the transmission of tax revenue to support people's welfare in developing nations, as reflected in their economic indices, remains a research question of interest, for which scholars have made various attempts. Although the results of research efforts on this topic tend to vary within the same climate and to varying degrees, this is the focal point of our study.

A country's tax system, backed by its policies, often determines the level of revenue that can be generated through its tax administration. Moreover, economic advancement or growth of a country should reflect in the growth of the economy and also the conditions of living of the populace of such a nation. As such, it is abnormal for a wealthy nation to have a consistently declining or stagnant economy or for the majority of its citizens to live below the poverty line. The gross domestic product growth rate, as an economic indicator, provides information on the rate at which the size of an economy's economic activities changes over time. In contrast, per capita income measures the average income earned by individuals within a given country. Gale and Samwick (2014) opined that efficient taxation will lead to a larger economy by improving the economic well-being of individual units within the economy. However, it is important to note that taxation involves amassing and transferring funds from individual units to the government, so it is also viewed from the standpoint of its influence on people's ability or incentive to earn, invest, and save. So government policies on taxation, whether to increase taxes or grant tax cuts, should be viewed through two conflicting perspectives: one focuses on increasing national wealth, whereas the other focuses on the economic growth of citizens within that economy. However, developing economies like West African Commonwealth countries are bedevilled with a high informal sector, over-dependence on the PAYE system, and corrupt tax officials (IMF, 2011). Thus, Ahmad and Stern (1989) and Myles (2000) argue that indirect tax revenue is a better contributor to national tax revenue and economic performance in developing countries.

This study is a research attempt towards evaluating the impact of indirect tax revenues on the economic indices of West African Commonwealth countries from 1981 – 2022. To achieve this broad objective, the study seeks to: determine the effect of indirect tax revenue on the gross domestic product growth rate of West African Commonwealth nations and study the impact of indirect tax revenue and per capita income of West African Commonwealth nations.

The study crystallizes the role of indirect taxation as an alternative to direct tax revenue, as it possesses the qualities that make evasion impossible. This is important for policymaking, especially in West African Commonwealth countries, which are primarily developing countries, as this study articulates the implications for economic progress and the impact of residents' personal income. Also, there is a need to explore the impact of indirect tax revenue on the economic performance of developing countries, with particular reference to the West African Commonwealth countries as a regional group. The Crown established these countries after many years of colonial rule. They are blessed with natural resources, which remain a significant source of revenue and a distraction to governments after British rule, as they tend to rely unduly on these resources at the expense of taxation. The submissions of McNabb and LeMay-Boucher (2014) and of Reuven and Yoram (2006) on the effectiveness of indirect tax administrations in promoting the growth of developing economies, as opposed to the use of direct taxes in pursuing economic progress, also create room for more research thrusts with specific regard to West African commonwealth countries.

LITERATURE REVIEW

The meaning of taxation

Tax is a compulsory levy paid by citizens to the government, which attracts no direct compensation from the government but is paid to comply with the relevant laws of the land. Ihendinihu et al (2018) defined tax as a compulsory contribution levied on 'persons', property, income, and transactions in the support of government. Tax can also be considered a compulsory, unrequited payment made to the general government (Nobes, 1998). Taxation is the means by which governments raise revenue to provide their citizens with basic infrastructure and social amenities, including covering the costs of governance. Taxation also provides governments with a basis for achieving desirable social objectives by imposing a premium tax on harmful substances, aiming to discourage their use or consumption by citizens. So, taxation provides the government with tools to raise revenue and to regulate the social and economic outcomes of the state. However, all the opportunities provided by taxation can only be useful when the state administration taps into them by implementing tax policies that optimize the peculiarities of its people.

The administrative systems of Ghana, Nigeria, Sierra Leone, and the Gambia are similar in various respects, including legal, social, and economic aspects. Moreover, these four countries were colonized by Britain and had their affairs overseen by the British government for nearly a century and are therefore

regarded as members of the Commonwealth. Though these countries may have differed in their political structures over time, the foundations of their economic structures, including the sources of government revenue and spending, were laid by various English leaders who administered their affairs with the approval of the Queen of England. Most of the legal structures, including tax laws, in West African commonwealth countries, some of which are still in use, were introduced by these English administrators, and the changes made to them have mostly reflected current realities rather than fundamentally altering them. In addition, the early political actors in the administrative systems of these countries were indoctrinated under the tutelage of the English political experts and educationists (Eribake, 2015), thus underscoring the fact that West African commonwealth countries, as former 'apprentices' of the United Kingdom, should have a comparable ideology in terms of sourcing government revenues from various means, which obviously includes taxation. The four West African Commonwealth countries are all developing countries because their economies have not yet become fully developed.

