

Structural change and tax revenue growth in ECOWAS countries

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Abstract

In this study, the effects of structural changes on tax performance for the countries in the ECOWAS sub-region were empirically examined. It is argued that given the nature of economic markets in the sub-region, the pattern of changes and adjustments in the structure of the economies will matter significantly for tax implications among the countries. The study considered tax performance in terms of the countries' taxes to GDP ratio. Moreover, structural changes were considered from four perspectives: Sectoral shares in output, productivity growth, social indicators, and macroeconomic factors. Data for thirteen countries of the ECOWAS sub-region from 2000 to 2022 were used in the study. The Fully Modified OLS technique was used to estimate the connection between structural change and tax performance. The study indicates that structural changes tend to matter for tax performance among ECOWAS countries. Specifically, the results show that changes in sectoral shares of the economy have a very significant impact on tax performance in the ECOWAS sub-region. While the rising share of agricultural output limits tax revenues, increased shares of the other sectors boost tax performance. There is, therefore, a need for the economies to ensure structural adjustments that are more market-based but effectively guided by policies and institutional enforcement. And that restructuring the foreign trade sector has solid implications for tax revenues among ECOWAS countries. To aid structural adjustments to the tax system, there is a need for more political support to improve tax performance.

Keywords: tax performance, structural change, agricultural sector, ECOWAS countries

JEL: H2; H11

1. Introduction

The African nations have recorded considerable GDP growth rates since the early 1990s. However, the economic growth of these nations has often been regarded as needing more depth associated with structural change-driven economic growth (International Fund for Agricultural

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Development, 2019). Bernardo (2022) and the International Fund for Agricultural Development (2019) proposed different policies and approaches that can promote structural transformation as well as long-term inclusive growth in African economies. They emphasized the critical role of increasing agricultural productivity, fostering employment creation and economic diversification. Apart from the agricultural sector of the economies of ECOWAS countries, there is also an urgent need to increase the contributions of the manufacturing, industry, services and financial sectors to the GDPs of member nations for employment creation as well as economic diversion.

Economic growth and development are key drivers of this pursuit of structural change in economics (Akinrinola & Oreoluwa, 2021). Structural change in a nation's economy is the change in visible outputs such as critical infrastructure, technological advancement, human capital improvement, expansion in commerce, and others. Structural change in economics and growth are most often used interchangeably. While structural change in economics refers to changes in visible output, economic growth is about a nation's changes in total production within a specified period. Economic developmental plans for every nation usually serve as pathways for achieving visible outputs (Todaro & Smith, 2015). Global economic expansion, including that of the Economic Community of West Africa States (ECOWAS), has been stirring at snail's speed within the past few years as a result of a number of factors ranging from rising inflation, soaring interest rates, supply disruptions further occasioned by the Russian-Ukraine war as well as reduced investment (Chibueze, 2023).

Nations all over the world require revenue to develop all the sectors of the economy and make them viable in order to enhance the rate of per capita income and economic growth, thereby increasing the living standard of the people. The various sources of government revenue include major and minor sources. While the major sources are taxes and prices of goods and services, the minor sources include grants, fees, fines, returns from direct investment, rates, tributes, donations, indemnities and earnings from public enterprises. In all, taxes are the major source of revenue in any nation, whether developed or developing (Okwara & Amori, 2017). Taxes can stimulate and accelerate such growth (Azubike, 2009). To a large extent, tax could be a veritable source of revenue to the ECOWAS nations and other nations of the world to enable governments to carry out their numerous obligations. Unfortunately, most governments have not been able to exploit this opportunity to generate revenue (Okwara & Amori, 2017). It effectively organizes a nation's internal resources to promote economic growth (Okwara & Amori, 2017; Azubike, 2009).

Oil reserves in most ECOWAS countries have dropped significantly, thereby negatively affecting the economies of those countries that rely mainly on oil income. This situation is very worrisome when it is realized that oil is not a renewable product. Once it is exhausted, it cannot be replaced in any way. Indeed, the revenue situation in the region is no longer stable as the country's ability to produce and the availability of the product buyers have been on the negative side (Anaeto & Nwachukwu, 2015).

Taxation could be applied as an instrument of social change in Africa, which is currently different from the case in the region. Therefore, to promote national economic growth and development, revenue from tax, which could be improved upon, can serve as a natural and maintainable source of income for Nigeria and other countries in the ECOWAS region, hence the need for this study. The general objective of this study is to examine the effect of structural change on Tax revenue growth in the ECOWAS region for twenty-three years ranging from 2000 to 2022. The choice of this period is predicted by several structural economic changes in the economy coupled with a series of tax policy reforms. The specific objectives are to:

- i) Examine the effect of sectoral structural change in economy on tax revenue growth in ECOWAS countries;
- ii) Examine the effect of productivity in the economy on tax revenue growth in ECOWAS countries;

- iii) Examine the effect of social structural change in the economy on tax revenue growth in ECOWAS countries;
- iv) Examine the effect of institutional structural change in the economy on tax revenue growth in ECOWAS countries.

The following hypotheses states in their null forms are tested in the study:

- Ho₁ Sectorial structural change in economy has no significant effect on tax revenue growth in ECOWAS countries;
- Ho₂ Productivity in the economy has no significant effect on tax revenue growth in ECOWAS countries;
- Ho₃ Social structural change in the economy has no significant effect on tax revenue growth in ECOWAS countries and
- Ho₄ Institutional structural change in the economy has no significant effect on tax revenue growth in ECOWAS countries.

The choice of this period is predicted by several structural economic changes coupled with a series of tax policy reforms. Furthermore, this region was chosen because it has clear tax revenue structures that are quite relevant to this study. The study is structured as follows: introduction, literature review, methodology, analysis of regression results, and conclusion.

2. Literature review

Developed and developing countries worldwide have engaged in various restructuring of tax systems after realizing that tax is a more viable source of national income and a means for economic development. However, in ECOWAS nations such as Nigeria, the level of execution of the different tax reform initiatives could be faster, with a crawling tax-to-GDP ratio of 6% (Maiye & Isiadinso, 2019). Further, Maiye and Isiadinso (2019) opined that the rate of tax revenue growth determines the rate of tax revenue growth to GDP ratio. In other words, it reflects a country's economic activity level. African and European nations that have been able to carry out effective tax reforms and thus increased their tax revenue base and corresponding ratios to GDP include Rwanda and Georgia, respectively. As of 2003, Georgia faced several economic challenges, including corruption, tax evasion, fraud, and unlawful tax credits perpetrated by government and tax officials (Akinrinola & Oreoluwa, 2021).

Rwanda also embarked on improving its tax revenue system through the Rwanda Revenue Authority (RRA) in 2003. Thus, the tax-to-GDP ratio in Rwanda increased from 9.6% in 2000 to 13.4% in 2013, 17.15 in 2018, and 21.6% in 2022. This tax revenue growth was realized through the improvement of tax reforms, tax administration, new legislation, greater compliance, and the broadening of the tax base (Akinrinola & Oreoluwa, 2021).

In most ECOWAS nations, the revenue generated from taxes has yet to reach the level of revenue from the oil sector as well as other sectors despite the efforts made. Generating revenue from taxes has been a bane due to leakages, endemic corruption, wastages, the numerous unorganized informal sectors, and a lack of total commitments to target objectives. World Bank (2014) carried out a comparative analysis of revenue from tax as a percentage of GDP of most African countries, including ECOWAS countries, between 2009 and 2012, showing that Nigeria and other nations in the region have the lowest percentage of GDP. Desai, Foley and Hines (2004) highlighted that governments can use many tax instruments to finance their activities. Ogbonna and Ebimobowi (2012), in their study on the impact of tax revenue on the economic growth of Nigeria, found that tax revenue is positively and significantly related to economic growth. Furthermore, tax revenue is vital in improving government machinery in revenue generation to finance and transform the economy.

