The Effect of Tax Revenue on Unemployment and Income in Developing Countries

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ABSTRACTS

The need for developing countries to create the enabling environment for rapid economic development put them in situation where they have to ensure that more households and firms are inclusive in their tax net. There have been a growing debate among researchers on the effect of tax on unemployment and income in the emerging and developed economies. While the findings from such studies showed positive, inverse relationships or their mix among these variables in the developed economies, the experience of developing countries with regard to tax revenue, unemployment and income is yet to be examined. This study aims to fill this vacuum in the literature. The study made use of the fully modified ordinary least squares technique to evaluate this relationship. The findings indicated that there was decreasing relationships between tax revenue and unemployment while, in the case of income, this was indeterminable, given its insignificantly positive estimate in developing countries.

Keywords: Tax Revenue, Unemployment, Income, Developing Countries, Fully Modified Ordinary Least Squares.

INTRODUCTION

Unemployment and low gross domestic product (GDP) per capita are some of the basic problems of developing countries and the quest to escape from these challenges have been a daunting task to policy makers in these economies. Compared to the developed economies, most developing countries are confronted with the shortage of skilled labor and advanced technology which are essential for development in modern industrial processes. The relative scarcity of these factors engenders low level of per capita income in developing countries and hinders them from reaching their full potentials in terms of industrial development. This problem is orchestrated by misguided economic policies, insecure property rights and political instability. The debates on the solutions to overcome unemployment and low income in developing countries have been fierce among economists. Among the arrays of economic policies prescribed by this group of social scientists is an effective and efficient tax revenue drive. What are the probable effects of tax revenue on unemployment and income in developing countries? A large number of empirical studies have shed light on this concern. Most of the evidence on the impact of tax revenue on labour market have focused on understanding the increasing wage gap between skilled and unskilled workers in the North (Freeman and Katz, 1991; Gaston and Trefler, 1997; Goldberg and Pavcnick, 2007). Infact, there were only few studies that focused on tax revenue and unemployment in developing countries (Epifani, 2003; Hoekman and Winters, 2005; Saba Arbache, 2001). Given the diversified revenue base in developing countries, a study of this nature that examines the influence of tax revenue on unemployment and income in these countries is of great importance because of its potentially much larger impacts.

The need to expand social and economic infrastructures is a desideratum for developing countries to be on the path of rapid economic development. However, the trend in most developing countries is worrisome as they are unable to raise the targeted revenues from taxation to uplift their dilapidated state of infrastructures. It has been observed that a large percentage of residents and firms in such economies evade paying the necessary taxes and even those that do, underpay the required amounts to the government (Aizenman, J. and Jinjarak, Y., 2009). Besides, given the statistics that, in developing countries, over 70% of the labour force work in the agricultural sector and that they operate mostly on subsistence basis, the collection of direct taxes on their incomes is difficult

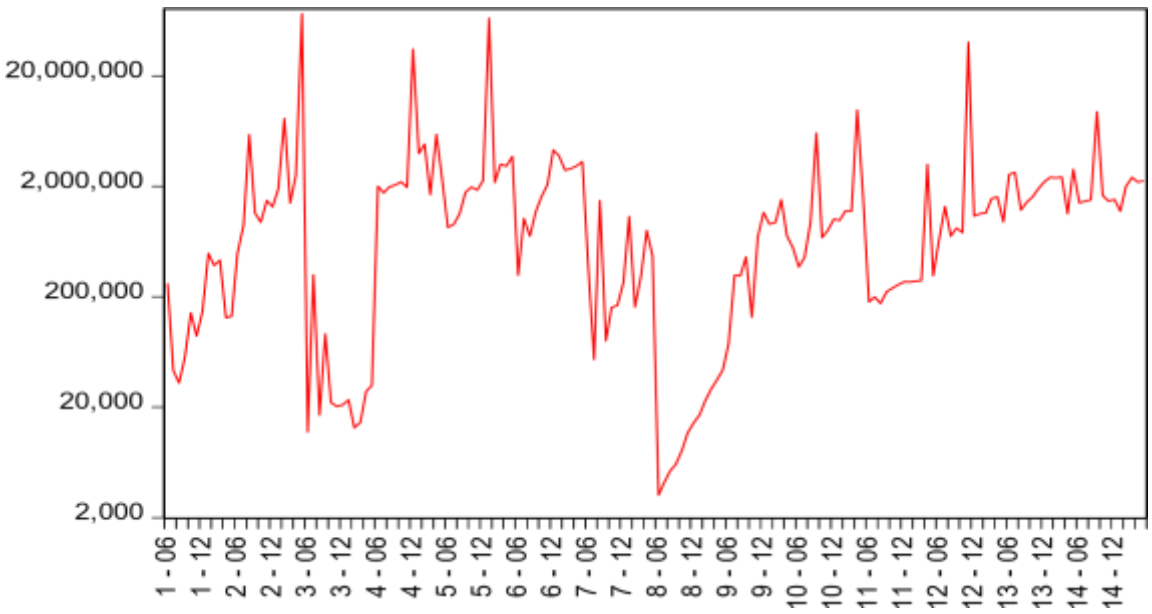
because of the herculean task of engaging each of these subsistence farmers. According to Aizenman and Jinjarak (2009), trade taxes are easier to collect and account for a major share of tax revenue in developing countries.

Tax is a compulsory levy imposed by the government on income, consumption, profits, capital gains and transfers of citizens and firms that thrive in such a country. This can come in the form of direct and indirect taxes. The former (direct tax) is a levy on the incomes of individuals and profits of firms. In the case of indirect taxation, the imposition is done on goods and services. Examples of this are excise duties and the value added tax on consumption items. These taxes are expected to generate income for the provision of economic and social infrastructures which will create the enabling environment for the prevalence and growth of economic activities.

Most of the countries in Sub Saharan Africa (SSA) are considered to be underdeveloped. Some countries in Asia and Latin America fall under this group. Developing countries differ widely among themselves and no single list of features unilaterally describes them. In the 1960s, these countries were much more similar to one another in their approaches to macroeconomic interventions. Soon, things began to change. East Asian countries embraced export-oriented development strategy, abandoning import-substitution as a panacea to industrial development. This strategy recorded greater successes. Also, some countries in Latin America adopted reduction in trade barriers like tariffs and canvassed for more government roles in economic processes. The outcome of this approach was mixed. Some developing countries like those of Sub Saharan Africa reformed their economic policies in similar fashion with those of the successful industrial economies. While few of these economies (of developing countries) were successful in such attempt, the overall assessment of most of their performances was awful as their economies were still characterized by low gross domestic product per capita, high unemployment rate and under-employment, dominance of agricultural produce in their exports, low production of industrial output and high inflation rate.

