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Analysis of Income Tax System Productivity in Kenya

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Abstract

The Government of Kenya has over the years undertaken reforms in the income tax system with a view of making it elastic. Despite these efforts, studies have shown that the structure is still inelastic. However, these studies omit key factors that affect income tax revenue productivity such as tax reforms, and the structural and demographic nature of the economy. Because of this omission, the estimated income tax elasticity cannot be relied on for planning purpose and for execution of further income tax reforms. The objectives of the paper is to assess the response of income tax yield to changes in its base, discretion actions by the tax authority and unusual circumstances. The study uses time series data that was obtained from various Kenya Government documents and International Monetary Fund Financial Statistics. Regression analysis is used to estimate income tax revenue elasticity which is a measure of productivity of the tax system. The estimated results show that the income tax system is responsive to its tax base (Gross Domestic Product) in the short run but unresponsive in the long run. The response of income tax with respect to Gross Domestic Product (GDP) is found to be less than that of monetary GDP. This suggests the existence of a black economy in Kenya. Income tax yields also respond with lags to changes in its base in addition to being sensitive to discretionary changes in income tax policy and unusual circumstances. The conclusion is that Kenya's income tax system is inelastic. The findings point to the need for more income tax reforms within the broad spectrum of the on-going implementation of the Public Finance Management programme.

Keywords: Tax reform, buoyancy, elasticity, yield, black economy

JEL Classification*:* H24, H21, H25

Paper Classification : Research Paper

Introduction

Government revenue is crucial in accelerating economic growth in an economy. In Africa, domestic government revenues have been declining due to decreasing resource prices for resource-rich economies. However, for non-resource- rich economies, tax revenue and tax ratios (Tax-GDP ratios) have improved. The increased tax yields are due to broadening of tax bases for direct and indirect taxes (African Development Bank, Organisation for Economic Cooperation & Development & United Nations Development Programme [AFDB, OECD & UNDP], 2016). Mobilizing government revenue is key to attaining the United Nations Sustainable Development

Goals (SDGs) that include increasing productivity levels and inclusive growth. It is also vital in moving the African Economies towards financial autonomy of their economies.

The Kenya government has steadily expanded social services including social security, education, health and infrastructure (Republic of Kenya, 2007). Furthermore, the government has increasingly mobilized her own internal resources to generate economic growth (Kenya Revenue Authority, 2010; Wawire, 2011).

In the early 1970s, Kenya experienced fiscal indiscipline that made management of the budgets and expenditures difficult. The public sector became large and more bureaucratic. For example, in the 1970s, the government had equity in about 250 commercially-oriented firms. These large state-owned enterprises were making losses, and the government had to finance their outstanding debts. The large public sector and the accompanying inefficiency became a challenge to the government programmes such as free university education and healthcare. Consequently, in the early 1980s, the country experienced balance of payment (BOP) problems with current account being in deficit, while the budget deficit-GDP ratio was over seven percent coupled with high inflation rate.

It is during this period that International Financial Institutions (IFIs) introduced the Structural Adjustment Programmes (SAPs). However, the government resisted abandoning the controlled regime initially but the option of borrowing from abroad led to their adoption and subsequent liberalization of the economy. Consequently, with the rising pressure from the IFIs, the government had no other option but to liberalize the economy (Were, Ngugi & Makau, 2006). The Public Financial Management Reform (PFMR) programme was launched in 2006 by the Kenya government. The objective of PFMR was to enhance responsiveness to the fiscal policy priorities, accountability and transparency (Kenya Revenue Authority, 2010). So far, several system reforms have taken place in the areas of external audit, budget formulation, revenue collection, public procurement, debt and guarantee, internal audit, accounting and reporting, budget execution, payroll and pensions, parliamentary oversight, the macro-fiscal framework, and external resources. These reforms were initiated and implemented by the government in collaboration with Development Partners.

Tax policies regarding income during the early years, addressed the issues of efficiency-equity dilemma and redistribution. Corporate taxes for example, increased from 40 per cent to 45 per cent and from 47.5 per cent to 52 per cent in 1973/74 for local companies and foreign companies respectively. The treatment of foreign owned companies and local owned ones differently is a testimony of the equity objective in the policy for corporate taxation during that time. The feeling was that local manufacturing enterprises needed more support compared to the foreign owned companies. The changes undertaken with respect to personal income taxes are another example of the use of income taxation in addressing equity objectives in the tax system. Personal income tax (PIT) was a more visible instrument and convenient way to indicate inequality issues by the government. As an indication of the progressivity of PIT, the government introduced many tax brackets. For example, there were eight tax brackets between 1974 and 1986. In 1982, there was a move to protect the real incomes of consumption from inflation by widening the tax brackets. Before then, the PIT system had very high top marginal tax rate.