Dom and Miller (2018) opine that tax administrations of colonized states did not follow any specific strategy aimed at bringing about lasting development while putting up an argument which suggests that taxation strategies applied in the colonies especially within the sub-Saharan Africa were merely intended to exploit the locals from the perceived surplus at the time coupled with the pressure of meeting up with social expectations based on what is currently obtained in the colonists of their counterparts. The authors' view above suggests that the tax systems in the West African Commonwealth countries, the focus of this study, may not have optimized economic development in those nations. If this is accurate, it is also expected that these former colonists will make efforts to institute and implement tax policies and reforms that best promote their interests as a people.

But tax administrations in developing countries are generally under-optimized for economic growth, especially in African countries, which tend to depend unduly on non-tax income to raise government revenues. These developing countries that rely on crude oil, other natural resources, or tourism are currently struggling and seeking to increase total government revenues amid declines in crude oil prices (Onakoya et al., 2016; Egbunike et al., 2018) and restrictions on international travel due to the COVID-19 pandemic.

West African Commonwealth countries, even though they are all developing countries, had their tax systems founded by a single colonialist who used taxation as a primary source of government revenue. Even though some of these countries had mineral resources that attracted the British powers in the first instance, Nigeria, particularly, had not begun oil production or production (oil mining) in commercial quantities at the time of colonization, so it is evident that Britain always held on to taxation, even with other sources of income. It is not out of place to assume that these West African Commonwealth countries will tap into tax opportunities and improve their tax systems to diversify their income streams, but this may not be the case. Mansfield (1988) highlights the huge difference between tax laws and actual taxation in developing countries. Developing countries tend to adopt admirable tax policies whose implementation should lead the economy toward emancipation, but the tax practices that follow these policies bear little resemblance to them. This is the greatest challenge of taxation in developing countries.

Bird (2018) recognizes the low rate of tax compliance as one of the prominent factors inhibiting successful tax administration in developing countries. He opined that an economic approach to the implementation of tax laws often fails to take key administrative issues as tax evasion and avoidance, into consideration; and these factors, which ought to have influenced the way the tax man assesses, collects, and enforces the tax laws, reduce notable policies to ineffective or suboptimal strategies. Some measures outlined to improve tax administration in developing countries are acknowledgment of the compliance level of the particular country in question, making uncomplicated tax laws and policies, development of good tax reform strategy which include firm control of the withholding tax agents, recognition and treating the taxpayers as clients, introduction of information technology into the tax system and dealing decisively with non-compliance to taxation.

However, while assessing the role of taxation in improving the wealth of developing countries, Bird and Milka (1992) observed that most policymakers tend to overlook the role that taxation plays in macroeconomic balance and equity. It therefore holds that tax policies in developing countries may maximize government revenue, especially as other sources of revenue are no longer yielding as before, as in the case of Nigeria. And this may lead to ignoring other macroeconomic roles of taxation, including distorting their balances; a case that is also detrimental to development.

Ligomeka (2019) argues that developing African economies are commonly associated with low-income taxes because the per capita incomes of the masses are generally low. Low tax-to-GDP ratios in developing countries can also be traced to poor income tax administration, including corruption at the level of tax collection and remittance to government coffers. These nations thus embraced the

opportunity to implement a value-added tax to boost tax revenues. Hence, developing countries depend more on indirect taxes than on direct taxes to generate tax revenues (Ahmad & Stern, 1989).

Aside from issues with administrative machinery, tax administrative challenges in developing countries, and low compliance with tax, these problems are products of corrupt government administrators, associated with poor governance, and the near absence of basic infrastructure. According to IMF (2011), taxation in developing countries faces the following challenges;

- i. Very large informal sector which may never be brought into the government tax net.
- ii. A narrow tax base and income taxes may have to depend only on the PAYE system and registered companies alone.
- iii. Most of these developing countries use tax incentives to attract foreign investment, especially in new sectors of the economy; these incentives ultimately result in revenue losses for the government.
- iv. They also face a lengthy tax process, frequent tax payments, and bribery and corruption among officials, which make compliance costs appear relatively high.