The Background of the Study

Figure 1 depicts the aggregate revenue generated from taxation in some Sub-Saharan-African countries. The taxes are represented in the vertical axis while the identifications of the samples and the series are shown on the horizontal axis.

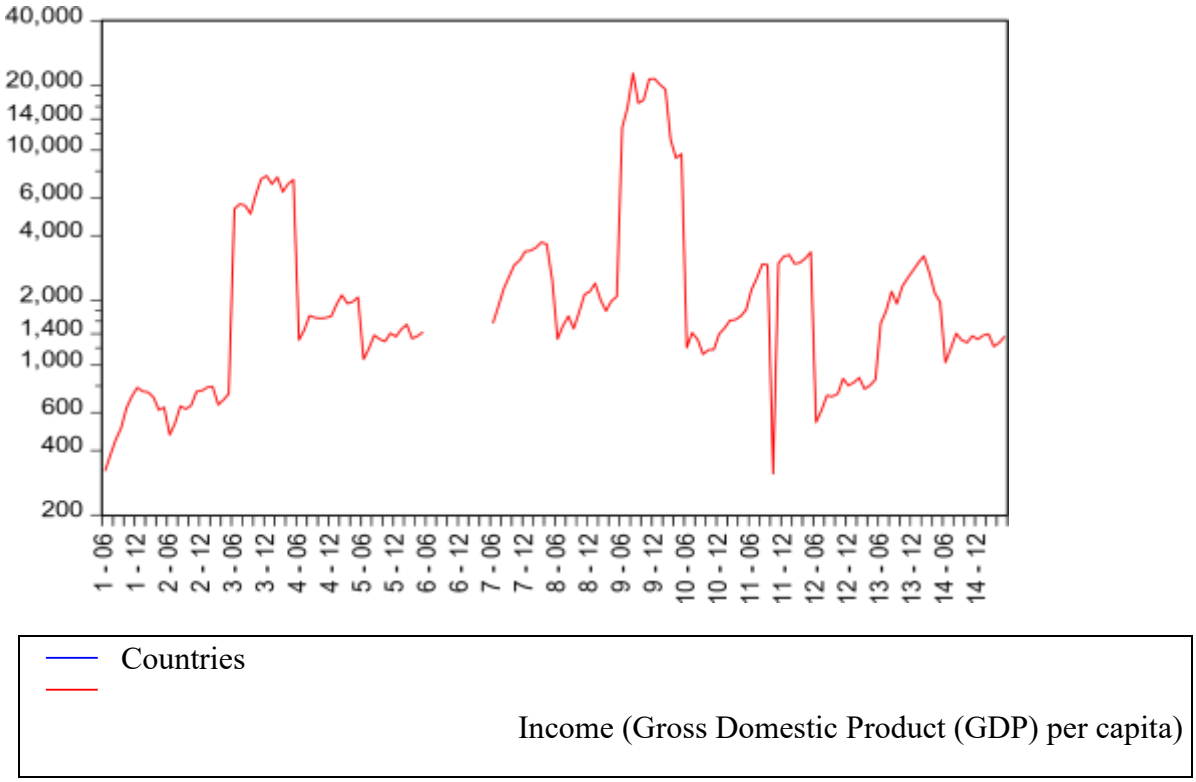


Countries	Total Taxes

Source: United Nations Government Revenue Dataset, 2021.

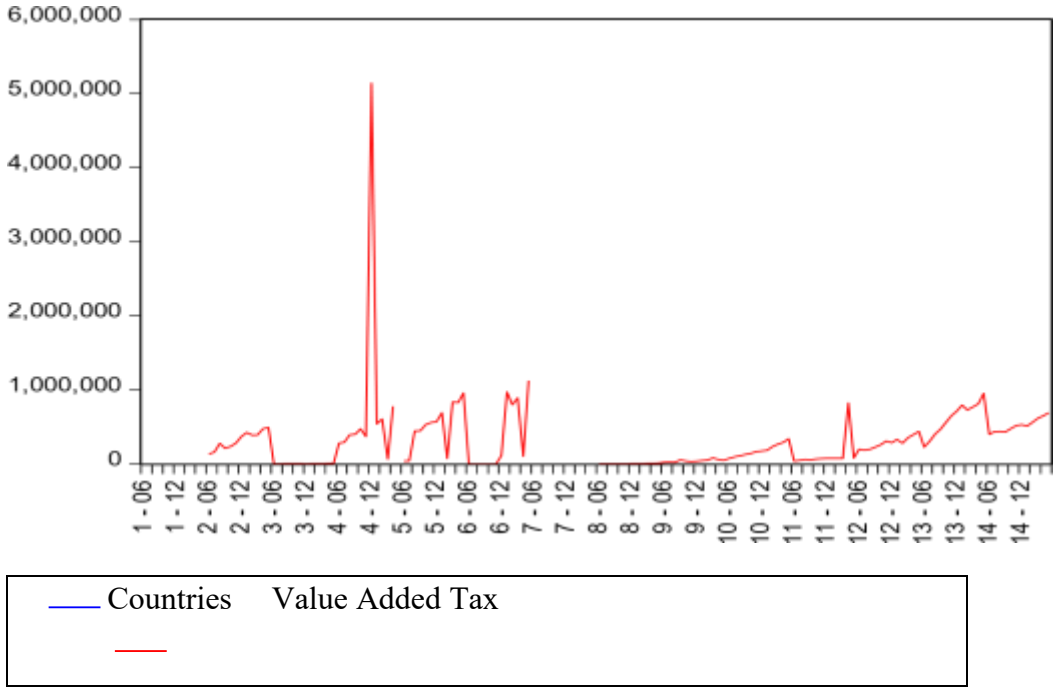
The maximum tax revenue was obtained by Burkina Faso (C_id 2) with a figure of $72,923,435 in 2017. This was seconded by Cameroon (C_id 5) with a tax revenue of $66,444,688 in 2013. The revenue from tax in the list of countries was at its lowest in Ghana (C_id 8) with a figure of $2276.11 in 2014.

Figure 2 represents the gross domestic product (GDP) per capita. This is used to represent income. The GDP per capita is shown on the vertical axis and the horizontal axis reflects the countries that are examined in the study with the sample period. The GDP per capita is the gross domestic product divided by the population of a country. It is usually used to measure welfare across different countries. This metric was at its maximum in Equitorial Guinea (C_id 9) with a score of $22,834 in 2008. The second country on the sequence was Botswana (C_id 3) which recorded $7609.17 in 2012. Morocco (C_id 11) had the least GDP per capita of $311.54 in 2010.