The economy of most countries in the ECOWAS region is structurally classified into four sectors, namely production, commerce, services and others. The production sector comprises agriculture, mining, manufacturing, technology, construction, and real estate. The commercial sector comprises domestic and foreign trade and discounted bills. The service sector includes communications, transport, and public utilities. The last sector comprises credit and financial institutions, government (public sector) and the private sector.

Structural change is regarded as a dramatic shift in the way an industry, country, or market operates, usually brought on by significant economic developments (Akhilesh, 2017). It is often sparked by innovation in technology, changes in available non-renewable resources, new projects, structural unemployment, changes in the political landscape, and changes in the supply and demand of resources.

Akinrinola and Oreoluwa (2021) studied the effect of the tax system on the economic development in Nigeria, using the human development index as the factor for measuring economic development while assessing the tax system by the tax to GDP ratio. The findings from the study revealed a positive relationship between the tax system and the economic development of a nation. Matundura (2021) examined Kenya's structural transformation and unemployment, using World Bank data from 2000-2020. Data was analyzed using panel VECM. The study showed that the changes in income positively impact unemployment in the long run, which indicates that sectoral income has played a fundamental role in reducing unemployment in Kenya.

Ewa, Adesola and Essien (2020) studied the impact of tax revenue on economic development in Nigeria. The study observed that tax leakages arising from tax evasion, low tax base, and avoidance have made the Nigeria case cancerous due to corruption, bad leadership, and poor governance. Liu (2020) studied China's structural changes and economic growth over 40 years of reform and opening-up. The findings revealed three concerns: first, the Chinese economy has gone through solid structural transformations which have prompted China's fast economic growth since the reform and opening-up 40 years ago; second, China's structural transformation and economic growth opened in phases with the opening-up and reform and; third, the economy of China has now a middle-to-high level of development.

Ahson, Siddiqi and Mirza (2017) empirically investigated the role of structural change in economic growth using a case of 20 selected Asian countries and data for a period spanning from 1991 to 2018. The paper showed that structural changes contribute to productivity growth and are vital growth boosters in Asia, Africa, and Latin America. Cortuk and Singh (2011) examined India's structural change and growth using 15 central Indian states over 30 years from 1983 to 2015. Findings showed that structural changes have contributed positively to growth in all the states.

Connolly and Christine (2010) examined structural change in the Australian economy using data from 50 years of time series. The findings showed that the structure of Australia's economy has shifted away from agriculture and manufacturing to services over time. The findings further showed that the mining sector has also developed in recent years, contributing to the increase of Western Australia and Queensland's resource-rich states relative to the southeastern states. Acemoglu, Johnson and Robinson (2001) studied structural change, fundamentals and growth in seven developing countries from 1990-2010. Brazil, Botswana, Ghana, India, Nigeria, Vietnam, and Zambia are the seven developing countries. Findings showed that the traditional path to fast growth of export-based industrialization played a significant role only in Vietnam.

3. Methodology

This study was conducted on thirteen countries that are members of the ECOWAS region, namely Burkina Faso, Cote d'Ivoire, Gambia, Ghana, Guinea, Guinea Bissau, and Liberia. Others are Mali, Niger, Nigeria, Sierra Leone, Senegal and Togo. These countries were selected because their data were readily available. While some countries have experienced substantial growth over the last decade, others had weak growth. The data were sourced from the Federal Inland Revenue Services (FIRS) and the Central Banks of ECOWAS countries, OECD, West African Monetary Agency (WAMA) fiscal databases, the UNCTAD *World Investments Reports* database, World Bank World Development Indicators database and the Worldwide Governance Indicators (WGI) database.

3.1 Models specification

The model specified for the relationship between structural changes in the economy and tax revenue performance is a panel regression model. The model specified is presented as follows:

$$Y_{it} = f(X_{it}, \beta) + \delta_i + \gamma_t + \epsilon_{it} \quad (3.1)$$

where:

- Y_{it} is the dependent variable that measures tax revenue and tax performance,
- X_{it} is a -vector of structural change regressors, and
- ϵ_{it} are the error terms for $i = 1, 2, \dots, M$ nations observed for the periods $t = 1, 2, \dots, T$.

The α parameter represents the overall constant in the model, while the δ_i and γ_t represent cross-section or period-specific effects (random or fixed).

The leading case comprises a linear conditional mean specification where the time-fixed effects are curbed so that we have:

$$Y_{it} = X_{it}'\beta + \delta_i + \epsilon_{it} \quad (3.2)$$

The model of tax performance specified in this study is a modification of the Sobel and Holcombe (1996) model, which was further developed by Tosun and Abizadeh (2005) on the effects of the economy's structure on tax performance. The model may be specified as:

$$PERF = f(SEC, PROD, SOC, INST) \quad (3.3)$$

where:

- PERF = performance of taxes, proxied by total tax revenue and tax to GDP ratio.
- SEC = sectoral structural change in the economy, proxied by shares of agriculture, industry and services in total output and the share of export in total foreign trade;
- PROD = productivity in the economy;
- SOC = social structural change in the economy, proxied by urban population share and secondary school enrolment;
- INST = institutional structural change, proxied by control of corruption, rule of law and government effectiveness.

The Econometric form of the model is written as:

$$PERF_{it} = \alpha_0 + \alpha_1 \Delta SEC_{it} + \alpha_2 PROD_{it} + \alpha_3 \Delta SOC_{it} + \alpha_4 INST_{it} + \alpha_5 X_{it} + \eta_i + \epsilon_{it} \quad (3.4)$$

There are two measures of tax outcomes, namely total tax revenue and tax ratio. Hence, two models are specified in this study:

$$TREV_{it} = \alpha_0 + \alpha_1 \Delta SEC_{it} + \alpha_2 PROD_{it} + \alpha_3 \Delta SOC_{it} + \alpha_4 INST_{it} + \alpha_5 X_{it} + \eta_i + \epsilon_{it} \quad (3.5)$$

Where:

TREV is total tax revenue, and all the other variables are defined as defined earlier. The a priori expectation in the model is that $\alpha_1, \alpha_2, \alpha_3, \alpha_4 > 0$. The implication of this is that each of the structural change components would positively affect tax revenues. Increases in the shares of economic sectors are expected to deliver more enormous tax revenues. However, some sectors, such as industry, are

expected to bring more revenue input than others, such as agriculture. Productivity growth is also anticipated to increase tax revenue. Furthermore, social changes, which involve more urban population as well as secondary education, are anticipated to boost the tax base, while better institutional changes are expected to improve tax revenue.

The second model comprises the estimation of the impacts of structural changes on the tax ratio:

$$(T/Y)_{it} = \alpha_0 + \alpha_1 \Delta SEC_{it} + \alpha_2 PROD_{it} + \alpha_3 \Delta SOC_{it} + \alpha_4 INST_{it} + \alpha_5 X_{it} + \eta_i + \varepsilon_{it} \quad (3.6)$$

where:

- T/Y is tax performance (measured as the tax-to-GDP ratio)
- and other variables are defined as defined earlier.