Major reforms in income tax mainly began in mid-1980s with the reduction of the top marginal tax rate for personal income tax from 65 per cent to 32.5 per cent in 1987 and 1998 respectively. Furthermore, the top marginal tax rate for companies was reduced from 45 per cent to 32.5 per cent in 1989 and 1998 respectively. The income tax structure was integrated by shifting from a system that had double taxation issues to one that ensured that there were no such elements

by embracing single stage taxation. There was a final tax on dividends and a compensating tax introduced that ensured that all corporate distributions were on after-tax income. According to Muriithi and Moyi (2003), the interest and penalty systems were rationalized and an instalment and self-assessment tax system introduced. For the purposes of tax assessment, a Personal Identification Number (PIN) was introduced. The aim was to improve management of tax information by identifying all individuals that are eligible to paying income taxes in the country so that all their transactions could be tracked for taxation purposes.

1990 to1996 was another phase of income tax reforms during which the target was the timing of collections and rationalization of withholding tax system. It involved expansion of the net for withholding tax to cover interest income from royalties, discounts on debt instruments, payments to contractors as well as self-employed persons with no PIN. There was also a shift in the business income tax payment from delayed to current payment. Personal relief to taxpayers was also provided for in the Income Tax Act. Since 1990, the tax relief and brackets have been reviewed. The objective was to secure equity, so that a large proportion of the tax burden is borne by those who earn high incomes. The single and family relief was increased in the period 1990 to 1997. Thereafter, family relief, single relief and insurance relief were replaced by a single personal relief in 1997.

KRA implemented a wide range of online services through a system called i-tax in the fiscal year 2009/2010. Tax payers can now use online services as a result of the reforms to file their tax returns online. The services now offered online include filling of yearly income tax return forms and acquiring of personal identification number (PIN), tax compliance certificates, withholding certificates, and consultation.

The Statement of the Problem

An elastic income tax system is vital for Kenya because it will reduce pressure on domestic borrowing and on seeking external finance. Moreover, external borrowing may open up the economy to international volatility and shocks despite increasing dependence on other economies. Furthermore, the tax system in Kenya over-depends on a few sources of revenue and top on the list is the income tax (Republic of Kenya, 2007; KRA, 2010). Therefore, income tax is a vital source of government revenues and its productivity is key to reducing dependability on borrowing to meet the budget deficits.

In this respect, the Kenya Government has been undertaking income tax reforms since independence with a view of making the income tax system elastic. When a new government took power in 2002, for example, there was an emphasis on government reform programme. A lot has changed in the income tax reform process since then and this includes a very strong involvement of the government in implementing tax reforms (Kosimbei, Wawire, & Kimani 2010). Alongside the income tax reforms highlighted in this study, the Public Financial Management Reform (PFMR) programme was started in 2006. The aim was to bring transparency, responsiveness to public fiscal policy priorities, and accountability in the system (KRA, 2010). Chapter 12 of the Constitution of Kenya also emphasises these tenets of good governance in this area (Republic of Kenya, 2010)

Despite these efforts, studies have shown that the income tax system is still inelastic (AfDB, OECD & UNDP, 2016; Muriithi & Moyi, 2003; Wawire, 2006; Karingi, Wanjala, Nyamunga, Okello, Pambah & Nyakang'o, 2005; Moyi & Ronge, 2006). However, a close scrutiny of these studies reveal that they omitted key factors that could be affecting income tax revenue productivity such as tax reforms, unusual circumstances, the structural nature of the economy and tax evasion

(Kitagawa & Takahashi, 2016). Due to these omissions, the estimated income tax elasticities cannot be relied on for planning purposes and for execution of further income tax reforms. It is against this background that this paper seeks to analyse the productivity implications of income tax system in Kenya.

Objectives of the Study

The general objective of the paper is to analyse the income tax system productivity in Kenya. The specific objectives are to:

(a) Estimate the short run and long run elasticities of income tax system; and

(b) Assess their income tax revenue productivity implications.

The Significance of the Study

The findings of the study are important for designing programmes that are oriented to economic growth and help in accelerating growth through reforming the income tax system. It provides a basis for prudent income tax measures that can be taken to improve tax collections. It also stimulates in-depth research in the area. In terms of taking action with regard to tax policy, it provides substantial information for doing so in addition to filling the gap about what is currently unknown about the income tax system in Kenya. The study is important because of the ongoing effort to implement the Kenya Constitution 2010, Public Finance Management Act 2012, integration of the tax system with the Integrated Financial Management Information Systems (IFMIS), Kenya Vision 2030 and Sustainable Development Goals (SDGs).

Literature Review

The tax literature available indicates an inelastic income tax structure that requires tax reforms to make it elastic and buoyant. For example, Ole (1975) found that the income tax structure in Kenya was inelastic (0.81) during the period 1962/63 to 1972/73. The results suggested that Kenya could only rely on external assistance to cover the budget deficit. Another study by Scovill (1975) found the tax structure in Kenya to be regressive and called for tax reforms that would make it more elastic. Moreover, as early as 1982, a Working Party noted that the methods used in detecting non-reporting and under-reporting of income were inadequate (Republic of Kenya, 1982). It was suggested that the means of identifying income recipients and confirming the incomes reported were needed in addition to investigating tax evasion.