Source: World Development Indicators Database, 2020.

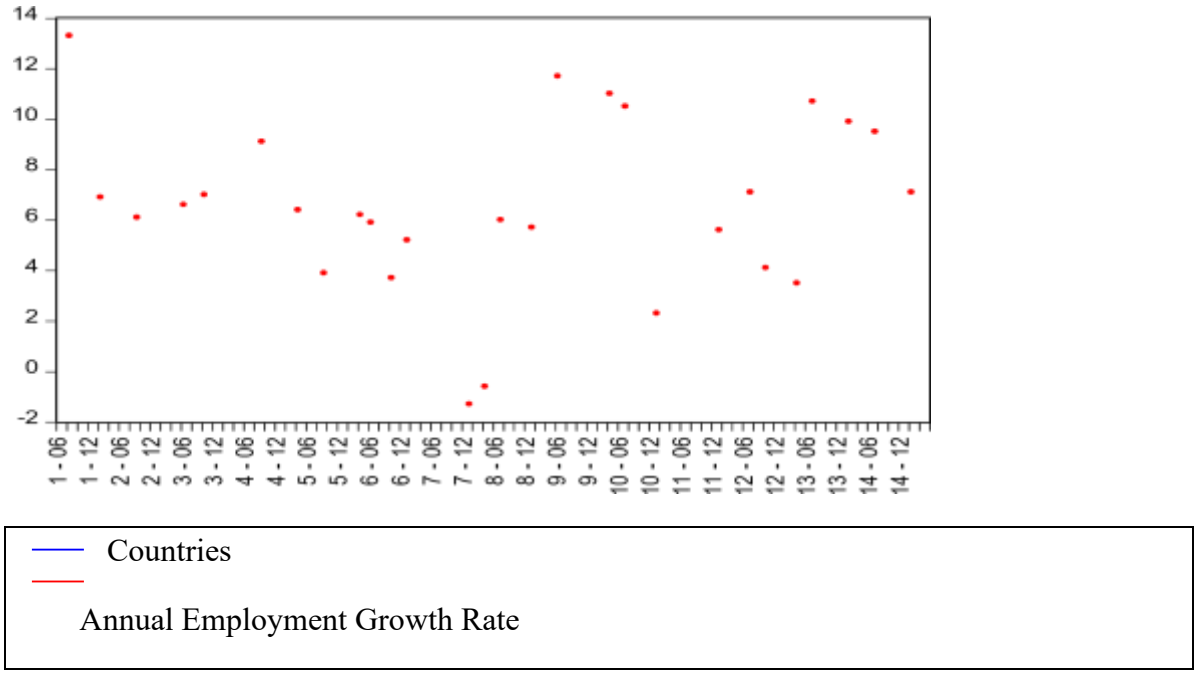
The figure 3 shows the amount of the value added tax (VAT) that were generated by the samples in the period under consideration. As can be seen from the graph, the revenue obtained through VAT was generally low and non-existent in some of the samples.



Source: United Nations University (UNU-WIDER) Dataset, 2021.

The value added tax was highest in Congo with a revenue of $970,633.08 in 2013. Cameroon came next in the ranking with a revenue of $958,153.08 in 2017. This was followed by Nigeria with a VAT of $953,663.78 in 2017.

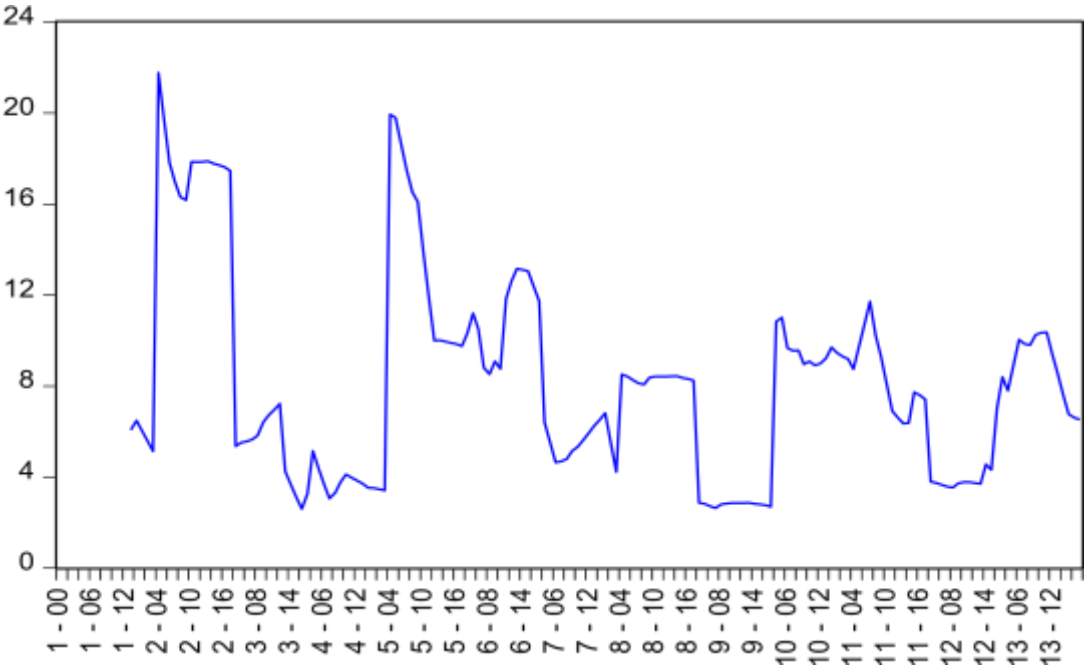
One of the constraints confronting researchers in this area of study was the dearth of data on employed labour in the sample of countries. Even when such data was available, it was randomly given. In other words, there was a great vacuum of omitted data on employment. In figure 4, the Y-axis represents the annual growth in employment and the X-axis depicts the sample period and countries.



Source: International Monetary Fund, World Economic Outlook Database, World Bank Enterprise Survey Data, 2021.

Given the shortcomings in employment data, this study considers an indirect approach as a panacea to this problem by examining unemployment data in the sample. This is represented in Figure 5 as shown below.

Annual Unemployment Growth Rate



Source: International Monetary Fund, 2020.

In the graph above, the growth rate of unemployment was at its peak in Botswana (C_iD 2) at 21.77% in 2004. Congo (C_iD 5) had an unemployment rate of 19.94% in 2005. Other countries with relatively higher unemployment rate were Egypt (C_iD 6) at 13.05% in 2015 and Mali (C_iD 11) at 11.71% in 2007. The growth rates of unemployment were generally low in Cote d'voire (C_iD 3), Kenya (C_iD 9), Cameroon (C_iD 4) and Nigeria (C_iD 12) during the period under consideration.

