ANALYSIS OF RESPONSIVENESS OF TAX REVENUE TO CHANGES IN NATIONAL INCOME IN KENYA BETWEEN 1986 -2009

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Abstract

Over the years, the Kenyan government has continued to experience budget deficit. This has been partly attributed to the inability of the tax system to generate sufficient revenue to finance public expenditure. Inadequacy of tax revenue to finance public expenditure has largely been attributed to lack of responsiveness of tax revenue to changes in national income. To reverse the trend, the Kenyan government has continued to initiate and implement tax reforms over years. The purpose of this study was to analyze the responsiveness of tax revenue to changes in national income using tax elasticity and buoyancy given the various tax reform measures that have been mooted over years. This was guided by various specific objectives namely i) to determine the income-elasticity of tax revenue; ii) to determine buoyancy of tax revenue; iii) to examine tax-to-base elasticity of tax revenue; and iv) to determine base to income elasticity of tax revenue. By adopting a causal research design, a multiplicative model of estimating elasticity and buoyancy was used. In terms of data, the study relied primarily on secondary data obtained from various Kenya Statistical Abstracts, Economic Surveys and International Financial Statistics Browser. ADF test was done to detect non stationarity and differencing done to make data stationary. The study found that the tax revenue was neither buoyant nor income-elastic despite reforms undertaken over period since 1986. On the basis of this, it was recommended that there is need re-evaluate the tax policy measures that have been implemented over the years to make tax responsive to national income while enhancing tax collection measures.

Key Words: Tax Elasticity; Tax Buoyancy; Budget Deficit

Background of the problem

The magnitude of government budget surplus/deficit has continued as one of probable single most important statistic measuring the impact of government fiscal policy in an economy. Fiscal deficit has become a recurring feature of public sector financing worldwide (Ariyo, 1997). This has been partly attributed to the desire of various governments to respond positively to the ever-increasing demands of the populace while at the same time enhance accelerated economic growth and development. In many instances, according to Chipeta (1998), tax as a source of revenue for the government has failed to generate adequate revenue to finance the expenditures thereby continuously contributing to budget deficits. As a result, many countries have resorted to internal and external borrowings as alternative sources of revenue especially in the short run to finance the deficit. This tendency toward deficit financing is more pronounced in developing countries where majority of the population are poor and look upon the government for the provision of the necessary public goods. These sources of finance are however, not sustainable in the medium and long terms. Chipeta (1998) contended that these sources of revenue have partly contributed in many countries towards inflationary conditions and therefore countries must design a tax system that can raise adequate revenue.

Moreover, external funds can no longer be relied upon given the recent world financial and economic crisis and the continuous donor conditions slapped on many developing countries. As rightly noted by analysts at the World Bank, 'it no longer makes sense to maintain the current mismatch between the volatile (short-term) character of aid flows and the long-term nature of expenditure commitments. According to David (2009) a rapid shift needs to be made towards building systems that are owned by countries and are fully consistent with their planning and budgeting processes (see also Bonnel, 2009).

In response, many countries, Kenya inclusive have made efforts to design a system that is viable and productive to finance and sustain government expenditure without recourse to deficit financing and foreign credit and aid by initiating tax reform measures. Mahon (1997) observed that tax reform involves the process of changing the way taxes are collected or managed by the government. It also involves the adoption of a Value Added Tax (VAT) or its expansion, elimination of stamps and other minor duties, simplification and broadening of personal or corporate income as well as asset taxes. Other reforms include the revision of tax codes, enactment of comprehensive administration and criminal penalties for evasion (Bird, 2003). Bird further noted that tax reforms also involve institutional aspects of tax reform introducing a Semi-Autonomous Revenue Authority (SARA) model, where traditional line departments are separated from the Ministry of Finance and granted the legal status of semi-autonomous authority (Bird, 2003). Musgrave (1987) on the other hand, noted that tax reforms involve broad issues of economic policy as well as specific problems of tax structure design and administration. In Mahon (1997), it was observed that at theoretical level, tax reforms are initiated either following an economic crisis or as a response to international pressure.