Njoroge (1993) found income tax structure elasticity to be 0.93 during the period 1972 to 1981. The implication was that the government collected a declining proportion of the increasing income in terms of tax revenues. The conclusion was that the tax system was not meeting its targeted revenue and needed to be reviewed over time. Wawire (2000) used aggregate variables estimated tax income-elasticity and buoyancy. The conclusion was that the system did not raise required revenues. This failure was blamed on corruption through intimidation and coercion at the inspection level and use of areas of discretion in the law to evade tax (see also Hira, 2000).

According to Muriithi and Moyi (2003), tax reforms ensure that the tax system is used to reduce the budget deficits. The expectation was that if taxes were elastic with respect to their bases, they would form the major sources of tax revenue. Through estimation of elasticity and buoyancy, the study determined whether or not the tax reforms in Kenya attained these objectives. Estimates of buoyancies and elasticities were calculated for the pre-reform and post-reform

periods. It was found that the tax reforms that had taken place had boosted the yields from both individual and overall tax structure. Furthermore, indirect tax elasticity was low while that of direct taxes was quite high during the post-tax reforms period.

Tax Modernization Programme in 1980's included reforms and its main aim was to increase revenue, redistribute income and wealth and finally put in place a sustainable tax structure (Karingi et al., 2005). The reforms in income tax encompassed decreasing top marginal rates, tax brackets being widened and increased tax relief that aimed at protecting those who earn low income from the negative effects caused by inflation. The study highlighted the challenges of tax reform that included: failure of such reforms to encompass distribution of tax burdens to various income groups; the growing level of budget deficit; and the inherent difficulties encountered in taxing the informal sector and agriculture (Karingi et al., 2005). The lessons derived from the study include: first, careful assessment of policy reforms, accounting for institutional, demographic, technological, and economic changes; second, embracing enhanced administrative capacity; and third, simplification of the tax system.

Moyi and Ronge (2006) sought to identify and prioritise tax reforms in Kenya. They found that inflation adversely affected tax collection and the tax structure was not buoyant as expected. The study noted the following challenges in the tax system: inherent difficulties encountered in taxing agricultural and informal sectors; too many tax holidays being granted; effective protection being too high; dispersion of tariff rates were also high; rigid custom rules; low response of Value Added Tax to reforms; and processing of voluminous returns and refunds for zero-rated commodities with low capacity to do so.

According to Mwakalobo (2009), the performance of Kenya's tax system responds to the changes in the tax policy. The study found that tax buoyancy had improved as a result of commencement of economic reforms. The improvement coincided with the period from mid-1980s to 1990s in which the government undertook tax reforms. When tax performance of the system was compared between pre-reform and post-reform periods, the results showed that the system had responded to changes in economic activities as a result of reforms. The system became more responsive after the 1987 reforms (Mwakalobo, 2009). This was attributed to the tax reforms that led to increased revenue from excise, sales, and income taxes; minimal tax exemptions; widening of the VAT brackets for goods and services; and an increasing tax base.

Research Gap

The study captures the effect of unusual circumstances and population as determinants of income tax revenues, which is a departure from the reviewed studies. Population is a control variable that has not been used by other studies as a determinant of income tax revenue. The inclusion of population as a variable is informed by the fact that demographic structure in Kenya exhibits high population growth rate. This is associated with high unemployment rate that makes it difficult to implement income tax policies because of low incomes. Moreover, high population growth rate influences tax policies through increased demand for public goods and services.

The study also separates the effects on tax revenues of monetary GDP from that of total GDP. The reason for this is that monetization of economic activities may lead to an easy way of collecting income tax revenues and enhancing of tax administration that reduces the underground economy.

The study uses average GDP because tax data are published as per fiscal year that starts on July 1st each calendar year and ends on 30th June of the next calendar year. On the other hand

GDP data are on calendar year basis. So for any meaningful results to be obtained, average GDP is to be used for estimation purposes. This is a key departure from the past studies.

Contribution of the Study

The study contributes to the existing knowledge on the income tax system in Kenya. The fact that additional variables such as population and unusual circumstances are included in the estimating models, makes the results a key ingredient to designing growth-oriented income tax system and a ground breaker in this area. The identified determinants of income tax revenues will make it possible to predict accurately tax revenues within a specified period of time.

The study uncovers comprehensive evidence on the variables that affect income tax revenues. It therefore provides an informed basis for taking action on income tax policy and fills the gap about what is currently known and unknown regarding income tax revenue functions in Kenya. The inclusion of additional variables that affect income tax revenues in the tax equations makes it possible to predict income tax revenues accurately.

Research Methodology

Type of Study

This is an empirical study that has both theory and review of literature. It uses both quantitative and qualitative data to estimate the income tax elasticity. A causal relationship is hypothesised between income tax revenue and its base (GDP) in addition to other variables. In the study, hypotheses that are derived from economic theory are tested to determine their validity.