Tax Administration and Governance in Sub-Saharan Africa

Information on tax administration and governance in Sub-Saharan Africa (SSA) is important not just as an academic exercise but also to provide fiscal authorities with robust compendium to proffer solutions to macro-economic challenges. The capacity of the countries in SSA to generate the required taxes to counter such problems reflects in the quality of governance. Quite often than not, there has been improvements in the amount of tax that has been generated over-time, there is still gap between the quality of governance and the expectations of the citizens.

Many countries in Sub-Saharan Africa establish quasi-independent tax authorities with the staff of these institutions being remunerated more than their counterparts in other departments and agencies in the civil service. Several reforms have been carried out in tax administration to re-evaluate tax assessments, collection and outsourcing in Sub-Saharan Africa. However, fiscal implementations have been facing brick-wall in SSA's countries. Budgets are perceived to be better made than implemented. Some of the challenges thwarting efficient implementation of fiscal policies include corruption, political instability, poor forecasting ability, macro-economic shocks and poor quality data.

The quality of social and economic infrastructures that are provided in most of the countries in Sub-Saharan Africa has leave less to be desired. This inadequacies calls for the need to come up with efficient tax drive that will generate the requisite finance to put the economies of Sub-Saharan African countries on the road map to increase employment and income.

LITERATURE REVIEW

Theoretical Review

In the word of Keynes (1936) in his General theory, employment can be increased by increasing the level of consumption and investment. Fiscal measure like taxation is one of the vital instruments that can be used to regulate consumption and investment. Consumption depends on income. For instance, when the fiscal authorities want to regulate consumption, they adjust the tax system (i.e direct tax on income and profits). In the face of decreasing consumption, the direct taxes may be reduced in order to increase the disposable income available to economic agents. When income rises, consumption also increases but not as much as the former. Also, investment can be jerked up by a fall in the rate of interest and a rise in the marginal efficiency of capital which depends on the cost of capital and its yields. Given the constraints of increasing some of the components of these variables (consumption and investment) to increase employment in the short run, the under-employment equilibrium is what is attainable in such a system. The observed behavior of the consumption function cited earlier widens the gap between income and consumption which basically cannot be filled due to insufficient investment. This makes the quest of attaining full employment unrealistic. The need for the adoption of effective tax system to counter this investment shortcoming to achieve full employment in developing countries is a desideratum.

However, Professor Schlesinger considered Keynes treatment of the aggregate demand to be defective. According to the critic, the relative prices in the different sectors of the economy partly determine supplies. This view was shared by Professor Don Patinkin. In his criticism, the 45 percent line adopted by Keynes infers that demand creates its own supply. This is a fallacy and neglect of the relevance of the supply side in determining employment equilibrium. Other critics rejected Keynes proposition of the consumption function because it was deficient of other vital components like wealth effect, technological change, expectations and attitude towards assets. Also, Keynes proposition of the investment function met brick wall as it failed to show how this transcended to technological progress. Furthermore, his theory on interest rate was short-lived as Keynes failed

to incorporate the real forces that determined interest rate. Interest rate is not only a function of the demand and supply of money but also other kind of assets. The General Theory offered solutions in countering cyclical unemployment only while it neglected frictional and technological unemployment.

Capital formation is of strategic importance for developing countries to jump-start their economies and experience rapid economic transformation. It is therefore necessary to achieve a higher ratio of savings to national income. The state must rely on the instrument of fiscal policies to actualize this ratio. However, there is an inherent dislike for direct regulation by the state by entrepreneurs viz what to be produced or price fixing. Similarly, most consumers would not like to be physically ordered on their consumption pattern. The taxation of articles whose consumption should be discouraged is therefore preferable. This strategy also applies to the entrepreneurs in the form of tax incentives and increased tax on non-essential products. A coherent tax system is a vital tool of raising the ratio of savings to the national income which is a sine-qua-non for developing countries to attain a high level of economic emancipation.

A constant savings-income ratio was a fundamental assumption of the Harod-Domar (1956). The proponents of the model like Kaldor and Pasinetti considered the savings-income ratio as a variable in the growth process. The hypothesis was that there were two classes of workers – the wage earners and the profit earners whose savings were functions of their income. However, the propensity to save of the profit earners was higher than the wage earners. Thus, the aggregate savings of the community depended on the distribution of income. The classical savings function was given as

$$S = sp.\pi/\gamma$$

where sp = propensity to save; π/γ = the ratio of profit to national income.

If the hypothesis of the propensity to save between the wage earners and the profit earners was maintained (in which the latter's propensity was higher than the former), steady state of growth will be the outcome.

The propensity to save and the capital-output ratio of the Harod-Domar model were criticized because they were assumed to be constant which is not true in real life. This altered the outcome of steady state in the model. Also, the assumption that capital and workers were used in fixed proportion was a mirage. Furthermore, inflation consideration was not taken into account in the model. Besides, the model ignored government interventions like fiscal and monetary policies.

The Solow-Swan model was a neo-classical model that examined the long run growth of output based on the growth of the population and the rate of technological progress. In the word of Romer (1990), this model discounted the relevance of government in economic stabilization. The endogenous growth model was formulated as a reaction of the shortcomings of the Solow-Swan model. The new growth model extended the work of the latter by introducing endogenous technological progress emanating from the rate of investment, the size of capital stock and the stock of human capital resulting from the creation of new ideas. According to this model, knowledge and technological progress were more important than natural endowments. This may be a major cause of underdevelopment of most developing countries. However, this model was criticized as it neglected institutional reform programmes like taxation.

Taxation is an instrument of the fiscal policy measures to achieve economic stabilisation or growth. The government may truncate undesirable levels in private consumption and entrepreneurial investments by adjusting its tax structure. The end result of such policy is to achieve macroeconomic stability like full employment, growth in output, high GDP per capita, amongst others. According to Jan Tinbergen (1952), the number of policy instruments must equalised the number of objectives, otherwise the system would be under-determined if the instruments fell short of the objectives or over-determined if vice-versa. This

Tinbergens's proposition was needful for economic policies to be successful. Based on this, Robert Mundell (1968) stated that in countries where employment and balance of payment policies were restricted to monetary and fiscal instruments, monetary policy should be reserved for external balance viz balance of payment situation

while the fiscal policy like taxation should be assigned for internal balance like employment. These two policies would bring the economy to simultaneous equilibrium in the internal and external balances.