The a priori expectations are similar to those of equation (3.5). Again, OLS is unsuitable in estimating yield-biased results because the regressors are endogenously determined in the I(1) case. Pedroni (2000) highlighted that the FMOLS is estimated based on the following co-integrated system time series;

$$y_{it} = \alpha_i + x_{it}\beta + e_{it} \quad (3.7)$$

$$x_{it} = x_{it-1} + \varepsilon_{it} \quad (3.8)$$

where:

- y_{it} is the dependent variable,
- x_{it} is a vector of explanatory variables and
- e_{it} is stationary with a constant covariance matrix represented.

3.2 Measurement of variables

3.2.1 Tax revenue growth/performance: The tax revenues were measured as the total yearly tax revenues for the individual countries. Conversely, performance offers a better understanding of the impact of structural changes on taxes in any country. Therefore, tax performance is measured as a tax-to-GDP ratio. Besley and Persson (2014) established that this measure of tax performance for the economies of developing countries presents a strong representation.

3.2.2 Measures of Structural Change: The study's objectives are based on structural change in the economy.

3.2.2.1 Sectoral structural change: This change will be measured by considering the sectoral shares in output, which is the value added in the economies. These sectoral shares include a share of agriculture in output (AGSH), a share of services in output (SVSH), a share of industry in output (INSH) and a share of export in foreign trade (EXSH).

3.2.2.2 Productivity: measured as the rate of productivity in the economy (PROD). It is measured as the ratio of value-added output to the country's overall population.

3.2.2.3 Social structural change: This is measured as a share of the urban population (UBSH) and the secondary school enrolment rate.

3.2.2.4 Institutional structural change: The institutional factors were used in estimating the equation to perceive the effects of institutional quality regarding tax administration and efficiency in the tax system in ECOWAS countries. The institutional variables included are the rule of law (RL, to capture the capacity and strength of institutions), the index of corruption (COR, to capture institutional quality) as well as government effectiveness (GE, to capture the strength of government in handling policy changes). In these institutional variables, lower ratings are usually given to nations where the quality is low, with higher tendencies for political risks. Better institutions are expected to promote efficiency in the tax system, which implies a positive relationship between institutional variables and tax performance (Morrissey et al., 2014; Yogo & Ngo Njib, 2018).

3.2.3 Control variables: Given the nature of the study and the countries it involves, some control variables will certainly be included in the model to increase its robustness.

3.2.3.1 Government Size (GSZ): This is usually a measure of government capacity. It is defined as the capability to carry out suitable tasks (Antwi & Analoui, 2008). It is usually measured as the ratio of budgetary fiscal expenditure to total GDP.

3.2.3.2 External Debt Ratio (EXDBT): This is referred to as the total external debt to GDP ratio. A nation's level of external indebtedness can also affect its revenue performance. Thus, a nation may choose to reduce imports to generate the required foreign exchange to service its debt.

3.2.3.3 Population density (PDEN): Population density is expected to have a positive effect on tax revenue, considering that a high population density leads to a rise in the tax base (Teera, 2003).

3.2.3.4 Inflation Rate (CPI). Inflation is often included among the variables that affect tax performance. According to Kontopoulos and Perotti (1999), the inflation rate may have a spontaneous effect on government receipts as well as expenditures through progression in tax brackets and tax rates and through price-indexation of receipts and expenditures. On the other hand, however, governments might use inflation to erode the actual value of nominal government debt. Thus, the general effect of inflation on the budget balances of a country is not a priori clear.

3.2.3.5. Democratic Accountability: Responsible government and the tax system usually have a good relationship.

3.3 Method of analysis

The two equations are estimated in the study by using the Fully Modified Ordinary Least Squares (FMOLS) method. Pedroni (2000) opined that this method is suitable for heterogeneous data with variables that are co-integrated panels. This technique is used in addressing the problem of non-stationary regressors and the problem of simultaneity bias

4. Analysis of Regression Result

4.1 Descriptive Statistics

In the descriptive statistics, individual country cases and aggregated patterns were conducted to provide a nuanced analysis of the initial characteristics of the datasets. The annualised summary data for the tax and sectoral patterns for the individual ECOWAS economies is presented in Table 1. It is seen that the tax-to-GDP ratio is highest for Senegal at 18.03 percent and lowest for Guinea Bissau (at 6.17 percent). This shows that certain countries in the sub-region had relatively high and closely competitive ratios with those of OECD countries. In contrast, other countries had very low tax-to-GDP ratios. The rates are generally low for ECOWAS, especially when the low standard deviation values are considered. This shows that the weak tax-poor performances for each country were relatively steady throughout the study (i.e., 2000 – 2022).

Table 1. Descriptive statistics for Tax and Sectoral Shares

COUNTRY	Tax/GDP		Productivity		Agric		Ind		Serv	
	Mean	S.D	Mean	S.D	Mean	S.D	Mean	S.D	Mean	S.D
Burkina Faso	12.46	1.63	3.71	1.59	35.00	2.44	20.33	2.67	44.67	2.45
Civ	15.69	1.06	1.32	3.30	25.39	2.57	25.85	1.93	48.76	1.77
Gambia	15.71	3.45	3.88	2.92	28.01	3.12	13.00	1.49	59.00	2.35
Ghana	13.14	1.21	2.20	2.92	26.12	3.33	33.60	2.93	40.27	2.84
Guinea	13.51	2.66	-0.18	3.32	18.38	2.73	33.53	1.82	48.10	2.48
Guinea Bissau	6.17	1.28	0.35	2.44	45.24	2.93	14.40	1.36	40.36	2.44

COUNTRY	Tax/GDP		Productivity		Agric		Ind		Serv	
	Mean	S.D	Mean	S.D	Mean	S.D	Mean	S.D	Mean	S.D
Liberia	7.44	2.30	-0.35	8.46	71.31	2.54	9.73	3.05	18.97	2.51
Mali	14.51	0.95	2.34	3.66	36.01	3.15	23.69	3.15	40.29	1.05
Niger	11.94	1.94	1.50	2.91	42.85	2.81	15.81	3.69	41.34	1.97
Nigeria	9.01	1.36	3.90	7.27	24.69	4.75	22.83	3.66	52.48	4.14
Sierra Leone	8.89	0.97	3.38	9.75	53.35	4.38	10.17	4.15	36.48	3.91
Senegal	18.03	1.10	2.05	1.77	15.58	1.28	26.43	0.99	57.99	1.49
Togo	14.66	1.56	0.79	2.29	31.18	2.53	18.40	1.43	50.42	2.02

Source: Author's computation.

Indeed, four countries (Liberia, Guinea Bisau, Nigeria, and Sierra Leone) had average tax ratios of less than 10 percent. The tax effort (in terms of total tax-to-GDP ratios) does not follow any defined pattern for the ECOWAS countries. For instance, the largest economy in the sub-region – Nigeria – has a tax ratio that is as low as one of the smallest economies in the region – Sierra Leone. It is clear from Table 1 that countries without many commodity exports appear to have higher tax revenue ratios in the ECOWAS region.

For the economic structure variables, productivity growth rates are higher in Nigeria, Gambia and Burkina Faso. In contrast, the rates for Guinea and Liberia throughout the analysis are negative on average. For developing countries that need rapid structural transformation, the productivity growth rates of less than 4 percent for all the countries indicate that the ECOWAS economies are not transforming fast enough to generate effective and sustainable revenues and welfare outcomes. Only Liberia, Guinea Bisau and Niger have agriculture as the largest sector of the economies; most of the countries have the services sector as the largest in terms of output shares. Compared with the conditions in the 1970s – where agriculture contributed substantial portions to total output – it can be seen that there has been an apparent transformation in the economies of the ECOWAS countries in terms of sectoral shares in output.