Empirical Model and Estimating Procedures

Multiplicative form of income tax revenue model was specified as follows:

$T = e^{\beta} Y^{\alpha} e^{\varepsilon}$…….. (1)

Where: = Income tax revenue

α = Tax buoyancy

Y = GDP

β = Intercept term

e = Natural number

ε = Random term

This specification follows standard practice in the estimation of tax buoyancy and elasticities (Wilford & Wilford, 1978a & 1978b; Rao, 1979; Omuroyi, 1983; Asher, 1989; Osoro, 1993; & 1995; Ariyo, 1997; Wawire, 2000; 2003; 2006; & 2011; Muriithi & Moyi, 2003). The log linear function was derived from the multiplicative form in order to estimate the coefficients by use of Ordinary Least Squares (OLS) method. The linearization was done by taking the logarithms of the variables in equation 1. An error term was then introduced and a subscript i, that stood for the type of income tax revenue. The estimating equation was therefore:

$\ln T_i = \beta_i + \alpha_i \ln Y + \varepsilon_i$ …… (2)

Where, i = Type of income

The approach explained so far does not take care of unusual circumstances and the nature of the tax system that involves institutional and demographic factors which contribute to the trends in income tax revenue in the economy. Since the tax revenues might change with time because of the changes in these factors, equation 2 is re-specified and dummies introduced for discretionary changes and special circumstances in order to capture their effects on income tax revenue. Dummies were introduced in those years where reforms and unusual observations occurred (see also Johnston & Dinardo, 1997; Thomas, 1997; Kennedy, 1989; Wilford & Wilford, 1978a). The re-parameterized and re-specified estimating equation was:

$$T = e^{\sum \alpha Di} Y^{\sigma} e^{\epsilon} \ldots\ldots\ldots\ldots\ldots\ldots \quad (3)$$

Where D = 0 for no unusual observations(s) or discretionary changes, and D = 1 for unusual observation(s) or discretionary changes. σ is a measure of the income tax elasticity. The log linear form of equation (3), where unusual observations or discretionary changes were detected was:

$$\ln T_t = \sum_{t=1}^{k} \alpha_i D_t + \sigma \ln Y + \in i \ldots\ldots\ldots\ldots\ldots \quad (4)$$

Where, K = dummies for dictionary changes and unusual observations

$\in$ = Disturbance term

Over a long period of time and the fact that there are unusual observations and discretionary changes being experienced, not only do intercept change but also slopes (Ariyo, 1997). Therefore a slope dummy is introduced in equation (4) by interacting Y with the dummy variable. Lags in the tax base (GDP) is also introduced in the estimating equation due to the fact that new policy guidelines in the budget speech are implemented only after the circulars have been received by implementing agencies. Hence there is need to model the effects of the implementation time lag to the income tax revenue. The income tax revenue equations that are estimated are as follows.

$$InT_t = \sum_{t=1}^{k} \alpha_{jt} D_t + \sigma_1 InY_t + \sigma_2 InY_t + \lambda_i D_t * Y_t + \gamma_i D_t * Y_{t-1} + \in t \ldots\ldots\ldots \quad (5)$$

Where,

Y_t	=	Current income (GDP)
Y_{t-1}	=	Previous year income (GDP)
t	=	year
T	=	Income tax revenues
D_t	=	Intercept dummy variables
αi	=	Coefficients of intercept dummies, 1…i
γ_i	=	Coefficients of slope dummies, 1…i
σ_1, σ_2	=	Income tax elasticity estimates

Definition and Measurement of Variables

The dependent variable is defined as follows:

Income Tax Revenue (T): Amount of money collected per fiscal year from personal income tax and corporate income tax. This is the dependent variable. It is measured in Kenya shilling.

The independent variables are defined as follows:

Total Gross Domestic Product (Y): This is the total value of goods and services produced in one fiscal year within the borders of the Kenyan economy. The nominal GDP was measured in Kenya shillings. The real total GDP was obtained after netting out the effect of inflation from the nominal GDP using the GDP deflator. This is one of the independent variables.

Monetary Gross Domestic Product (Y): This is the value of goods and services produced in one fiscal year within the borders of the Kenyan economy that is exchanged in the markets. The monetary GDP was measured in Kenya shillings. The real monetary GDP was obtained after netting out the effect of inflation from the monetary GDP using the GDP deflator.

Population: Total number of people in Kenya per year for the fifty years under study. It is measured in millions of shillings.

Dummy Variable (D1): Captures the effects of the following on income tax revenue; oil crisis, unfavourable weather, donor funds suspension, ethnic clashes, terrorism, multiparty elections (D = 1for years 1973, 1979, 1983, 1984, 1993, 1998, 2002, 2008, 2013= 0 otherwise).

Dummy Variable (D2): Captures the effects of the following on income tax revenue; unusual circumstances such as East Africa community market, coffee and tea booms, budget rationalization, establishment of KRA, broadening income tax base, widening income tax base, reducing corporate income tax rate, constitution implementation and online services (D = 1 for years 1972, 1977, 1978, 1985, 1986, 1995, 2010, 2014 = 0 for others).