Highlights of tax administration in developing countries, including West African Commonwealth countries, are paramount for understanding the background of taxation in these countries. Still, some of these nations may have a comparative advantage over others in terms of effective tax administration, tax reforms, maintaining a firm hold on taxation as an important source, and fiscal independence.

Taxation and Economic Growth

Tax revenue and its influence on economic growth are topics that will continue to attract debate and scholarly discussion, especially in developing economies as they strive to re-strategize and augment other sources of public revenue. In economic theory, taxation reduces consumption and savings, and a higher tax rate may discourage work and productivity. However, state wealth and the provision of basic infrastructure and essential goods are impossible without taxation. Even in countries with alternative sources of income from mineral resources, diversification of government revenues is paramount for financial balance and stability. N'Yilimon (2014) observed that though theoretical literature suggests an indirect relationship to exist between tax and economic growth because high tax rates have the probability of distorting economic balance and affecting growth inversely; he opined that optimal tax rate will lead to high economic growth in the long-run just the same way low tax rate if sustained, have the possibility of amounting to high tax revenues in the long-run.

The above view is supported by the findings of McNabb and LeMay-Boucher (2014), which revealed that indirect tax revenue is best utilized by developing countries to facilitate economic growth. Their findings revealed that revenue-neutral increases in personal income taxes can be detrimental to the economic growth of developing countries; thus, government reliance on direct taxes to increase revenue may distort and negatively influence economic growth. Odhiambo and Olushola (2018) posit that developing countries endowed with mineral resources, such as Nigeria (crude oil), Ghana, and Sierra Leone (gold), tend to rely more on their natural resources for government revenue, while paying less attention to taxation. The researchers believe that taxation will play a vital role in the growth of developing economies, especially Nigeria, if proper effort is made to ensure effective tax administration. It is important that, even though empirical findings favour the use of taxation to achieve economic progress, fiscal thrusts of developing economies should be wary of relying on direct taxes to achieve economic growth. Thaci and Gerxhaliu (2018) highlighted the IMF's advice to developing countries, which centers on the need to increase tax revenue through high corporate tax rates and consumption taxes, such as value-added tax, rather than international trade taxes.

According to Thaci and Gerxhaliu (2018), taxation plays a similar role in influencing economic growth and stability in both developing and developed countries, especially by controlling inflation through the regulation of indirect tax rates. However, other factors, such as differences in the dominant industries in both developing countries, the size of administrative costs and compliance, corruption, the size of the informal economy, and polity restrictions, can hinder the effectiveness of taxation in achieving economic growth in developing countries.

Effect of taxation on per capita income

Empirical studies on taxation tend to focus interest on gross domestic product (GDP) and its growth rate as measures of economic growth, thus paying little attention to other economic indices. This outcome suggests that results on economic growth should suffice for making inferences about the per capita income of these case study countries. However, the two variables are obviously different and cannot be interpreted the same way. Per capita income, or GDP per capita, refers to the average income earned by a country's citizens, measured as total GDP divided by the country's population. Thus, per capita income emphasizes equitable distribution of income.

Similar to some empirical findings on the interaction between taxation and economic growth, Romero and Strauch (2008) argue that direct taxes negatively affect per capita income growth and the accumulation of physical capital. This result will always hold for economies where GDP per capita reflects, or is close to, the actual GDP. One feature of developing economies, exacerbated by high levels of corruption, is an inequitable distribution of income; thus, for such countries, the influence of taxation on the GDP growth rate will tend to differ from that on per capita income. Arnold (2008) also found that corporate income taxes negatively affect GDP per capita, whereas consumption taxes have a more positive effect. These findings suggest that direct taxes reduce wealth in the hands of paying citizens, especially in the short run; this is consistent with the theoretical stance, which views taxes as likely to discourage growth and savings.