In Kenya, tax reforms become part of a large structural adjustment programmes that were incorporated in the economic restructuring between the Government of Kenya and the International Financial Institutions led by Breeton Wood institutions-World Bank and International Monetary Fund (IMF) in the mid 1980s (Fjeldstand and Rakners, 2003). Consequently, substantial tax reforms followed fiscal crisis that were being experienced at the time and the resulting pressures for reform from IMF and World Bank. In response, the Kenya government adopted tax reforms voluntarily to gain favour with powerful international donors. Further, tax reforms in Kenya were necessitated by increasing complexity of tax codes, narrow tax base and concerns with horizontal equity (Taliercio, 2004). The reforms entailed separating traditional line departments from the Ministry of Finance (MOF) by establishing Kenya Revenue Authority (KRA) in 1995 as a legal autonomous entity charged with the responsibility of improving tax collection through efficient administration, assessment, collection, and enforcement of tax law and policies.

Tax reforms measures in the country have been emphasized in various policy documents including the Economic Recovery Strategy (ERS) for wealth and employment creation of 2003, the National Development Plans of 1994-1998 and 2002-2008, and Tax Management Administration Guidelines of 1986. In the policy documents, the government emphasized the need to raise more tax revenue without increasing the burden on those who are already contributing to the exchequer. For instance, the tax measures contained in the Tax Management Administration Guidelines emphasize broadening the tax base to while at the same time continue to strengthen tax administration. Additionally, devising a tax structure that distribute income equitably and promotes rural-urban balance, reduce compliance and administrative costs through low and rationalized tax rates were reiterated. Other measures included improved tax administration by sealing leakages loopholes, and designing a buoyant and elastic tax system that keeps revenues expanding at the same pace with income growth without annual changes in rates, among other goals (GoK, 1996). In Karingi *et al.* (2005), it was noted that the government adopted the tax reforms after realizing that the present tax structure could not raise adequate revenues and continuous use of domestic borrowing and seeking external borrowing could not be relied on as a long term strategy of financing budget deficits. Furthermore, potential sources for domestic borrowing are few while external grants reduce the country's autonomy as well as an increase in political and economic dependence (Wawire, 2006). In lieu of this, Wawire (2006) observed that the alternative is to raise money through taxation.

High revenue productivity from a tax system is normally considered as one of the criteria of a good tax system in developing countries (Musgrave, 1989). Studies by Ariyo (1997), Osoro (1993), Karingi *et al.* (2005), Moyi and Ronge (2006) contend that, both tax policy reforms and tax administration reforms, are crucial in making tax revenue responsive to changes in national income which in the process enhances revenue productivity. In an attempt to increase the tax revenue, government through Sessional Paper No. 1 of 1986, introduced measures aimed at increasing tax revenues. The most notable policy were Tax Modernization Programme (TMP) that was adopted in 1986 and the Budget Rationalization Programme of 1987. More recently the focus has expanded to address the capacity and efficiency of the tax administration which led to creation of Kenya Revenue Authority (KRA) as an autonomous institution charged with the responsibility of collecting tax revenue on behalf of the government. Since 1986 when Tax Modernization Programme was introduced, various changes have been experienced. These changes include transforming sales tax to value added tax (VAT), introduction of excise duties, and fluctuations of GDP.

Others relate to political uncertainty in the wake of multiparty elections, change of political regime in 2002 and formation of Grand Coalition government in 2008, introduction of electronic tax register in 2005 and granting the Kenya Ant-Corruption Commission (KACC) substantial authority to fight corruption. As a result of the changes, Kenya tax system was expected to generate tax revenue that was responsive to changes in national income as one of features of a good tax system. In this regards, tax structure should make the tax revenue income-elastic. This implies that tax revenue is supposed to show both strong pure responsiveness to changes in national income. According to Kusi (1998), a tax system that is responsive to economic growth is desirable since it enables tax revenue to grow automatically without resorting to the politically difficult task of raising tax rates. Kusi (1998) noted that if the tax system has tax revenue that is not responsive to changes in national income, it will end up having huge deficit financing which has negative impact on the other macroeconomic variables. As noted by Muriithi and Moyi (2003), the responsiveness of a tax system to change in national income can result from two effects namely either in-built flexibility (elasticity) or the buoyancy of the tax structure. Although studies exist with regard to the same, they are deficient in informing the policy process given the various macroeconomic changes that have evolved over time and continued tax reforms that the government has initiated and implemented. It is against this background that the study focused on analysis of the responsiveness of tax revenue to changes in national income in terms in-built flexibility and buoyancy of the tax structure for a period of 23 years.