However, there was controversy whether monetary or fiscal authorities should carry out their policies based on pre-determined rules that put into template how their policy directives will be determined in all future economic situations or whether they should deploy the use of discretion in determining the policy variables as the situations evolve. According to the Keynesian, the economy was subject to several vagaries caused by changes in expectation, political events, oil crisis and war. These exogenous shocks led to cyclical fluctuations and this resulted to uncertainties of varying intensity which may affect employment and income. This situation was aggravated by the inherently unstable private sector in areas like employment generation, output and income. Thus, Keynesians proposed that government should be aggressive in its fiscal policy drive to stabilize the economy.

Economists like Lucas do not agree with the Keynesians. According to him in his rational expectation theory, it is only unexpected changes in policies that led to changes in real GDP. He assumed that consumers and firms had accurate information about future economic events like government actions and they adjusted their plans appropriately. This made government policies to be ineffective. In this regard, in the face of active fiscal policy actions by the government to counter unemployment, a tax cut or increased in government expenditure to solve the unemployment situation would be effective if its short run effects on the economy were unanticipated by economic agents. If this was on the contrary, when these agents expected price hike with such a policy, workers would demand for more wages while firms raised the price of their goods to offset their cost, given the expectation of increased wages. Consequently, the government good fiscal intentions would be made non-effective. The Rational Expectation Hypothesis (REH) was criticised because the rational economic agents did not have perfect knowledge of economic activities to counter fiscal policy actions of governments.

Empirical and Methodological Reviews

Empirics on this literature found that tax revenue was correlated with reductions in employment or rather increase in unemployment, although the nature of this impacts differed in-between studies. In some studies, tax revenue reduce unemployment while in others, the reverse was the case. In most studies, a greater number of statistically significant coefficients suggested positive relationship between tax revenue and different strata of unemployment (Marquez and Pages, 1997; Jaramillo and Tovar, 2006).

In models with increasing returns to scale, the impact of tax revenue on labour reallocation and income showed that tax reduction increased agglomeration in specific geographic clusters and sectors (Melitz, 2003). It depended on the size of the trade policy shock which included the size of the initial tariffs, the extent of tariffs reduction, the structure of trade partners and other complementary macro-economic policies.

Ebrill et. al (1999) stated that the main effects of tax reductions on revenue collection in developing countries was the price elasticity of import demand. If import demand was price inelastic, reduction in tariffs had smaller effects on the quantities imported which tantamount to lower tax receipts. On the other hand, when the elasticity of import was price elastic, reduction in tariffs translated to larger quantities of goods being imported. With regards to unemployment, tax revenue could affect this concern but this was a function of the size of public employment which was usually small in developing countries (Rama, 1999).

Muendler (2007) analysed the impact of tax revenue on labour reallocation in Brazil. He found that reduction in tariffs led to reduction in unemployment in this country.

Cobham (2005) assumed that income generated in the shadow economy (in developing countries) enhanced the tax gap at the national level in these economies (as this income was taxed) if effective tax auditing was possible. This outcome was vehemently criticized by Auriol and Warlters (2005). They argued that many developing countries deliberately created cost of entry into their formal economies in order to reduce competition. In this direction, they created economic rent which was later taxed. According to these critics, this was because the size of the shadow economies was endogenous. If this endogeneity was taken into consideration, the negative correlation between the ratio of the tax revenue and the size of the shadow economies would disappear.

In terms of methodological review, most studies on this literature made use of the revenue/gross domestic product (GDP) data provided by the International Monetary Fund (IMF).

Ahlerup and Bigsten (2015) made use of cross country panel data to examine the revenue impact of value added tax (VAT) on Sub-Saharan African (SSA) countries.

Oliver et. al (2016) used pooled ordinary least squares, fixed effects and random effects with country specific quadratic time trend (to allow for heterogeneity) to examine tax revenue performance in developing countries. The standard errors were clustered by countries to control for serial correlation and heterogeneity within each country.

Afuberoh and Okoye (2014) studied the impact of tax revenue on the gross domestic product in some sections of Nigeria, namely Abuja, kogi State, Delta Sate, Niger State, Ebonyi State and Ondo State. The study made use of primary data and estimated the regressors on the regressand using the SPSS 17.0.

Neway et. al (2018) examined the determinant of tax revenue in Ethiopia. The study made use of the multiple regression analysis.

Velaji and Prendi (2014) studied the relationship between tax revenue and unemployment, inflation, the gross domestic product and import in Ethiopia using the Pearson correlation and regression analysis.

METHODOLOGY

This study makes use of the panel data analysis and the fully modified ordinary least square technique in its analysis. The former enables us to understand more complex behavioral patterns in the model while the latter analysis is needed to explain the dynamic. To set the stage, the variables of the cross-sectional units in this study are specified in the following model.

$$T_{it} = \alpha_{1i} + \beta_2 UE_{it} + \beta_3 I_{it} + \mu_{it} \quad \text{Eq (1)}$$

Where T represents total taxes, α depicts the intercepts of the countries in the sample, β_i is the vector of coefficient estimates showing the relationship between the regressors and the regressand. UE is unemployment variable, I is income,

$i = 1, \ldots\ldots\ldots\ldots, 13$ where i is the number of countries in the sample, $t = 1, \ldots\ldots\ldots\ldots., 13$ where t is the time covered in the sample.

Equation (1) denotes the pooled effect regression in which all the cross sectional units or countries have homogenous characteristics. Given the disparity in the socio-cultural environment of countries, the fixed effect model is inculcated in the framework in which differential intercepts dummy variables are introduced like

$$T_{it} = \alpha_{1i} + \alpha_2 D_{2i} + \alpha_3 D_{3i} +, \ldots\ldots\ldots\ldots, + \alpha_4 D_{13i} + \beta_2 E_{it} + \beta_3 I_{it} + \mu_{it} \quad \text{Eq (2)}$$

Where $\alpha_2 D_{2i}, \ldots\ldots\ldots\ldots, \alpha_{13} D_{13i}$ represents the different intercepts or heterogenous features across the various countries in the sample.

Since only thirteen countries are examined in the sample, we only introduce twelve dummy variables in equation (2) to avoid the dummy trap. Thus, the intercept of the first country is treated as the reference intercept category while other intercept coefficients show the extent to which they differ from the former or base intercept category.

In equation (3), rather than treating α_{1i} as fixed, we hypothesize that it is a random variable with a mean value of α_1, having no subscript i. The intercept value for each country is expressed as

$$\alpha_{1i} = \alpha_1 + \varepsilon_i \quad \text{Eq (3)}$$

where ε_i is a random variable with a mean value of zero and variance of σ_ε^2. The individual differences in the intercept of each country is reflected in the random variable.