Theory of optimal commodity taxation

The Ramsey tax model is a precursor to several other models addressing optimal commodity taxation theory. It considers the ability of policymakers to set different commodity tax rates for different goods to minimize the system's deadweight loss with minimal distortionary effects (Agarwal, 2003). Deadweight loss in this aspect refers to the excess burden of taxation. The Ramsey tax model supports adjustments to indirect taxes under specific conditions to minimize the reduction in taxpayers' utility. The Ramsey tax model is centred on the trade-offs between efficiency and equity. Whereas popular demand is to charge a uniform rate on all goods for indirect taxes, optimal commodity taxation recognizes the economic inefficiency of imposing an excess consumption tax burden on taxpayers in pursuit of equity (a uniform rate) and thereby suggests the use of differentiated rates.

According to Ramsey (1927), indirect taxes on each commodity should be proportional to the sum of the reciprocals of its supply and demand elasticity. Even though this model was criticized for being practically problematic and concerns are drawn on the ability of administrators to calculate and collect taxes on goods and services based on differentiated rates, it is important to observe the problem it confronted, as goal of obtaining equity by imposing uniform indirect tax rate on all goods will be achieved only at the expense of efficiency in the economy. So, considerations of partial welfare improvement, which aim for a second-best position where optimization cannot be achieved, become desirable. An example of social welfare improvement through commodity taxation is the use of standard rate, zero rate, and VAT-exempt for goods and services tax in Nigeria. The application of varied rates here recognizes the need to reduce the excess tax burden, especially on basic goods, given the circumstances of the majority of the masses in developing countries. Optimal commodity theory underpins this research, given its basic tenet: achieving economic efficiency through the administration of indirect taxation. It is worth noting that raising sufficient tax revenue is the goal of indirect taxation; to an extent, an economy's performance depends on its efficiency. So, the study hypothesizes as follows;

- i. H01: Indirect tax revenue does not have a significant effect on the gross domestic product growth rate of West African Commonwealth Nations
- ii. H02: Indirect tax revenue does not significantly influence the per capita income of West African Commonwealth Nations

METHODOLOGY

This work adopted an ex-post facto research design and covered the four West African countries previously colonized by Britain: Ghana, Nigeria, Sierra Leone, and The Gambia. Secondary data on indirect tax revenue, GDP growth rate, and per capita income from 1981 - 2022 were obtained from electronic publications of the World Bank, the Federal Inland Revenue Service of Nigeria, and the International Monetary Fund through the International Center for Tax and Development. The method of analysis is the ordinary least square panel regression. The study used simple regression analysis to capture the direction and magnitude of the association between indirect tax revenue and two indicators of economic performance: real gross domestic product growth rate and per capita income.

The simple regression analysis model of each hypothesis is given as follows:

Model I

$$GDPgr_{it} = \beta_0 + \beta_1 [IDT]_{it} + \mu_{it} \quad (1)$$

Where:

GDPgr Gross Domestic Product Growth Rate

IDT Indirect Taxes

μ Error term

i individual countries

t time

Model II

$$[\text{PCI}]_{it} = \beta_0 + \beta_1 [\text{IDT}]_{it} + \mu_{it} \quad (2)$$

Where

PCI	Per capita income
IDT	Indirect Taxes
μ	Error term
i	individual countries
t	time

RESULT AND DISCUSSIONS

The results of the ordinary least square regression analyses conducted for the two hypotheses formulated in this work are presented and discussed here.

Analyzing the effect of Indirect Tax Revenue on GDP Growth Rate of West African Commonwealth Countries

Hypothesis I: Indirect tax revenue does not have a significant effect on the gross domestic product growth rate of West African Commonwealth Nations

Table 1: Estimation of Indirect tax revenue on GDP growth rate of West African Commonwealth Countries

Regression Estimates	Values
C	-0.0922(0.0837)
LOGIDT	0.0149(0.0181)
R-squared	0.0360
F-statistic	5.6061(0.0192)

Source: Research Output 2023

Table 1 presents the random-effects panel regression results for the indirect tax revenue and gross domestic product growth rate of the four West African Commonwealth countries. The choice of random-effect regression over fixed-effect regression was based on the Hausman test, which yielded a p-value of 0.0519; thus, the Hausman test null hypothesis, that random effects are the appropriate estimate, was accepted. The Hausman test results are attached as Appendix I to this research.