Unfortunately, the transformation of sectoral share does not favor the industrial sector, which has remained low in terms of contribution to output. From Table 1, only Ghana and Guinea had over 33 percent of the contributions from the industrial sector. Note that the agricultural and services sector is mainly filled with informal activities that are difficult to tax, thereby making the tax system quite cumbersome in terms of coverage for many ECOWAS countries.

The descriptive statistics for structural transformation related to social patterns are shown for the individual countries in Table 2. In the Table, Gambia has the highest rate of urban dwellers on average, with 54.14 percent of the population living in urban centres, while Ghana has an urban rate of 49.0 percent. Only Niger (17.24 percent) and Burkina Faso (23.68 percent) have an urban rate of less than 30 percent. This generally shows that the structure of demographic concentration in most ECOWAS countries is skewed towards urban centres. Table 2 also shows that secondary school enrolment is generally low for the ECOWAS countries. Gambia, which has the highest secondary school enrolment rate among the countries, has a rate of 55.5 percent.

Table 2. Descriptive statistics for social dimensions of economic structure

COUNTRY	Urban rate		Secondary enrolment rate	
	Mean	Std. Dev.	Mean	Std. Dev.
BURKINA_FASO	23.68	3.85	19.16	7.50
CIV	48.75	3.42	41.46	2.59
Gambia	54.14	3.76	55.52	4.50
GHANA	49.00	3.22	46.76	9.15
GUINEA	33.91	1.95	31.32	8.25
GUINEA B	43.03	4.07	33.72	8.13

COUNTRY	Urban rate		Secondary enrolment rate	
	Mean	Std. Dev.	Mean	Std. Dev.
Liberia	46.95	1.69	39.42	3.47
Mali	34.06	3.69	31.65	9.20
NIGER	17.24	0.81	11.95	4.26
NIGERIA	41.29	4.14	39.31	10.90
S_L	37.62	1.36	35.28	4.99
SENĒGAL	41.79	1.07	30.66	12.44
TOGO	36.38	2.24	47.34	8.21

Source: Author's computation

In comparison, Niger (with 11.95 percent) has the lowest secondary enrolment rate among the ECOWAS countries. The rate for Niger is relatively low and shows how socially rigid the economy has been throughout the study. Each standard deviation for the countries is low and indicates that the mean values were relatively stable over the study period.

In the descriptive statistics for macroeconomic variables representing economic structure, Table 3 shows that Burkina Faso (21.4 percent) has the most significant government in the sub-region. In contrast, Guinea (8.9 percent) and Cote D'Ivoire (9.4 percent) have the smallest government. Government sizes in the ECOWAS countries are generally low, suggesting that budgets are quite small relative to the economies. The challenge with the structure of the economies is that budgets (that are quite small) tend to lead annual macroeconomic performances for each country exclusively. Thus, the economy's structure appears superficially dependent on a minimal government capacity. In a more balanced economy, private sector investment is the leading indicator of macroeconomic directions.

Trade openness is also extremely high for Liberia (154.6 percent) and Togo (97.4 percent). This shows that these countries engage mainly in transit-based foreign trade activities. This also implies that indirect taxes on external trade should be high for most of the countries. Indeed, only Burkina Faso and Guinea Bissau have trade openness ratios that are less than 50 percent, indicating that the countries of the sub-region are highly dependent on trade activities regarding economic direction. For the financial sector, the rate of financial liquidity or development (M2 to GDP ratio) is high in Gambia at 46.95 percent, but it is smallest in Sierra Leone. For most countries, liquidity is around the 0 – 30 percent mark, which suggests a low level of liquidity in the economies. This is one area where the ECOWAS countries would require extensive consideration in ensuring expansion and sustainability.

Table 3. Descriptive statistics for macroeconomic factors in economic structure

COUNTRY	GSIZE		OPEN		M2/GDP	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
BURKINA_FASO	21.49	1.50	44.92	14.02	28.01	5.53
CIV	13.35	1.06	84.41	8.32	30.08	7.16
Gambia	9.47	1.55	63.62	7.06	46.95	8.41
GHANA	13.71	3.91	87.70	15.34	21.94	13.46
GUINEA	8.91	2.11	68.69	13.35	23.37	8.41
GUINEA_B	14.33	1.74	49.41	5.27	28.87	9.66
Liberia	12.35	4.78	154.66	84.89	27.05	13.53
Mali	15.67	1.47	57.23	3.24	29.46	3.44
NIGER	14.46	1.34	53.58	10.65	20.78	12.14
NIGERIA	10.21	3.31	55.30	15.56	25.15	8.81
S_L	10.39	2.12	57.05	20.66	19.16	4.24
SENĒGAL	14.30	1.36	70.64	5.02	36.10	6.88
TOGO	11.26	2.16	97.41	11.85	37.61	10.43

Source: Author's computation

For the aggregate of the economies in ECOWAS, the summary statistics for economic structure variables are shown in Table 4, and it indicates that the average tax-to-GDP ratio was 13.72 percent for the period. As noted earlier, this ratio is relatively low for a region that requires massive expenditures on investment and other social projects in order to boost poverty reduction processes. The average direct-to-indirect tax ratio is 0.55 for the entire sub-region, or 55 percent of the taxes collected are made up of direct taxes. This suggests the overbearing capacity of direct taxation among the sub-region countries.

For the other variables, the average share of agriculture in total output for all the countries is 30.73 percent, while that of the industry is 21.75 percent and 47.52 percent for the services sector. This shows that the services sector dominates in terms of production and output in the ECOWAS sub-region. The growth rate of productivity is low for the sub-region at 1.87 percentage points over the period. Given that this value is less than the average population growth rate of 2.34 percent over the period (World Bank, 2019), the productivity growth appears to be unsustainable. The average urban rate is 39.6 percent, while the average enrolment rate is 38.85 percent, indicating relatively low educational performance over the period. Considering the Jarque-Bera coefficients in the Table, it can be seen that seven of the eleven variables are non-normally distributed. This highlights that the datasets follow a probability distribution that is largely influenced by country-specific time-varying effects. Thus, the application of the Panel Data estimation framework in the study is justified.

Table 4. Descriptive statistics for economic structure variables (aggregate)

Variable	Mean	Max.	Min.	Std. Dev.	Skewn	Kurtosis	J-B	Prob
TOTALTAX	13.72	25.70	5.92	4.17	0.39	3.11	5.46	0.01
D_I	0.55	3.84	0.19	0.46	4.58	28.09	615.84	0.00
AGRIC	30.73	71.74	8.98	13.39	0.78	3.67	25.10	0.00
INDY	21.75	38.14	0.63	7.76	0.03	2.31	4.14	0.13
SERV	47.52	70.95	17.72	10.23	-0.03	3.60	3.18	0.20
PRODTY	1.87	30.95	-32.17	4.65	-0.62	22.53	406.21	0.00
URBANRATE	39.73	65.53	16.19	11.53	-0.14	2.76	1.15	0.56
M2_GDP	33.74	95.10	2.70	18.36	1.42	5.36	118.01	0.00
OPEN	68.62	136.97	30.73	22.47	0.66	3.06	15.01	0.00
GSIZE	13.55	25.79	5.09	4.02	0.26	2.69	3.27	0.20
ENROL	38.85	89.35	6.83	18.05	0.55	3.26	11.11	0.00

Source: Author's computation

Further evaluation of the initial characterization of the datasets involves considering the direct relationships among the study's pairs of variables. Table 5 shows the correlation matrix for the variables. There is a positive correlation between the total tax to GDP ratio and all the other variables except the direct-indirect tax ratio and the share of agriculture in total output. There is an indication, therefore, that the agricultural sector tends to contribute negatively to tax revenue and performance among the ECOWAS countries. Indeed, both direct and indirect tax shares in GDP have significant negative correlation with the share of agriculture in output. This emphasizes the unlikely position of agricultural production in terms of ensuring optimum tax performance for the ECOWAS economies. Interestingly, indirect tax ratios have significant positive correlation with direct tax shares. In contrast, the ratios are negatively correlated with productivity growth among the countries, highlighting the role of a structural transformation strategy that ensures improvement in productivity in expanding the direct tax base.