Dummy Variable (D3): Captures the effects of the following on income tax revenue; unusual circumstances such as coup attempt, drought, El Nino (D= 1 for 1982, 1983, 1997, 1998, = 0 otherwise).

Working Alternative Hypotheses

(i) Total GDP has a positive effect on the amount of income tax revenue collected.

(ii) Monetary GDP has a positive effect on the amount of income tax revenue collected.

(iii) Population has a negative effect on the amount of income tax revenue collected.

(iv) The following unusual circumstances have a negative effect on the amount of income tax revenue collected: oil crisis, unfavorable weather, donor funds suspension, ethnic clashes, terrorism, and multiparty elections.

(v) The following unusual circumstances have a positive effect on the amount of income tax revenue collected: East Africa Community Market establishment, coffee and tea booms, budget rationalization, establishment of KRA, broadening income tax base, widening income tax base, reducing corporate income tax rate, constitution implementation and introduction of the online services.

(vi) The following unusual circumstances have a negative effect on the amount of income tax revenue collected: coup attempt, drought, and El Nino.

Data Type, Source and Collection

Both quantitative and qualitative data were collected for the purpose of estimating the income tax productivity for the tax system of Kenya. The sources of time series data on Gross Domestic

Product (proxy of income), income tax revenues, discretionary changes and unusual observations were: International Monetary Fund Financial Statistics Year Books, Budget Speeches, the Quarterly Budgetary Reviews, Statistical Abstracts, Economic Surveys, KRA documents, Kenya Institute of Public Policy and Research (KIPPRA) documents. The data was collected for a period of fifty years from 1964/65 to 2014/2015.

Data Refinement

The variables are converted to real values using 1995 as the base year since macroeconomic variables did not show unusual behaviour during this year and also it was a year that experienced few changes in the economy. GDP deflator is applied in converting nominal GDP to its real values while Consumer Price Index is used to convert the income tax revenues to real values in order to avoid biased results due to inflation. A control factor in the study is the population since high population is associated with high illiteracy rate that makes it difficult to implement income tax policies.

Time Series Properties

Various diagnostic tests were carried out so as to ascertain the fact that the equations were statistically sound. Akaike Information criterion (AIC) and the Schwarz Criterion (SC) were used to determine the appropriate number of lags for each estimated equation. Correlation analysis was used to detect multicollinearity, the presence of which would have impaired the efficiency of the estimated elasticities or made it impossible to estimate them.

The tests for stationarity of variables were done following Augmented Dickey Fuller (ADF) procedures (Dickey & Fuller, 1979; Mackinnon, 1991; Thomas, 1997). The presence of spurious correlation due to serial autocorrelation was tested using Durbin-Watson (D.W) statistic and the Breusch-Godfrey asymptotic (LM) tests. Information on non-stationary series was captured without sacrificing the statistical validity of the estimated income tax equations by use of cointegration technique (Granger, 1986; Engle & Granger, 1987). The Philip-Perron (PP) and the ADF unit root tests were vital in this exercise. Several other diagnostic tests were also performed and their results reported.

Several diagnostic tests were carried out to determine a meaningful long run relationship before elasticity estimates were derived. The model specified for the exercise was the Autoregressive Distributed Lag (ARDL). From the ARDL model, the procedure outlined by Johnston and Dinardo (1997), and Hill, Griffiths, and Judge (2001) were followed when computing the elasticity.

Data Analysis and Results Interpretation

The objectives of the study is attained through the estimation of a log linear income tax function. The log linear form is preferred because it allows the coefficients of total GDP and the monetary GDP to be interpreted as elasticities of income tax system. The magnitude of the coefficient of GDP indicate the productivity of the income tax system. The decision making criteria is that if the coefficient of GDP is less than one (1), then the income tax system is inelastic and the percentage change in income tax is less than the percentage change in GDP. If the coefficient of GDP is one (1), then the income tax system's elasticity is unity and a given percentage change in GDP will result in a proportionate change in income tax revenue. If the coefficient is more than one (1), then the system is elastic and quite productive. A higher percent of income tax revenue will be collected for each percentage change in GDP. Dummy variables are interpreted as having

an effect or no effect on the income tax revenue collected, depending on whether their coefficients are statistically significant or insignificant. Their signs, whether negative or positive, are also taken into account when interpreting the coefficients for dummy variables.

The Autoregressive Distribution Lag (ARDL) relation that is used in the study to capture the long run elasticity of the income tax system in Kenya is given as:

$$A(L)\,Y_t = m + B_1(L)\,X_{1t} + B_2(L)\,X_{2t} + \varepsilon_t \quad \text{..... (7)}$$

And the implied long run relationship is:

$$\tilde{y} = \frac{m}{A(1)} + \frac{B_2(1)}{A(1)}\bar{X}_t + \frac{B_2(1)}{A(1)}\bar{X}_2 \quad \text{..... (8)}$$

Where;

A (1) = 1- sum of the coefficients of lagged dependent variables (Y)

B1 (1) = Sum of the coefficients of explanatory variables, X_{1t}.