Research objectives

The general objective of this study was to analyze responsiveness of tax revenue to changes in national income in Kenya. To address this general objective, the study was guided by four specific objectives namely: i) to determine elasticity of tax revenue of the tax system as a whole and of its major components; ii) to determine buoyancy of tax revenue of the tax system as a whole and of its major components; iii) to examine tax-to-base elasticity of major tax components; and iv) to find out base-to-income elasticity of major tax components.

The scope of the study

This study focused on the productivity of tax system of Kenya. The study was limited to the period 1985/86 to 2009/2010 for a number of reasons. This period is long enough to captures both the pure and total responsiveness of tax revenues to change in national income. It is within this period that the economy grew negatively before picking up in 2002 after positive political change in the country. From 2002 there was progressive economic growth until the 2007 general election. Further, it was during this period that the government introduced and implemented a host of tax reforms aimed at generating adequate revenue necessary for the provision of public goods. Therefore it is possible in this period, to capture the effects on tax revenues of such events like trade liberalization, privatization, tax modernization programmes and the establishment of KRA.

Theoretical Framework and Model

In the study, productivity of the tax system was determined by applying the concepts of tax buoyancy and elasticity. As noted by Amin (2000), assessing tax productivity is important because it not only allows the examination of the responsiveness of the tax system, but also because it affects the system's equity and efficiency effects. The income elasticity of a tax was broken down into tax-to-base and base-to-income elasticities. This implied that the elasticity of a tax was essentially the product of the elastic relative to the base and the elasticity of the base-to-income. As observed by Muriithi and Moyi (2003), the decomposition of elasticity into tax-to-base and base-to-income is useful for two reasons. This is necessary as it allows not only the identification of the source of either fast revenue growth or lagging revenue growth but also highlights that component of growth or lagging revenue growth. Second, it highlights that component of growth that is amenable to policy manipulation. Borrowing from Mansfield (1972), and assuming a system of *n* taxes, the tax revenue-to income elasticity was considered as the weighted sum of the individual tax elasticities expressed as:

$$E_T tY = (\Delta T_t / \Delta Y)(Y/T_t) \ldots\ldots 1$$

where T_t is total revenue; Y is income measured by gross domestic product; elasticity of k^{th} individual tax income; Δ is a discrete change in the variable associated with it.

Assuming elasticity of k^{th} individual tax to base, equation (1) was expressed as:

$$E_T kY = (\Delta T_t / \Delta \beta_K)(Y/T_k) \ldots\ldots 2$$

Where T_k is tax revenue from the k^{th} tax, β is the base of the k^{th} tax. Given that a tax system constitutes several tax component, equation (2) was expressed as:

$$E_T tY=\frac{T_1}{T_t}\left[\frac{\Delta T_1}{\Delta Y}\times\frac{Y}{T_1}\right]+\ldots+\frac{T_k}{T_t}\left[\frac{\Delta T_k}{\Delta Y}\times\frac{Y}{T_k}\right]+\ldots+\frac{T_n}{T_t}\left[\frac{\Delta T_n}{\Delta Y}\times\frac{Y}{T_n}\right] \quad \ldots\ldots\ldots\ldots\ldots\ldots 3$$

However, elasticity of total tax revenue to income is equal to the weighted sum of individual tax elasticities, with the functional distribution to total tax by each individual tax serving as its weight. The elasticity of any individual tax was thus decomposed into the product of elasticity of the tax to its base and the elasticity of base to income as shown n equation (4).

$$E_T kY=\left[\frac{\Delta T_k}{\Delta B_k}\times\frac{B_k}{T_k}\right]\left[\frac{\Delta B_k}{\Delta Y}\times\frac{Y}{B_k}\right] \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 4$$

Combining equation (3) and (4), equation (5) was obtained as the elasticity of total revenue to income in a system of *n* taxes.

$$E_T kY=\frac{T_1}{T_t}\left[\left(\frac{\Delta T_1}{\Delta B_1}\times\frac{B_1}{T_1}\right)\left(\frac{\Delta B_1}{\Delta Y}\times\frac{Y}{B_1}\right)\right]+\ldots+\frac{T_k}{T_t}\left[\left(\frac{\Delta T_k}{\Delta B_k}\times\frac{B_k}{T_k}\right)\left(\frac{\Delta B_k}{\Delta Y}\times\frac{Y}{B_k}+\ldots+\frac{T_n}{T_t}\right)\left[\left(\frac{\Delta T_n}{\Delta B_n}\times\frac{B_n}{T_n}\right)\left(\frac{\Delta B_n}{\Delta Y}\times\frac{Y}{B_n}\right)\right]\ldots\ldots\ldots 5$$