Substituting equation (3) into equation (1) gives

$$T_{it} = \alpha_1 + \beta_2 UE_{it} + \beta_3 I_{it} + \mu_{it} \quad \text{Eq (4)}$$

Equation (4) translates to

$$T_{it} = \alpha_{1i} + \beta_2 UE_{it} + \beta_3 I_{it} + w_{it} \quad \text{Eq (5)}$$

Where $w_{it} = \varepsilon_i + \mu_{it}$ Eq (6)

w_{it} consists of ε_I which is the individual-specific error component of the countries in the sample and μ_{it} which is the combination of time series and cross-sectional error components called error components model (ECM). The assumption of the ECM is that the individual error components are not correlated with each other and are not auto-correlated both in the cross-sections and time series units.

The Description of Variables and Sources of Data

The constituents of total taxes are taxes on income, profits and capital gains, taxes on goods and services, taxes on international trade and transactions, the value added tax and other taxes. This information is obtained from the United Nations University database. The gross domestic products per capita of the different countries in the sample are used to define their respective income and this is measured in the US dollar. This data is obtained from the world development indicator (WDI). The data on unemployment's variable is sourced from the international Monetary Fund. The sample period was between 2004 and 2017. The countries that were examined in the study were Bourkina Faso, Botswana, Cote d'voire, Cameroon, Congo, Egypt, Ghana, Equitorial Guinea, Kenya, Morocco, Mali, Nigeria and Senegal.

RESULT AND DISCUSSION

The panel data analysis is used to examine the relationship between tax revenue, unemployment and income in developing countries. This is carried out with the pooled ordinary least square regression, fixed effect and the random effect estimations. The pooled regression assumes that the cross sectional units have homogenous characteristics. In other words, the sub-sectional units have a common intercept. The fixed effects regression allows the cross sectional units to retain their unique features or varying intercepts but this should be time-invariant. In the case of the random effect regression, the intercept of the cross subsections have a common mean value, however the differences in the intercepts of the different units or sample countries are reflected in their disturbance terms.

In appendix 1 of the pooled regression, a percentage increase in the annual growth rate of unemployment leads to an increase in the tax revenue of 238811.0 in the cross-sectional units of the sample, all other things being equal. This estimate is significant at less than 10% level of significance. This implies that there is a positive and significant relationship between tax revenue and the growth rate of unemployment in the sample. Also, a percent point rise in the gross domestic product per capita (which depicts income) leads to a negative growth of 95.47 in the revenue from taxation in the sampled countries. However, this result is insignificant. Generally, the assumption of pooled regression of homogenous characteristics of the cross sectional units of the sample is unrealistic as the different countries vary in their economic, social and cultural attributes.

In appendix 2 of the fixed effect regression, all the countries (in the sample) have an intercept of 4,559,529 and this estimate is insignificant at less than 10% probability level. A percentage increase in the annual growth rate of unemployment in the sample results in 295,814.3 decline in the income generated from taxation by governments, ceteris paribus. Thus, there is an inverse relationship between unemployment and tax revenue in the group. Furthermore, if the gross domestic product per capita rises by a percentage, tax revenue increases by 94.50 percent. The results of the fixed effect regression vis-a-vis the coefficients of the unemployment growth

rates and income (with respect to the total tax revenues) are insignificants in the cross sectional units.

In appendix 3 which considers the random effect regression, all the countries examined in this study have a mean intercept of 5,730,008 and this estimate is significant at less than 10% probability level. If the annual growth rate of unemployment rises by a unit, the revenue derived from the aggregate tax declines by

313,178.7. This reveals an inverse relationship between tax revenue and unemployment. Also, a percentage rise in the GDP per capita (income) leads to a decline in tax revenue by 140.05 percent. Thus, there is negative relationship between the gross domestic product per capita (which signifies income) and tax revenue. Like in the case of the fixed effect regression, the estimates of the coefficients of unemployment's growth rates and income are insignificant, given their probability values.

To examine which of the two effects (fixed or random effect regression) to select in order to analyse the relationship (if any) between tax revenue, unemployment and income, the Hausman test is conducted. The result of this estimate in appendix 4 shows that the probability of Chi square statistics is 0.8547 which is insignificant. This implies that the study rejects the null hypothesis that presupposes that the random effect is appropriate and adopts the fixed effect estimates. In the fixed effect regression, there is positive correlation (94.50) between income (GDP per capita) and tax revenue. When employees experience increased tax on their income as well as consumption (indirect tax), they increase their number of man-hour in a bid to smoothen their consumption pattern. Also, if the annual growth rate of unemployment soars by a unit, tax revenue reduces by 295,814.3 units. It is important to note that all the estimates from the fixed regression are insignificants. This insinuates that there are unobserved heterogeneity and measurement errors in the series, using the panel data analysis.

Given this shortcomings, the study analyses the relationship between tax revenue, employment and income in developing countries by utilising the fully modified ordinary least squares. This technique solves the problem of serial correlation and endogeneity. Table 5 reveals the Pedroni residual cointegration estimates for the individual intercepts and the probability values of the eleven statistics (Panel V-Statistics, Panel Rho-statistics, Panel PP-statistics, the Weighted Statistics of the listed statistics as well as their Group Statistics). Most of the values of these listed statistics fall below the 5% probability threshold. Similar results are also obtained for the individual intercepts and trend deterministic. Given these results, the study rejects the null hypothesis which states that there is no co-integration among the variables. The Table 6 in the appendices corroborated this finding in the Kao Residual Cointegration test. The probability value of the Augumented Dickey Fuller Test of the Residual Variance and HAC Variance is below 5%. The Durbin Watson (DW) estimates of 1.93 reveals stationarity of the series.

Since there is co-integration in the variables, the study examines the relationship between tax revenue, unemployment and income by using the fully modified ordinary least squares technique. Table 7 (in the appendices) shows that after correcting measurement and statistical errors in the analysis, a unit increase in income generates 25,557.18 in tax revenues in the cross-sectional countries in the sample. The probability value of this estimate is above the 10% threshold indicating its insignificance. However, a percentage increase in the growth rates of unemployment in the sample leads to a decline of tax revenue by 3,789,372 in the cross-sectional units. This estimate is significant as it falls below the 10% benchmark. Thus, there is negative relationship between unemployment and tax revenue in developing countries. This indirectly suggests that there is the dearth of virile private sector in developing countries. In other words, if there is reduction in taxation in developing countries, the expectation is that this should translate to more investment, output and employment in developing countries which results in fall in unemployment. However, this is not the case in the examined countries as the estimates reveal inverse relationship between unemployment and tax revenues, suggesting that there is the lack of enabling environment for the growth of the private sector and businesses in the sampled countries. Another possibility is that the elasticity of demand of consumers with regard to taxable commodities and/or services is highly elastic. In this case, such economic agents can evade the burden of taxation by drastically reducing the quantities purchased or not consuming them at all. Such behavior and response adversely affect supplies, investment, output, unemployment and income. Thus, there should be proper assessment of the elasticity of demand of taxable commodities and services before such taxes are initiated in order to achieve desirable macroeconomic outcomes like increases in income and reduction in unemployment level.