The panel regression beta coefficient is approximately 0.02, with a t-statistic of 2.39 and a p-value of less than 5%. This shows that indirect tax revenue has a positive and significant influence on the GDP growth rate of West African Commonwealth countries. The result implies that the indirect tax revenue for West African Commonwealth countries moves in the same direction as changes in the GDP growth rate, to a significant extent. Indirect tax revenue can serve as an instrument of advancing the economic progress of the group. The probability of the f-statistics is significant at the 5% level, suggesting that the regression of indirect tax revenue on the GDP growth rate is credible, as indirect tax revenue can predict changes in economic growth when used as an independent variable. However, the R-squared of the regression indicates that indirect tax revenue can only explain 4% of changes in the GDP growth rate.

Given the significance of the beta coefficient for indirect tax revenue, the study concludes that indirect tax revenue has a significant effect on the gross domestic product growth rate of West African Commonwealth Nations, thereby supporting the rejection of the null hypothesis.

Analysing the effect of Indirect Tax Revenue on Per Capita Income of West African Commonwealth Countries

Hypothesis II: Indirect tax revenue does not significantly influence the per capita income of West African Commonwealth Nations

The Hausman test result, presented in Appendix II of this work, was used to select between the fixed-effect and random-effect regression estimates. The test shows that the chi-square value of 2.72 is approximately statistically significant, so we accept the null hypothesis and conclude that the random-effect regression is the most appropriate estimate.

Table 2: Estimation of Indirect tax revenue on the per capita income of West African Commonwealth Countries

Regression Estimates	Values
C	-0.0406(0.8998)
LOGIDT	0.3214(0.0000)
R-squared	0.3250
F-statistic	73.7029(0.0000)

Source: Research Output 2023

The random-effect regression estimate in Table 2 shows a beta coefficient of 0.32, a t-statistic of 8.63, and a corresponding probability value of 1%. These outcomes show that indirect tax revenue has a significant, positive effect on individuals' annual average income in the selected countries in this study. It also implies that indirect tax revenue of West African Commonwealth nations, as a means of government revenue sourcing, is relevant to improving the economic status of the group, since government tax revenue and per capita income of the average individual within this group grow in the same direction to a significant extent. The regression estimates show that indirect tax is a credible independent variable for predicting changes in per capita income in West African Commonwealth nations. The R-squared of 32% suggests that indirect tax revenue can explain changes in per capita income in West African Commonwealth nations to some extent. The study therefore rejects the null hypothesis and concludes that Indirect tax revenue significantly influences the per capita income of West African Commonwealth Nations, based on the t-statistics and probability values reported in Table 2.

Discussion of findings

Analysis of the first hypothesis indicates that indirect tax revenue for the panel of West African Commonwealth countries significantly impacts their economic growth. This result aligns with the conclusions of McNabb and LeMay-Boucher (2014) and Reuven and Yoram (2006) on the relevance of indirect tax revenue to the economic progress of developing economies. The outcome here also aligns with the works of Nmesirionye et al. (2019), Ogundana et al. (2017), Arabi and Elbeely (2019), Kamara and Mingfei (2011), and Ezu and Jeff-Anyeneh (2021). Also, Nwobodo et al. (2022) argue that indirect tax revenue positively affects Nigeria's GDP in the long run. Though these studies were focused on one African country, which includes Nigeria, Sudan, and Sierra Leone, they found that indirect tax revenue is positively and significantly associated with the economic growth of these countries. This suggests that applying tax policies that place greater emphasis on raising tax revenues from indirect sources is more beneficial for the economic growth and performance of West African Commonwealth countries. It is worth noting that these taxes have a higher compliance rate than direct taxes, especially in African countries.

The implication of this finding for fiscal revenue sourcing in West African countries lies primarily in the significance of indirect taxation to the region's overall revenue and economic growth. Indirect tax types, such as Value Added Tax (VAT), are structured in a manner that makes them less avoidable, thereby compelling all consumers of VAT Table goods and services to pay the tax. Hence, the results of this study confirm the effectiveness of indirect taxation for developing countries in general.