B2 (1) = Sum of the coefficients of explanatory variables, X_{2t}.

The coefficients of the non-lagged explanatory variables were taken as the short run elasticity estimates. The following formula was used to find the long run elasticity estimates:

$\frac{B_1(1)}{A(1)}$, and $\frac{B_2(1)}{A(1)}$, for X_1 and X_2 respectively.

Empirical Results and Discussions

Diagnostic and Distributional Tests Results

The following table shows the empirical results for stationarity of variables and AIC and SIC tests.

Table 1: Table showing diagnostic test results for regression residuals (1% Critical value)

Dependent variable	Tax base	Unit root tests for regression residuals				Other criteria	
		ADF test		PP test		Akaike information	Schwarz
		Statistic	Critical value	Statistic	Critical value		
Log income tax revenue	Log total GDP	-3.2*	-3.7	-5.1*	-3.7	-1.40	-1.10
	Log monetary GDP	-4.6*	-3.7	-6.4*	-3.7	-2.80	-2.20

Source: Own calculations

The results depicted in Table 1 show that the variables were non-stationary at levels at one percent critical value. However, they were stationary at first difference with an intercept and four lags. The results also imply the existence of a cointegrating relationship. To ensure that the dynamic specification of the income tax equations fitted the data well, it was important to show

that the features of the data were consistent with economic theory. Therefore several distribution tests of variables and other important properties were performed. Jarque-Bera test results are presented in Table 2.

Table 2: Table showing Jarque-Bera test results

Dependent variable	Independent variable	With population		Per capita taxes	
		Test stat.	Prob.	Test stat.	Prob.
Log Income tax revenue	Log total GDP	0.34	0.85	0.09	0.96
	Log monetary GDP	2.10	0.35	0.84	0.66

Source: Own calculations

The results in Table 2 show the non-rejection of the normality assumptions of the regression residuals since the probability values (p-values) are greater than 0.05. OLS coefficients that were estimated are therefore efficient and consistent. The results for serial correlation are presented in Table 3.

Table 3: Table showing autocorrelation test results

Dependent variable	Independent variable	Durbin-Watson test statistic		Langrage Multiplier Test			
				With pop.		Per capita taxes	
		With pop.	Per capita taxes	Test stat.	Prob.	Test stat.	Prob.
Log income tax revenue	Log total GDP	1.70*	1.80	0.16	0.86	0.18	0.84
	Log monetary GDP	2.30	2.20	0.87	0.44	0.50	0.61

Source: Own calculations
The asterisk (*) imply a relatively low Durbin-Watson statistic and significant LM test statistic

The results for DW statistics in Table 3 show that there is no serial correlation since values are greater than two. The problem with using the DW statistic to test the presence of serial correlation is that it has a relatively low explanation power since it is a test of the first order auto-correlation (See Thomas, 1997; Adam, 1998). It is also a fact that where there is a lagged dependent variable, which is the case with the income tax equations, this was bound to bias the statistic for DW towards two. Therefore, the LM test was used because it has a higher explanatory power than the DW statistic. Specifically for the current study, this was embraced by inclusion of lagged dependent variables as explanatory variables and making the error generating process autoregressive type. From the results, the hypotheses of no serial correlation for the income tax equations are not rejected since the probability values are greater than 0.05.

The Autoregressive Conditional Heteroscedasticity (ARCH) residual test was done in recognition of the fact that the series may have serial correlation disturbances that may lead to homoscedasticity (See Johnson & Dinardo, 1997). The results for homoscedasticity and heteroscedasticity are depicted in Table 4.

Table 4: Table showing homoscedasticity and heteroscedasticity tests results

Dependent variable	Independent variable	ARCH test				White test			
		With population		Per capita taxes		With population		Per capita taxes	
		F-stat	Prob.	F-stat	Prob.	F-stat	Prob.	F-stat	Prob.
Log income tax revenue	Log total GDP	0.15	0.70	0.03	0.87	1.33	0.29	3.00*	0.02
	Log monetary GDP	0.00	0.95	0.04	0.84	1.60	0.24	2.58*	0.06

Source: Own calculations

The ARCH tests show p-values of coefficients that are between 0.13 and 0.99, with p-values of F-statistics that are between 0.11 and 0.96. The p-values are high by any standard meaning that the assumption of homoscedasticity of the residuals for the income tax equations was not rejected in favour of the ARCH residuals. Furthermore, there was no presence of heteroscedasticity since the results of white test show high p-values greater than 0.05.

The Ramsey Regression Equation Specification Error Test (RESET) was carried out to determine if the equation was well specified. Table 5 that follows presents the results.