Table 5. Correlation matrix

	Total tax	Dir_tax	Indir_tax	d_i	Agric	Indy	Serv	Prody	Urbanr	M2/GDP	Open	Gsize
Dir_tax	0.34 0.00											
Indir_tax	0.52 0.00	0.65 00.0										
d_i	-0.11 0.12	0.14 0.04	-0.49 0.00									
Agric	-0.67 0.00	-0.28 0.00	-0.22 0.00	-0.14 0.04								
Indy	0.28 0.00	0.37 0.00	0.16 0.02	0.16 0.02	-0.65 0.00							
Serv	0.67 0.00	0.09 0.21	0.17 0.02	0.06 0.36	-0.82 0.00	0.09 0.19						
Prody	0.13 0.06	0.17 0.02	-0.09 0.20	0.44 0.00	-0.50 0.00	0.19 0.01	0.52 0.00					
Urbanr	0.38 0.00	0.42 0.00	0.21 0.00	0.14 0.05	-0.37 0.00	0.06 0.38	0.44 0.00	0.47 0.00				
M2/GDP	0.66 0.00	0.32 0.00	0.33 0.00	0.01 0.87	-0.45 0.00	-0.07 0.29	0.65 0.00	0.29 0.00	0.64 0.00			
Open	0.34 0.00	0.41 0.00	0.22 0.00	0.03 0.63	-0.14 0.05	0.12 0.08	0.09 0.21	-0.02 0.73	0.48 0.00	0.44 0.00		
Gsize	0.22 0.00	0.06 0.40	0.30 0.00	-0.24 0.00	-0.01 0.91	0.01 0.85	0.00 0.99	-0.18 0.01	-0.15 0.03	0.28 0.00	0.02 0.80	
Enrol	0.50 0.00	0.40 0.00	0.18 0.01	0.19 0.01	-0.41 0.00	-0.01 0.94	0.53 0.00	0.36 0.00	0.87 0.00	0.78 0.00	0.53 0.00	-0.04 0.55

Source: Author's computation

The very high negative correlation between agricultural share and those of industry and services shows that, essentially, the share of agriculture in total output has been on the decline over the years among ECOWAS countries. Government size is negatively correlated with tax structure, suggesting that the less the government participates in the economy, the more the share of indirect taxes in total tax revenues. Government size is also negatively correlated with productivity growth and the rate of urban population. This underscores the fact that a public sector-centred production system does not often guarantee effective expansion in productivity among the workforce.

4.2 Tests of panel and time series properties of data

4.2.1 Cross-section dependence test

The cross-section dependence tests are carried out prior to testing for the primary time series characteristics of the datasets. These tests enable the essential characteristics of the pertinent variables to be separated out while accounting for the problem of cross-section dependence in the data. The sample countries are expected to respond to general structural dynamics with essentially linear variability since they share similar revenue characteristics, namely a heavy reliance on commodity exportation. Certain degrees of interdependencies could result from this, and the datasets could experience spatial autoregressive processes. The issue of dependence across countries is investigated by implementing the most commonly used test for cross-section dependency (Pesaran, 2001). Given that the number of cross-sectional units in this study is less than the time period ($n = 13$ and $T = 22$), the standard Breusch and Pagan LM test for cross-equation correlation is not appropriate for testing cross-sectional dependence in a panel data model (Baltagi et al., 2012). We adopt the cross-sectional dependence (CD) test developed by Pesaran (2001), which uses a pair-wise average of a sample correlation to test the existence of cross-sectional dependence. The CD test is useful for a high number of cross-sectional units (n) observed during T time periods, in contrast to the conventional Breusch-Pagan (1980) LM test. Results of the Pesaran cross-section dependence test are shown in Table 6.

Table 6. Cross-section dependence test results

Variables series tested	Pesaran CD	P-value	Abs corr
	<i>Tax rate Equations</i>		
<i>Sectoral Shares</i>	0.635	0.516	0.144
<i>Productivity growth</i>	1.123	0.239	0.195
<i>Social indicators</i>	-0.692	0.488	0.170
<i>Macroeconomic factors</i>	1.330	0.103	0.291

Source: Author's computations

According to the outcome, all of the equations using the tax-to-GDP ratio have CD coefficients that fail the significance tests at the 5 percent level in the Pesaran CD test. This demonstrates that there is no cross-sectional dependence in the estimates for these equations. The absence of cross-sectional dependency suggests that heteroskedastic impacts do not exist in the derived equations.

4.2.2 Unit root test

Panel unit root tests must be performed to ensure the study's data are stationary since they display common (homogenous) and country-specific (individual heterogeneity) characteristics. Testing for unit roots reduces the likelihood of "spurious" inferences and conclusions drawn from the estimations. The test for unit roots entails considering the stationarity status of each of the variables in the study. In this study, the tests developed by Levin, Lin and Chu (LLC), as well as the Im, Pesaran

and Shin (IPS, 2003) and the Augmented Dickey-Fuller tests, are all employed for testing unit roots. The test results are presented in Table 7.

Table 7. Panel Data Unit Root tests results *in levels

Variable	Homogenous Unit Root Process		Heterogeneous Unit Root Process				Remarks
	Intercept and Trend						
	LLC		IPS		ADF-Fisher		
	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)	
TAXRATIO	-1.04	-8.57*	-3.68	-7.13*	21.8232	106.41*	I[1]
AGRIC	-1.46	-11.17*	-1.23	-8.67*	40.84	125.20*	I[1]
INDUSTRY	-0.89	-1.08*	-1.08	-7.75*	24.94	114.77*	I[1]
SERV	-1.16	-6.63*	-1.40	-7.96*	-1.40	117.15*	I[1]
PRODTY	0.12	-5.21*	3.32	-4.86*	22.88	76.11*	I[1]
M2/GDP	-1.28	-8.91*	0.89	-8.91*	20.14	109.5*	I[1]
OPEN	-2.20	-5.04*	-1.38	-5.04*	41.02	78.03*	I[1]
GSIZE	-1.38	-10.11*	-0.74	-7.52*	40.17	110.86*	I[1]
URBANR	2.23	29.39*	4.30	2.22*	29.3970	2.22*	I[1]
ENROL	-1.32	-2.39*	0.20	-2.65*	38.3	49.69*	I[1]
DEBTR	-1.07	-2.16*	1.09	-2.75*	17.44	50.32*	I[1]
CPI	-1.78	-2.02*	2.18	-5.58*	11.42	85.84*	I[1]
GDPG	-0.56	60.69*	1.32	-3.55*	27.56	60.69*	I[1]
PDEN	1.69	-11.64*	1.21	-11.64*	49.55	167.12*	I[1]
CORRUPT	-1.38	-3.01*	-1.47	-4.42*	34.31	56.1*	I[1]
DEMACCT	-3.06	-6.23*	-2.44	-5.37*	44.35	76.94*	I[1]
GOVT STAB	-0.30	-4.90*	-1.02	-4.62*	27.67	68.98*	I[1]
LAW ORDER	-1.32	-7.06*	-0.29	-3.96*	19.05	47.70*	I[1]
CRITERIA	-1.19	-7.28*	1.66	-8.09*	32.60	119.6*	I[1]