CONCLUSIONS AND RECOMMENDATIONS

Given the inverse relationship between tax revenue and unemployment in developing countries, these economies should create the enabling environment for increased capacity utilization of the employers of labor (firms and industries). Expansionary fiscal measures like reduction in taxation and increased spending in infrastructures should be promoted. These policies will increase the employment of labor which is a desirable macroeconomic objective in any economy. Additionally, fiscal authorities should endeavor to impose tax levies on goods and/or services whose demand are inelastic. This reduces tax evasion from the intended tax payers. Such initiative generates increased investment, reduction in unemployment, increased output and income. The empiric of the study also showed that there is direct relationship between tax revenue and income in developing countries. This is a progressive tax system in which more tax is imposed as income increases. Fiscal authorities should desist from tax measures which are regressive in nature. The value added tax, for instance, is regressive in nature in which both the poor and non-poor are subjected to the same rate. This could be a dis-incentive to the former group of workforce (in terms of man-hour put in production) as it depletes their disposable income relative to the latter group. Generally, most indirect taxes are regressive. Developing countries need to adopt interventionary policies that will boost local production, increase disposable income and open their economies such that they can leverage on the benefits of comparative advantage. Also, if policy makers can get it right in setting the right tariffs on imports, promote exports through the initiation of appropriate incentives and institutionalise progressive tax system in developing countries, these policies engender south-ward movement in the growth rate of unemployment and causes the income level of individuals and profit of firms to soar in such economies. Overtime, most firms (in developing countries) that do not have the stamina to compete with their foreign counterparts will overcome such challenge, given these fiscal policy measures. Furthermore, the revenue generated from tax should be channeled in economic developmental projects that are capable of enhancing domestic production of goods and service, increase the employment of labour and income. The practice of squandering tax revenue on activities of little or no economic value should be discouraged. There should be fiscal discipline, transparency and accountability of tax resources.

Limitation of the Study

Initially, the study intended to examine the relationship between tax revenue, employment and income in developing countries. This plan was limited by the number of observations of some of the variables of the model. There was dearth of data on the employment variable across the sample. Moreover, it was observed that there was a large presence of omitted data in the sample. This makes it difficult to conduct further statistical checks on the estimates to counter some of this problem. Given the challenge of obtaining robust employment data in the sample during the period under review, the study explored unemployment data in the cross section.

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APPENDICES

Appendix 1

Dependent Variable: TOTAL_TAXES

Method: Panel Least Squares

Sample: 2004-2017 Periods included: 13 Cross-sections included: 12 Total panel (unbalanced) observations: 154				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
ANNUAL_UNEMPLOYMENT_GROWTH_RATE	238811.0	112423.6	2.124207	0.0353
INCOME__GROSS_DOMESTIC_PRODUCT GDP__PER_CAPITA_	-95.47168	176.1284	-0.542057	0.5886
R-squared	-0.048385	Mean dependent var		2626288.
Adjusted R-squared	-0.055282	S.D. dependent var		8910767.
S.E. of regression	9153759.	Akaike info criterion		34.91013
Sum squared resid	1.27E+16	Schwarz criterion		34.94957
Log likelihood	-2686.080	Hannan-Quinn criter.		34.92615
Durbin-Watson stat	1.595540			

Source: Author's calculation.

APPENDIX 2

Dependent Variable: TOTAL_TAXES
Method: Panel Least Squares
Date: 02/19/22 Time: 02:44
Sample (adjusted): 2004 2017
Periods included: 14
Cross-sections included: 12
Total panel (unbalanced) observations: 154

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4559529.	5026402.	0.90711	0.3659
ANNUAL_UNEMPLOYMENT_GROWTH_RATE	-295814.3	631280.9	-0.468594	0.6401
INCOME__GROSS_DOMESTIC_PRODUCT__GDP__PER_CAPITA_	94.50028	478.0809	0.197666	0.8436
	Effects Specification			
Cross-section fixed (dummy variables)				
R-squared	0.149615	Mean dependent var		2626288.
Adjusted R-squared	0.070651	S.D. dependent var		8910767.
S.E. of regression	8590225.	Akaike info criterion		34.85666
Sum squared resid	1.03E+16	Schwarz criterion		35.13274
Log likelihood	-2669.963	Hannan-Quinn criter.		34.96880
F-statistic	1.894721	Durbin-Watson stat		1.971616
Prob(F-statistic)	0.035417			

Source: Author's computation.

Appendix 3

Dependent Variable: TOTAL_TAXES

Method: Panel EGLS (Cross-section random effects)

Sample (adjusted): 2004-2017

Periods included: 14

Cross-sections included: 12

Total panel (unbalanced) observations: 154

Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	5730008.	2161798.	2.650574	0.0089
ANNUAL_UNEMPLOYMENT_GROWTH_RATE	-313178.7	257999.3	-1.213874	0.2267
INCOME__GROSS_DOMESTIC_PRODUCT	-140.0501	230.6429	-0.607216	0.5446

__GDP__PER_CAPITA_				
	Effects Specification		S.D.	Rho
Cross-section random			2642125.	0.0864
Idiosyncratic random			8590225.	0.9136
	Weighted Statistics			
R-squared	0.015781	Mean dependent var		1830487.
Adjusted R-squared	0.002745	S.D. dependent var		8652508.
S.E. of regression	8619156.	Sum squared resid		1.12E+16
F-statistic	1.210605	Durbin-Watson stat		1.816350
Prob(F-statistic)	0.300892			
	Unweighted Statistics			
R-squared	0.026177	Mean dependent var		2626288.
Sum squared resid	1.18E+16	Durbin-Watson stat		1.722282
Source: Author's Calculation.				
Appendix 4				
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		0.314070 2		0.8547
Cross-section random effects test comparisons: Variable	Fixed	Random	Var(Diff.)	Prob.