Estimated Model

Generally, the elasticity concept assumes the following functional relationship:

$$T^*=\alpha B^{\beta}\varepsilon \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 6$$

where T is tax revenue, B is tax base, α and β are parameters to be estimated, while ε is the multiplicative error term. Taking logs, equation (6) was expressed as:

$$\text{Log } T=\log\alpha+\beta\log B+\log\varepsilon \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 7$$

Equation (7) was expressed in standard form as:

$$\log T_t^*=\alpha+\beta\log B_t+\upsilon_t \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 8$$

where β is tax elasticity is defined as the responsiveness of revenue yields to movements in the base. To estimate elasticity of tax to income where there have been discretionary changes in tax policy, the model must be modified to correct for such policy changes. The procedure entails adjusting historical tax revenue series to eliminate the effects on tax revenue of all factors apart from GDP. The proportional adjustment (PA) method of eliminating the discretionary effects from the revenue series was invoked due to its superiority.

METHODOLOGY

This study adopted causal relationship research design as explained in Cooper and Schindler (2006). To attain the objectives of the study, fact sheet was prepared and used to collect the necessary time series data. Time series data in terms of various categories of taxes, total revenue as well as their bases, GDP deflator and consumer price index for the period ranging from 1986 to 2009, was collected from published official government reports including Economic Surveys and Statistical Abstracts. Additional data was collected from IFS – CD browser and DTMs as shown in appendix. Data collected on both dependent and independent variables were converted to real values measured in constant values of 2005 as the deflator. This deflator was chosen because it was not only the most comprehensive price index for GDP and but also measured correctly inflation since it amounted to weighted average of the changes in all prices in the economy. Similarly, time series data for GDP and its related variables were converted from their nominal values to their real values by dividing nominal values with the GDP deflator using 2005 as the base year.

Tax revenues on the other hand, were converted to their real values by dividing their nominal values with the consumer price index (CPI). This was necessary to avoid biased results that could have resulted from inflation. The CPI was used because it falls on the expenditure side of the GDP equation. According to Wawire (2006), CPI is more of a cost-of-living index and hence it is the right to employ for tax revenues which have the effects of reducing disposable personal income. Thus, the conversion of data was done in order to avoid biased results. Before running any regression, test for stationarity was conducted to determine the randomness and non-randomness of the data collected. This was considered crucial because time series analysis was perceived central to the understanding and modeling of dynamic response of tax revenues to changes in their bases. As explained in Gujarati (1995), the non-random behavior of time series data undermine the usefulness of the standard econometric methods applied without considering time series properties. Regression on such data is thus expected to be spurious and inconsistent thereby causing a common time trend. Stationarity test was done through unit root test. The unit root test model adopted was of the form:

$Y_t = Y_{t-1} + \mu_t$ ……………………………………………………………….8

where μ_t is the stochastic error term that follows the classical assumptions.
The equation above was a first-order or AR (1), regression in that, one regress the value of Y at time t on its value at time (t-1). Now if the coefficient of Y_{t-1} is in fact equal to 1, one faces what is known as the unit root problem that is a non-stationarity situation. Additionally, Augmented Dickey and Fuller (ADK) test was applied to test the stationarity of the variables. The tests showed that the time series for all variables in nominal terms were non-stationary at l0 percent while the first difference for all the variables in nominal terms was stationary at the same level. All variables in their real terms however, depicted no serious problem of non-stationarity. Thereafter, regression test for the unit root of their error term was done which revealed that the error term was stationary.

The study adopted the model used by Muriithi and Moyi (2003) with modifications to estimate tax buoyancy and tax elasticity. These modifications were considered necessary given the time lapse and the various tax reforms that have been implemented after study by Muriithi and Moyi (2003). Additionally, since 2003, there have been changes in terms macroeconomic economic performance of the country since then. The changes are exemplified in terms of economic growth and growth in various taxes considered in the study. Additionally, unlike Muriithi and Moi (2003) study, this study considered data for a slightly longer time. Others modifications introduced were conversation of nominal data to real values implying that the study applied both the nominal and real and compared the results. Finally this study considered stationarity of a time series data though important, was omitted in the previous study. In estimating the parameters, Ordinary Least Square (OLS) method was adopted using E-views package. The model was however, first linearized by taking the logarithms of the variables.