Note: * indicate significant at 5 % level; IPS = Im, Pesaran & Shin; LLC = Levin, Lin & Chu

Source: Author's computation

It is evident from the unit root results in Table 7 that, at the 5 percent level, none of the test coefficients for the variables in levels are significant. Given that the crucial test values exceed the test statistic, this suggests that every variable in the levels is non-stationary. When the test statistics are differenced, each of the data series has significant coefficients (at the 5 percent level). This demonstrates that following the initial difference, all of the variables become stationary. Since the variables are difference-stationary, the panel unit root test reveals that each variable is integrated of order one (i.e., I [1]).

4.2.3 Cointegration tests

The unit root results clearly show that all variables have equal stationarity, with each being I[1]. Nonetheless, it is possible to determine the long-term circumstances of the variable interactions, which will provide a more solid foundation for a dynamic relationship between the variables. The results of the Pedroni and Kao panel cointegration tests and the corresponding variance ratios and rho statistics (non-parametric tests) are displayed in Table 8 for both the panel and group assumptions. Based on the categories of structural change variables, several combinations of the variables are tested for cointegration with the dependent variable. For the panel and group assumptions in both Tables, the IPS and Augmented Dickey-Fuller test statistics have significant coefficients at the five percent level. Both the ADF-t and non-parametric-t statistics thus show substantial evidence of panel cointegration. Another residual-based (Kao) Panel Cointegration Test is included to supplement these findings.

Table 8. Panel cointegration test result for Tax Ratio

Equation with Sectoral Shares	Panel Statistics	Group Statistics	Kao (ADF)
Variance ratio	-3.01	--	
Rho	-0.424	2.203	-2.102
IPS	-5.275	-3.426	
ADF	-1.205	-0.822	
Equation with Macroeconomic Var.	Panel Statistics	Group Statistics	Kao (ADF)
Variance ratio	-1.221	--	
Rho	0.571	2.355	-2.090
IPS	-6.269	-4.407	
ADF	-4.011	-1.747	
Equation with social var.	Panel Statistics	Group Statistics	Kao (ADF)
Variance ratio	-1.612	--	
Rho	-1.099	1.169	3.072
IPS	-5.332	-4.358	
ADF	-3.957	-3.242	

Note: **, * indicates the rejection of the null hypothesis of no cointegration at the 0.01 and 0.05 level of significance, respectively

Source: Author's computations

4.3 Empirical results on the panel analysis

The goal of the regression analysis based on the Panel data framework is to determine the effects of the various channels of structural changes on either overall tax performance or tax structure among ECOWAS economies. We conduct our econometric analysis to test for the particular roles of three categories of structural changes (sectoral shares in output – three variables; social dimensions of structural changes – two variables; and macroeconomic dimensions of structural change – three variables) within the panel data analysis framework.

4.3.1 Econometric results

The results for the estimates of the effects of the structural factors on tax-to-GDP ratios or tax performances of the ECOWAS countries are presented and analyzed in this section. Table 9 shows the effects of the sectoral shares on tax performance. The results are estimated in recursive forms, where the effects of each sectoral share variable are estimated (along with other control variables) in sequential form. In the second and third columns, the effects of the share of agriculture on total GDP value added are demonstrated. The goodness of fit statistics is quite impressive (as are the cases for the other estimates), considering that a panel of countries was used for the analysis. The adjusted R-squared value shows that over 64 percent of the systematic variations in tax to GDP ratio were captured by the model. In comparison, the F-statistic is highly significant at the 1 percent level, suggesting a very strong relationship between the explanatory variables combined and the dependent variable.

From the result, the coefficient of the share of agriculture in output passes the significance test at the 1 percent level, though the coefficient is negative. This result suggests two outcomes: First, the agricultural sector has contributed negatively to tax performance in the ECOWAS sub-region. Secondly (and more importantly), the result shows that expansion of the agricultural sector tends to lead to lower and lower yields in tax revenues in the country. Thus, any structural change that leads to increases in the share of agriculture in total value added will only lead to declining streams of revenue

in the tax system. Apparently, the agricultural sector, as is currently for the sub-region, does not have enough capacity to form a strong base for realizing tax revenues in the economies. Thus, the pattern of structural changes in the sub-region where the share of agriculture is on the decline in most countries provides a rather encouraging pattern for the tax systems of the ECOWAS countries.

Table 9. Changes in Sectoral Shares and Tax Performance

Variable	Coefficient	t-Stat	Coefficient	t-Stat	Coefficient	t-Stat
C	2.556	5.995	-0.740	-2.003	-1.657	-3.837
AGRIC	-0.482	-10.99	---	---	---	---
IND	---	---	0.261	6.852	---	---
SERV	---	---	---	---	0.496	5.551
CORRUPT	-0.085	-2.823	-0.038	-1.114	0.009	0.261
DEMACCT	0.000	-0.030	-0.015	-0.955	-0.001	-0.031
GOVT_STAB	0.020	1.794	0.037	2.925	0.036	2.758
LAW_ORDER	0.181	7.935	0.206	7.845	0.145	5.049
CRITERIA	0.040	4.569	0.051	5.189	0.046	4.389
LDEBRATIO	0.134	6.359	0.102	4.268	0.106	4.268
LCPI	0.008	0.152	0.101	1.732	0.132	2.215
GDPG	0.003	0.960	0.004	1.182	0.004	1.155
LPDEN	0.076	3.388	0.131	5.280	0.060	2.029
Adjusted R-squared	0.642		0.527		0.491	
F-statistic	15.86				12.04	
Prob(F-statistic)	0.000				0	

Source: Author's computation

The result in Table 9 also shows that the output shares of both industry and service sectors have significant positive impacts on tax performance for the ECOWAS countries. Thus, structural changes that lead to higher shares of industry and services tend to ensure higher tax regimes for the sub-region. A one percent rise in industry share leads to a 0.26 percent increase in tax to GDP ratio, while the one percent rise in services sector share in output leads to a 0.49 percent rise in tax to GDP ratio for the sub-region. The pattern of modernization in the industry and services sector makes tax collection easier through well-defined tax bases and ease of administrative composition in the sectors. Thus, structural change tends to favor the tax system when change boosts industry and services production within the economies.

Regarding the other variables in the model, the coefficients of law and order and the proportion of convergence criteria met are the most significant institutional quality factors ubiquitous in each of the estimates. This shows that the maintenance of the rule of law in a country has significant positive impacts on tax performance since abiding by the rule of law will ensure equity and justice in tax administration. For the other institutional variables, control of corruption was only significant in the equation with agricultural shares, while democratic accountability had different coefficients under the equations with agricultural shares and with services shares.

Table 10 presents the result of the effect of productivity changes (a critical component of structural transformation) on tax-to-GDP ratios. As a result, the coefficient of productivity growth is significant at the 1 percent level and is positive. This shows that productivity growth has a significant positive impact on tax performance among ECOWAS countries. A one percent rise in productivity growth leads to an increase in tax to GDP ratio by 0.113 percentage points. This outcome demonstrates the critical role of productivity growth as an essential tool for promoting structural changes and also ensuring adequate tax yields even when the tax base does not appear to be changing.