- -

Annual_Unemployment_Growth_Ra 295814.2897 313178.74017 33195192192 Te 26 0
4.31492 0.9760 Income__Gross_Domestic_Product 175365.24248

__Gdp__Per_Capita_ 94.500275 -140.050089 6 0.5754

Cross-section random effects test equation: Dependent Variable: TOTAL_TAXES Method: Panel Least Squares Date: 02/19/22 Time: 02:50 Sample (adjusted): 2004 2017 Periods included: 14 Cross-sections included: 12 Total panel (unbalanced) observations: 154				

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4559529.	5026402.	0.907116	0.3659
ANNUAL_UNEMPLOYMENT_GROWTH_RATE	-295814.3	631280.9	-0.468594	0.6401
INCOME__GROSS_DOMESTIC_PRODUCT__GDP__PER_CAPITA_	94.50028	478.0809	0.197666	0.8436
	Effects Specifi cation			
Cross-section fixed (dummy variables)				
R-squared	0.149615	Mean dependent var		2626288.
Adjusted R-squared	0.070651	S.D. dependent var		8910767.
S.E. of regression	8590225.	Akaike info criterion		34.85666
Sum squared resid	1.03E+16	Schwarz criterion		35.13274
Log likelihood	-2669.963	Hannan-Quinn criter.		34.96880
F-statistic	1.894721	Durbin-Watson stat		1.971616
Prob(F-statistic)	0.035417			

Source: Author's Calculation.

Appendix 5

Pedroni Residual Cointegration Test

Series: TOTAL_TAXES INCOME__GROSS_DOMESTIC_PRODUCT__GDP__PER_CAPITA_ ANNUAL_UNEMPLOYMENT_GROWTH_RATE

Sample: 2000-2017

Included observations: 186

Cross-sections included: 11 (2 dropped)

Null Hypothesis: No cointegration

Trend assumption: No deterministic trend

User-specified lag length: 1

Newey-West automatic bandwidth selection and Bartlett kernel

Alternative hypothesis: common AR coefs. (within -dimension)

			Weighted	
	Statistic	Prob.	Statistic	Prob.
Panel v-Statistic	-0.210337	0.5833	-2.268016	0.9883
Panel rho-Statistic	-1.716037	0.0431	-1.279651	0.1003

Panel PP-Statistic -8.050991 0.0000 -7.578026 0.0000

Panel ADF-Statistic -3.213306 0.0007 -2.162200 0.0153

Alternative hypothesis: individual AR coefs. (between-dimension)

	Statistic	Prob.
Group rho-Statistic	0.373085	0.6455
Group PP-Statistic	-8.899417	0.0000
Group ADF-Statistic	-3.354920	0.0004

Cross section specific results

Phillips-Peron results (non -parametric)

Cross ID	AR(1)	Variance	HAC	Bandwidth	Obs
1	Dropped from Test			3.00	11
2	-0.439	4.66E+09	3.59E+09		
3	-0.113	6.89E+13	5.94E+13	2.00	11
4	-0.242	2.44E+14	1.04E+14	4.00	13
5	Dro	pped from Te	st	11.00	13
6	-0.326	1.54E+11	2.03E+10		
7	1.022	32151585	52776116	2.00	13
8	0.383	1.12E+11	9.52E+10	3.00	12
9	-0.230	6.39E+12	3.08E+12	4.00	13
10	-0.127	5.73E+11	5.73E+11	0.00	13
11	-0.105	9.84E+13	8.68E+13	2.00	13
12	-0.085	3.27E+11	3.27E+11	0.00	13
13	-0.167	4.13E+12	1.06E+12	5.00	13

Augmented Dickey- Fuller resul ts (parametric)

Cross ID	AR(1)	Variance	Lag	Max lag	Obs
1	Dro	pped from Test			

2	-0.505	4.80E+08	1	--	10
3	-0.308	7.35E+13	1	--	10
4	-0.502	2.53E+14	1	--	12
5	Dro	pped from Test			
6	-0.726	1.51E+11	1	--	12
7	0.843	26846592	1	--	12
8	0.234	1.12E+11	1	--	11
9	-0.660	6.37E+12	1	--	12
10	-0.244	6.20E+11	1	--	12
11	-0.255	1.05E+14	1	--	12
12	-0.128	3.12E+11	1	--	12
13	-0.440	4.22E+12	1	--	12

Source : Author's Calculation

Appendix 6

Kao Residual Cointegration Test

Series: TOTAL_TAXES INCOME__GROSS_DOMESTIC_PRODUCT__GDP__PER_CAPITA_ ANNUAL_UNEMPLOYMENT_GROWTH_RATE

Sample: 2000-2017 Included observations: 186 Null Hypothesis: No cointegration

Trend assumption: No deterministic trend

User-specified lag length: 1

Newey-West automatic bandwidth selection and Bartlett kernel

ADF	t-Statistic	Prob.
	-3.188628	0.0007
Residual variance	1.96E+14	
HAC variance	1.12E+14	
Augmented Dickey-Fuller Test Equation Dependent Variable: D(RESID) Method: Least Squares Date: 02/18/22 Time: 11:18 Sample (adjusted): 2006 2017 Included observations: 130 after adjustments		

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RESID(-1)	-1.282607	0.147416	-8.700581	0.0000
D(RESID(-1))	0.137742	0.104259	1.321159	0.1888

R-squared	0.48842	Mean dependent var	519350.8
Adjusted R-squared	0.484427	S.D. dependent var	12081236
S.E. of regression	8674742.	Akaike info criterion	34.80499
Sum squared resid	9.63E+15	Schwarz criterion	34.84911
Log likelihood	-2260.325	Hannan-Quinn criter.	34.82292
Durbin-Watson stat	1.926893		

Source: Author's computation.

Appendix 7

Dependent Variable: TOTAL_TAXES

Method: Panel Fully Modified Least Squares (FMOLS)

Sample (adjusted): 2005-2017

Periods included: 13

Cross-sections included: 12

Total panel (unbalanced) observations: 145

Panel method: Grouped estimation

Cointegrating equation deterministics: C

Long-run covariance estimates (Bartlett kernel, Newey-West fixed bandwidth)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INCOME__GROSS_DOMESTIC_PRODUCT__GDP__PER_CAPITA_	25557.18	17318.40	1.475724	0.1424
ANNUAL_UNEMPLOYMENT_GROWTH_RATE	-3789372.	2042929.	-1.854872	0.0659

R-squared -192.137247 Mean dependent var 2748608. Adjusted R-squared -211.303539 S.D. dependent var 9169718. S.E. of regression 1.34E+08 Sum squared resid 2.34E+18 Long-run variance 5.32E+13

Source: Author's calculation.