Table 5: Table showing Ramsey RESET and Chow Forecast tests results

Explanatory variable	Independent variable	Ramsey RESET				Chow test			
		With population		Per capita taxes		With population		Per capita taxes	
		F	Prob.	F	Prob.	F	Prob.	F	Prob.
Log income tax revenue	Log total GDP	1.32	0.26	1.73	0.20	0.55	0.76	0.18	0.98
	Log monetary GDP	0.07	0.79	2.40	0.12	1.50	0.26	1.68	0.20

Source: Own calculations

The p-values are quite high (greater than 0.05) implying lack of evidence for model miss-specification. The results of the Chow Forecast test for parameter constancy show p-values that are greater than 0.05, implying that they are constant.

Regression Results for the Income Tax Function

Table 6 that follows reports the regression results.

Table 6: Table showing income tax revenue productivity regression results (t-statistics are in parenthesis)

Independent variables	Dependent Variables			
	Log income tax revenue	Log per capita income revenue	Log income tax revenue	Log per capita income revenue
Constant	-0.1 (-0.04)	0.21 (0.08)	1.3 (1.4)	1.62* (1.9)
Oil crisis, unfavourable weather, donor funds suspension, ethnic clashes, terrorism, multiparty elections (D = 1for years 1973, 1979, 1983, 1984, 1993, 1998, 2002, 2008, 2013= 0 otherwise)	-0.57** (-5.1)	-0.61** (-5.5)	-0.42** (-6.1)	-0.44** (-6.2)
Log total GDP	1.93** (3.2)	2.3** (4.0)		
Log population	-0.04 (-0.1)		0.17 (0.9)	
First lag of log total GDP	-1.46* (-2.5)	-1.69** (-2.9)		
Fifth lag of log total GDP	1.86** (3.1)	2.25** (3.8)		
Sixth lag of log total GDP	-1.49* (-2.4)	-2.16* (-4.3)		
Log monetary GDP			1.96** (5.3)	2.07** (5.4)

First lag of log monetary GDP			-1.82** (-3.3)	-1.98** (-3.5)
Second lag of log monetary GDP			0.84 (1.7)	0.87 (1.7)
Third lag of log monetary GDP			-1.16** (-3.2)	-1.1** (-2.9)
Fifth lag of log monetary GDP			1.19** (3.4)	1.33** (3.8)
Sixth lag of log monetary GDP			-0.62* (-2.0)	-0.88** (-3.3)
First lag of log income tax revenue			0.36** (4.3)	0.36** (4.0)
East Africa community market, coffee & tea booms, budget rationalization, establishment of KRA, broadening income tax base, widening income tax base, reducing corporate income tax rate, constitution implementation and introduction of online services (D = 1 for years 1972, 1977, 1978, 1985, 1986, 1995, 2010, 2014 = 0 for others)			0.25* (7.0)	0.25* (6.6)
Coup attempt, drought, El Nino (D= 1 for 1982, 1983, 1997, 1998, = 0 otherwise)			-0.17** (-3.9)	-0.15** (-3.4)
Adjusted R-squared Standard error of regression Durbin-Watson statistic Degrees of freedom F-statistic P-value	0.83 0.11 1.7 32 25 0.00	0.66 0.11 1.8 32 12 0.00	0.96 0.05 2.3 32 64 0.00	0.92 0.05 2.2 32 33 0.00

The asterisk (*) and (**) denotes parameter estimate that are statistically significant at five percent level and one percent level respectively.

The regression results in Table 6 show that in the short run, the income tax system is elastic with respect to total GDP and log monetary GDP since the two coefficients are greater than one. The coefficient on log monetary GDP (1.96) in the equation for log income tax revenue is statistically significant and has a positive sign. The coefficient is also greater than one on total GDP (1.93) by 0.03. The implication is that economic activities that surround monetary GDP are easy to trace for taxation purpose compared to the non-monetary ones. The findings also indicate that there exists an informal sector and a black economy that involves rent seeking activities and smuggled goods and currency (see also, Osoro, 1995 & 2009; Mwanza, 1997).

The lagged values for log monetary GDP have negative and statistically significant coefficients (except for the positive coefficients of its second and fifth lagged values). This means that the previous levels of monetary GDP are related to the amount of current income tax collection. Furthermore, the coefficients on the lagged values of log income tax revenue are statistically significant, meaning that the current income tax yields are influenced by the previous tax yields.

The coefficient on log population in the equation that captured monetary GDP is positive but statistically insignificant. This can be attributed to the KRA targeting of individual income taxpayers through online services so as to increase tax compliance. However, the coefficient on log population in the equation for log income tax revenue that contained log total GDP is negative and statistically insignificant. This means that an increasing population leads to a decreasing individual income tax yields. This can be attributed to the increase in dependency ratio (World

Bank, 2003), free rider problem practiced by some potential income taxpayers (Barnett, 1993; Borooah, 1993; KRA, 2010), tax evasion (Pyle, 1993; KRA, 2010), tax avoidance and corruption.

The following unusual circumstances and discretionary changes are found to have had a positive influence on the income tax collections: establishment of East Africa Commodity Market, coffee and tea booms, budget rationalization, establishment of KRA, broadening income tax base, widening income tax base, reducing corporate income tax rate, implementation of the constitution and introduction of the online services. These unusual circumstances and discretionary changes increased the income earning and filing capacity of the citizens leading to less tax evasion and avoidance and improved income tax collections from individuals and corporates.