Table 10. Productivity changes and Tax Performance

Variable	Coefficient	t-Statistic	Prob.
Constant	-1.212***	-2.804	0.006
LPRODTY	0.113***	3.914	0.000
CORRUPT	0.003	0.096	0.924
DEMACCT	-0.019	-1.118	0.265
GOVT_STAB	0.035**	2.561	0.011
LAW_ORDER	0.191***	6.767	0.000
CRITERIA	0.054***	5.097	0.000
LDEBTRATIO	0.107***	4.120	0.000
LCPI	0.170***	2.783	0.006
GDPG	0.004	1.031	0.304
LPDEN	0.132***	4.892	0.000
Adjusted R-squared	0.451		
F-stat	7.796 (0.000)		

Source: Author's computation

Table 11 also presents the result for the effect of structural changes that relate to social indicators on tax performance for the ECOWAS countries. The goodness of fit for the results is also relatively impressive (note that R-squared values are often lower when panel data is used for estimation – Gujarati [2014]). The F-statistics are also all significant at the 1 percent level, indicating a significant relationship between tax performance and all the independent variables combined in both equations. In terms of the individual effects of the variables, the coefficients of both the rate of urban centers and school enrolment fail the significance tests at the 5 percent level. This shows that, on a general level, changes in social conditions do not actually lead to changes in tax revenues for the ECOWAS countries. This outcome is, however, interesting since earlier results appear to show that movement into a modern economic system tends to spur more tax capacities and administrative efficiency, thereby leading to larger revenues.

Table 11. Changes in Social Indicators and Tax Performance

Variable	Coefficient	t-Statistic	Coefficient	t-Statistic
Constant	-0.502	-1.101	-0.646	-1.505
LURBANR	-0.015	-0.199		
ENROL			0.050	0.883
CORRUPT	0.032	0.823	0.026	0.717
DEMACCT	-0.029	-1.656	-0.026	-1.433
GOVT_STAB	0.039	2.655	0.034	2.260
LAW_ORDER	0.194	6.579	0.190	6.368
CRITERIA	0.060	5.321	0.064	5.537
LDEBTRATIO	0.087	3.278	0.086	3.236
LCPI	0.199	3.109	0.187	2.905
GDPG	0.004	1.188	0.004	1.169
LPDEN	0.143	5.137	0.149	5.268
Adjusted R-squared	0.405		0.407	
F-statistic	6.628		6.685	
Prob(F-statistic)	0.000		0.000	

Source: Author's computations

In particular, we should expect that a more educated population that lives in cities should be more aware of tax obligations and also more accessible in terms of tax collection. This concern is clarified when a non-linear estimate for social indicators is presented. For the control variables, the coefficients of government stability, law and order, and the number of criteria met are all significant

and positive. Also, the coefficients of debt ratio, price levels, and population density are significant and positive in each of the cases. This result shows that when social factors are taken into consideration, the traditional determinants of tax performance become more pronounced.

Table 12 reports the impact of other macroeconomic variables that highlight structural changes in tax performance. As a result, only the coefficient of the money supply to GDP ratio (financial liquidity) is significant at the 5 percent level. The coefficients of trade openness and government size both fail the significance test. However, the coefficient of financial liquidity is negative, showing that the transformation of the financial system into a deeper and more formal system will lead to a drop in the tax-to-GDP ratio. This outcome may be due to the nature of the financial system, where a more robust financial market (or financial development) does not always translate to higher income per capita or larger production systems.

Table 12. Changes in Macroeconomic Factors and Tax Performance

Variable	1		2		3	
	Coeff	t-Stat	Coeff.	t-Stat	Coeff.	t-Stat
Constant	-0.514	3.029	-0.696	-1.610	-0.558	-1.223
M2/GDP	-0.087	2.237	---	---	---	---
OPEN	---	---	0.067	1.173	---	---
GSIZE	---	---	---	---	0.006	0.093
CORRUPT	0.042	1.330	0.026	0.713	0.029	0.795
DEMACCT	-0.031	2.054	-0.027	-1.572	-0.029	-1.653
GOVT_STAB	0.037	2.104	0.032	2.115	0.039	2.579
LAW_ORDER	0.208	6.042	0.199	6.735	0.194	6.605
CRITERIA	0.066	5.831	0.060	5.553	0.060	5.356
LDEBTRATIO	0.095	2.704	0.080	2.932	0.087	3.242
LCPI	0.223	2.473	0.185	2.890	0.198	3.115
GDPG	0.004	1.046	0.004	1.162	0.004	1.162
LPDEN	0.151	5.353	0.146	5.250	0.144	5.182
Adjusted R-squared	0.414		0.409		0.405	
F-stat	6.849		6.731		6.626	

Source: Author's computations

The results suggest that structural changes that shift production (and consumption) to the foreign sector do not lead to a significant change in tax revenues (though there are signs of positive changes) over time. Similarly, a structural change that encourages a stronger or weaker government presence has no significant impact on tax performance among the ECOWAS countries. For the other control variables in the model, only the coefficients of control of corruption, democratic accountability and growth in real GDP failed the significance tests at the 5 percent level.

5. Discussion of findings

The outcomes of the aforementioned empirical assessments have broad implications and can be applied to numerous policy paths. The results reveal the patterns and dimensions of output shares among ECOWAS countries exert strong effects on tax performance for the economies. The analysis showed that agricultural sector output shares had a mostly negative impact on tax performance for the countries. The negative coefficient of the agricultural sector shares demonstrates the fact that the sector can be regarded as the shadow sector where tax evasion is rampant. Another way to view this relationship is that raising taxes in the agricultural sector leads to an increasing reduction in the tax base. The reason for this is the case in which agents in the sector can go underground and evade tax easily. As the tax rate rises, the incentive to evade tax also rises. The analysis showed that agricultural sectors constituted the shadow sectors where tax collection and remittances are difficult to pursue.

There are other implications for this result in an essential manner. The result demonstrates that when the agricultural sector is dominant (perhaps at the more traditional levels of the economies), control of corruption may not actually be too necessary as an institutional tool; rather, it is the rule of law that matters more for an efficient tax system. Moreover, government stability only failed the significance test at the 5 percent level for the model with agricultural output. This shows that the stability of government and public institutions becomes more essential for well-transformed economies – where industries and services activities dominate. The debt ratio and population density coefficients passed the significance test at the 5 percent levels for each set of estimates (with positive coefficients). This shows that governments with less leverage for spending activities tend to enlarge their tax activities. Also, tax increases with population expansion among the countries in ECOWAS.

The results of the study also demonstrate the critical role of productivity growth as an essential tool for promoting structural changes and ensuring adequate tax yields even when the tax base does not appear to be changing. Thus, any transformation of the economic structure that involves structural change will guarantee tax yields also, no matter what direction of sectoral gains are occurring. There may even be more tax gains when the productivity growth is occurring in the sectors where output growth is more pronounced since such sectoral shifts in productivity tend to provide additional speed to both transformation and per capita yields from output (Matundura, 2021; Akinrinola & Oreoluwa, 2021; Gacanja, 2012; Osei et al., 2020; Cortuk & Singh, 2011). All the control variables (except for control of corruption, democratic accountability, and GDP growth) have significant positive impacts on tax performance when productivity growth is taken into account.