The study also found, in the analysis of the second hypothesis, that indirect tax revenue also significantly influences per capita income in the selected countries. This negates the findings of Adukonu and Ofori-Abebrese (2016) on the effect of indirect tax revenue on the poverty level of Ghanaians. The authors posit that indirect taxes worsen the poverty level of the average Ghanaian, using household per capita consumption as a measure of poverty. However, panel studies of West African Commonwealth countries, including Ghana and three others, have shown that Ghana's singular outcome may not hold for other countries in the region. The findings here also do not align with those of Gbato (2017), who maintained that tax revenues of sub-Saharan African countries do not have a long-run relationship with their economic growth, but are in line with the conclusions of Onakoya et al (2016), who concluded that tax revenue and FDI has positive and significant effect on gross domestic product of African countries. It is important to note that where Gbato (2017) employed the dynamic common correlated estimator (DCCE), Onakoya et al. (2016) used Cointegration to analyze the data.

However, the study supports the positions of McNabb and LeMay-Boucher (2014) and Reuven (2006) on the critical positive role that indirect taxes play in boosting the economic performance of developing countries. These results suggest that West African Commonwealth countries need to critically explore the opportunities provided by taxation to generate internal revenue, leaning more on indirect taxation. Since direct tax revenue of developing countries is always under-optimized as a result large informal economy (Ezejelue, 2008), and undue dependence on PAYE (IMF, 2011), it is therefore necessary for them to explore indirect tax revenue and boost the total tax revenue, in a bid to contribute effectively to the economic performance of their countries.

CONCLUSION AND RECOMMENDATION

This paper posits, based on findings to date, that indirect tax revenue is relevant to the economic performance of West African Commonwealth countries. The study recommends that the tax policies of these countries should optimize tax revenues by relying more on indirect taxes, as they impose tax even on the informal sector of these economies with little resistance. To achieve this, accountability must be ensured by the Customs Unit, which controls the import taxes, to the agents and corporations of the Tax Revenue Services, who are charged with deducting and remitting these taxes to the government. The study also recommends that an adequate accountability system be maintained in the management of indirect taxes,

and that value-for-money principles be followed in the disbursement of these funds to projects that will ultimately enhance citizens' living standards and foster economic growth.

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Appendix I

Correlated Random Effects - Hausman Test

Equation: Untitled

Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	3.779799	1	0.0519
Cross-section random effects test comparisons:			
Variable	Fixed	Random	Var(Diff.)
LOGIDT	0.028930	0.014914	0.000052
			0.0519

Cross-section random effects test equation:

Dependent Variable: GDPGR

Method: Panel Least Squares

Date: 05/04/20 Time: 01:22

Sample: 1981 2022

Periods included: 42

Cross-sections included: 4

Total panel (balanced) observations: 168

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.210703	0.080688	-2.611331	0.0100
LOGIDT	0.028930	0.009536	3.033908	0.0029
Effects Specification				
Cross-section fixed (dummy variables)				
R-squared	0.077634	Mean dependent var	0.033715	
Adjusted R-squared	0.052535	S.D. dependent var	0.057077	
S.E. of regression	0.055558	Akaike info criterion	-2.910438	
Sum squared resid	0.453743	Schwarz criterion	-2.810968	
Log likelihood	226.1933	Hannan-Quinn criter.	-2.870030	
F-statistic	3.093178	Durbin-Watson stat	1.626034	
Prob(F-statistic)	0.017655			

Appendix II

Correlated Random Effects - Hausman Test

Equation: Untitled

Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	2.724324	1	0.0988
Cross-section random effects test comparisons:			
Variable	Fixed	Random	Var(Diff.)
LOGIDT	0.344402	0.321417	0.000194
			0.0988

Cross-section random effects test equation:

Dependent Variable: LOGPCI

Method: Panel Least Squares

Date: 05/04/23 Time: 01:27

Sample: 1981 2022

Periods included: 42

Cross-sections included: 4

Total panel (balanced) observations: 168

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.234798	0.336315	-0.698150	0.4862
LOGIDT	0.344402	0.039745	8.665231	0.0000

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.470162	Mean dependent var	2.674898
Adjusted R-squared	0.455744	S.D. dependent var	0.313893
S.E. of regression	0.231571	Akaike info criterion	-0.055520
Sum squared resid	7.882882	Schwarz criterion	0.043949
Log likelihood	9.219551	Hannan-Quinn criter.	-0.015112
F-statistic	32.61077	Durbin-Watson stat	0.142607
Prob(F-statistic)	0.000000		