The following unusual circumstances had negative effects on income tax revenue collection: coup d'etat attempt; oil price shocks; droughts and the resulting power rationing; suspension of donor funds that included the World Bank's Structural Adjustment Credit and International Monetary Fund's Enhanced Structural Adjustment Facility. Others were ethnic violence that affected agricultural production; political uncertainty caused by multiparty elections; decreased tourism activities due to some trade partners putting in place travel adversaries in the wake of enhanced terrorism activities; and poor infrastructure linked to El Nino. Note that the model with slope dummy variables did not fit the data well hence the one with intercept dummy variables which best fitted the data was chosen.

The long run income tax revenue elasticity was estimated from the ARDL regression results following standard procedures explained in methodology section. The long run income tax elasticity is appropriate for analysing income tax revenues than the short run one because it takes into account the effects on income tax of discretionary changes, institutional and demographic variables. The long run tax elasticity for income tax revenue was 0.83 implying an income tax system that is insensitive to growth in income. The results are supported by studies done by Ole (1975), Njoroge (1993), Wawire (2011; & 2003). The policymakers should therefore expect the growth rate in income tax revenues to be less than proportionate to growth in income.

Conclusion

Income tax system is growth inelastic despite the argument that it should be among the most elastic ones for it to be an important source of tax revenue. The tax elasticities with respect to GDP are less than those with respect to monetary GDP pointing to the existence of an underground economy. Borrowing from Osoro's (1995) study, this underground economy in Kenya may consist of the parallel market that comprises rent seeking activities, the black market that comprises smuggled commodities and currencies, and the vibrant informal sector.

This finding suggests that the income tax reform efforts by KRA have not yet borne the expected fruits. These efforts include, for example, mandatory acquisition of Personal Identification Number (PIN), compulsory filing of tax returns by all civil servants and provision of online tax services. However, the finding may support the success of the government's efforts in reducing the number of low-income earners directly involved in income tax payment (Republic of Kenya, 1997). Furthermore, the finding may suggest that income taxes in the long run throttle the effort that produces the taxable income through disincentive to save, invest and work. Moreover, income tax revenue declines with the increase in population which can be attributed to the high dependency ratio, free rider problem, tax evasion and avoidance, and corruption.

The challenges that have made it difficult for these reforms to translate into higher income tax revenue seem to be attributed to the structural weaknesses in the economy. That is, high poverty

level, high dependency ratio, low levels of formal employment, and low wages. These are serious constraints on the ability of the country to raise income tax revenue collections.

Policy Implications

The finding that income tax system is inelastic in Kenya has several policy implications. It implies that at this point in time, when trade taxes are being reduced within the Common Market for Eastern and Southern Africa (COMESA) and in the East African Community (EAC), tax reform measures should focus on the factors that affect income tax revenue in order to make the system more elastic and therefore productive. This will be vital in providing tax revenue needed to accelerate economic growth without the need for continuous discretionary changes in income tax policies.

To increase revenue from personal and corporate income taxes, the government should expand their bases by approving fewer tax exemptions, using presumptive taxation for those taxpayers in the hard-to-tax sectors and relying on withholding taxes in order to reduce tax evasion and avoidance. This is because the inelastic income tax could be due to increased tax evasion and avoidance.

There should be hastened implementation of new policy guidelines contained in the budget speeches and other tax policy documents. This will avoid potential adverse effects of the implementation time lags on revenue collections from income tax. This is because the results show that time lags are important in determining income tax revenue collection.

Population growth rate must be controlled since it impacts negatively on tax revenues. Hence reduction in the birth rate is vital and tax relief for married couples should not be used to encourage large families.

Tax brackets should be continuously reviewed to benefit the low-income earners and keep tax rates low to reduce the black economy activities and avoid distorting the markets.

KRA should put in place an electronic system that links Government Ministries and Financial Institutions such as Central Bank and Commercial Banks with the Integrated Financial Management Information system (IFMIS). This will make it easier for the KRA to monitor money flows into and out of the personal accounts and ministries accounts. The money flow can then be compared with the tax returns filed. This exercise will go a long way to help in identifying tax evaders in addition to reducing corruption substantially.

Limitations of the Study

The study uses time series data that was collected from published and unpublished documents generated by government and international organisations. This data might not have been consistent throughout the period of study. This may have created biasness in the coefficients that were estimated. Therefore, caution need to be exercised when using the result of this study for policy formulation. It is also possible that not all factors that affect income tax revenue collected were included in the estimating models. Furthermore, there are known limitations of time series data in terms of how it is collected.

Scope for Future Research

The following areas are recommended for further research:

(i) An investigation into the income revenue sources of Country Governments.

(ii) A detailed investigation of the income tax compliance using primary data.

(iii) An analysis of individual productivity of corporate and personal income taxes.

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