6. Conclusion

Getting tax money flowing is a key policy goal for every economy or government. Governments have some control over other factors that affect tax income, such as economic policies, the degree of corruption, and the caliber of tax administration, even though they are limited in their ability to modify structural drivers of tax revenue (such as the composition of value added). The effective and statutory tax rates differ significantly in many ECOWAS nations, indicating significant fundamental discrepancies in the tax systems that need significant structural adjustments.

Furthermore, the structural gaps suggest that it may be possible to increase tax revenue without raising tax rates by strengthening tax and customs administrations, lowering tax exemptions (particularly in the manufacturing sector), and combating fraud and corruption. Nonetheless, considering the low degree of development and the largely agrarian and informal nature of the economies, one must be realistic about the improvement in revenue ratios that can be realistically expected to be achieved among ECOWAS members. The best way to maximize tax mobilization and tax system reforms is to consider the fundamental dynamics of the economies and use solid political will and leadership to enact the necessary steps.

Authors' contribution

Introduction: Osahanuwa Eugene IYEN

Literature Review: Florence Chinwe ONWUZURUIKE

Methodology: Florence Chinwe ONWUZURUIKE

Data Analysis, Research Results and Discussion: Dr. Osazee Godwin OMOROKUNWA

Conclusion: Dr. Osazee Godwin OMOROKUNWA

References

- Acemoglu, D., Johnson, S., Robinson, J. (2001). The colonial origins of comparative development: An empirical investigation *American Economic Review* 91 (5): 1369–1401
- Ahson, U., Siddiqi, M. W., & Mirza, F. (2017). Structural change and economic progress: Empirical evidence from selected Asian countries *Pakistan Journal of Social Sciences*, 37(2), 549-565 <http://pjss.bzu.edu.pk/website/journal/article/5ec615142b5c1/page>
- Akhilesh, G. (2017). Structural Change: Definition, causes and examples. Retrieved from https://www.investopedia.com/terms/s/structural_change.asp
- Akinrinola, O.O., Oreoluwa, B. (2021). Effect of tax system on the economic development of a nation: Nigeria. *Journal of Advance Research in Business Management and Accounting* 7(11) 24-34
- Anaeto, E., Nwachukwu, C. (2015). Economy in trouble as oil price crashes. *Vanguard*, August 24, 25(62477), 1 and 5.
- Antwi, K.B., Analoui, F. (2008). Reforming public sector: Facing the challenges of effective human resource development policy in Ghana, *Journal of Management Development*, 27(6), 600-612. <https://doi.org/10.1108/02621710810877848>
- Azubike, J.U.B. (2009). Challenges of tax authorities, tax payers in the management of reform processes. *Nigeria account*, 43, 36-42
- Baltagi, B. H., Feng, Q., Kao, C. (2012). A Lagrange multiplier test for cross-sectional dependence in a fixed effects panel data model. *Journal of econometrics*, 170 (1), 164-177.
- Bernardo, C. (2022). Structural change(s) in Ghana: A comparison between the trade, formal and informal sectors Laboratory of Economics & Management, Institute of Economics, Piazza Martiri Libertà, 33-56127 Pisa, Italy.
- Besley, T, Persson, T. (2014). Why do developing countries tax so little? *Journal of Economic Perspectives*, 28 (4). pp. 99-120. ISSN 0895-3309.
- Breusch T.S., Pagan A. (1980). Applications to Model Specification in Econometrics. *The Review of Economic Studies*, 47(1) 239-253.
- Chibueze, J. (2023). Reversing World Bank's predictions as development outlook deteriorates. *The Guardian*, January 15, 39(16089) 4
- Connolly, E. Lewis, C. (2010). Structural change in the Australian economy. *Reserve Bank of Australia Bulletin*. <https://www.rba.gov.au/publications/bulletin/2010/sep/1.html> - fn0.
- Cortuk O., Singh, N. (2011). Structural change and growth in India *Economics Letters*, 110(3), 178–181
- Dessai, M. A., Foley, C. F., Hines, J. R. (2004). Foreign direct investment in a world of multiple taxes. *Journal of Public Economics*, 88 (12), 2727-2744
- Ewa U., Adesola W, Essien, E. (2020). Impact of tax revenue on economic development in Nigeria *International Business Research*; 13 (6), 1913-9012
- Gacanja, E. W. (2012). Tax revenue and economic growth: An empirical case study of Kenya, Unpublished MBA Project, University of Nairobi
- International Fund for Agricultural Development (2019). *Creating Opportunities for Rural Youth* (Rural Development Report 2019). Rome: Author. Retrieved from <https://www.ifad.org/ruraldevelopmentreport>.
- Kontopoulos, Y., Perotti, R. (1999). Government Fragmentation and Fiscal Policy Outcomes: Evidence from the OECD Countries. In J. Poterba, & J. von Hagen (Eds.), *Fiscal Institutions and Fiscal Preferences* (pp. 81-102). University of Chicago Press.
- Liu, X. (2020). Structural changes and economic growth in China over the past 40 years of reform and opening-up *China Political Economy*, 3(1), 19-38. <https://doi.org/10.1108/CPE-05-2020-0010>
- Maiye, O., Isiadins, O. (2019). Nigeria's unchanging tax to GDP ratio. Retrieved from: <https://www.mondaq.com/nigeria/tax-authorities/760270/nigeria39s-unchanging-tax-to-gdp-ratio>

-
- Matundura, E. (2021). Structural transformation and unemployment in Kenya: *International Journal of Scientific and Research Publications*, 11(1). <http://dx.doi.org/10.29322/IJSRP.11.01.2021.p10937>
- Morrissey, O., Prichard, W., Torrance, S. (2014). *Aid and Taxation: Exploring the Relationship Using New Data*. ICTD Working Paper 21. Brighton: IDS
- Ogbonna, G. N., Ebimobowei, A. (2012). Impact of tax reforms and economic growth of Nigeria: A Time Series Analysis *Current Research Journal of Social Sciences*, 4(1), 62-68.
- Okwara, C.C., Amori, O.M. (2017). Impact of tax revenue on economic growth in Nigeria *International Journal of Business and Management Invention*, 6(11) 93-99
- Osei, R.D., Atta-Ankomah, R., Lambon-Quayefio, M. (2020). Structural transformation and inclusive growth in Ghana University of Ghana, *The United Nations University World Institute for Development Economics Research WIDER Development Conference*.
- Pedroni, P. (2000). Fully modified OLS for heterogeneous cointegrated panels, No. 2000-03, Department of Economics Working Papers, Department of Economics, Williams College.
- Pesaran, M.H (2021). General diagnostic tests for cross-sectional dependence in panels. *Empirical economics* 60 (1), 13-50.
- Teera, J. (2003). *An Appraisal of Uganda's Tax Performance*. Working Paper, University of Bath, Bath
- Todaro, M.P., Smith, S.C. (2015). *Economic Development* Pearson Education Limited, United Kingdom 9-126, 805-810.
- Tosun, M.S., Abizadeh, S. (2005). Economic Growth and Tax Components: An Analysis of Tax Change in OECD. *Applied Economics* 37, (19) 2251-2263
- World Bank Group (2014). *Tax revenue (% of GDP)*, data worldbank.org
- World Bank (2019). *Report on Nigeria*. Retrieved from: <https://www.Worldbank.Org/En/Country/Nigeria/Overview>
- Yogo, U.T, Ngo Njib, M.M. (2018). Political competition and tax revenues in developing countries. *Journal of International Development*, 30 (2), 302-322