Further, proportional adjustment method which as suggested by Prest (1962) and later described by Mansfield (1972) was used. The adjusted data was then used to estimate the elasticity. This adjustment method was necessary because of a series of discretionary changes that have occurred between 1985/86 to 2009/10 fiscal years and the fact that using dummy variable technique may be unrealistic. Hypotheses were tested by determining the significance of the regression coefficients of relevant regression equations that was estimated and by determining whether the relevant regression coefficients are equal to one while at the same time examined whether the coefficient was statistically different from one. The p-value was compared to the significance level (α), and on this basis the null hypothesis was either accepted or rejected.

RESULTS AND FINDINGS

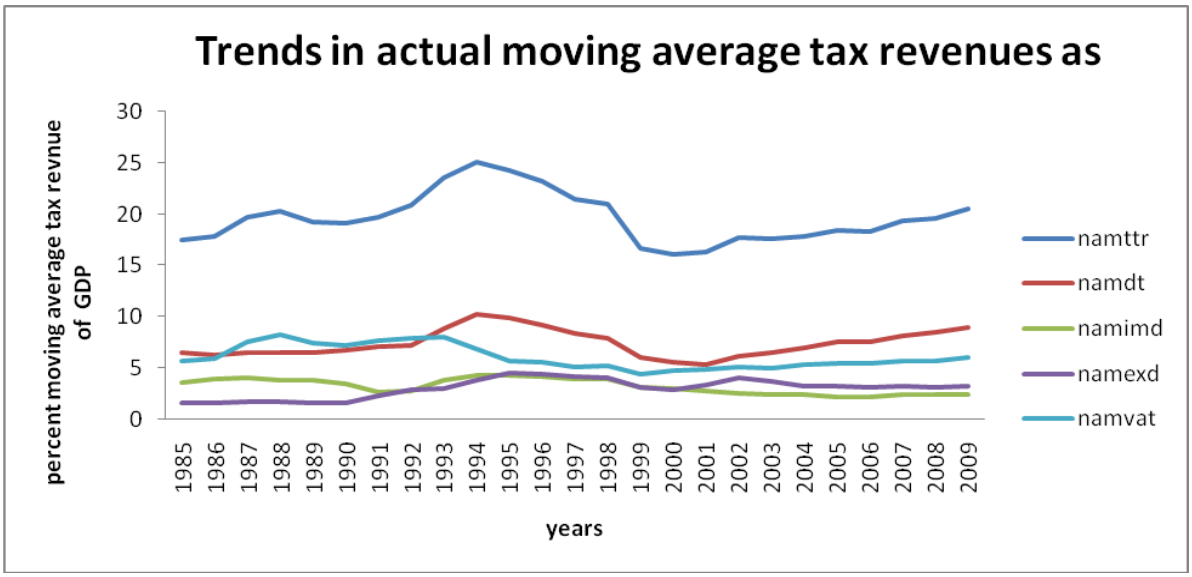
In this sub-section, the results are presented in terms of trends of various variables using charts. Similarly, regression results for elasticities and buoyancies are provided based on the research objectives. This is followed by the discussions on the basis of the regression results.

Trends in Tax Revenue as a percentage of GDP

Figure 1.1 depicts trends in tax ratios of the relative magnitudes of various categories of taxes and total tax revenues from major tax components as a percentage of Gross Domestic Product (GDP). As shown in the figure, there has been mixed trends in tax ratios over the period under consideration. Total tax revenue from major tax components as a percent of GDP exhibited an oscillatory trend over the years. For instance, in 1999/2000, it was estimated at about 16 percent compared to 25 percent experienced in 1993/94 fiscal year. However, between 1998/99 to 2001/02, low tax ratios were recorded. This low tax ratios could be attributed the low levels of economic growth rate experienced over this period accessioned by the political environment witnessed over this period in the country.

Over the same period, total tax revenue remained, however, high averaging above 23 percent of GDP. Given the macroeconomic performance witnessed in the country, this situation was not healthy especially for the private sector since it meant that most of the resources available for private for investment were being channeled to the public sector. This might have resulted in crowding out of private sector investment further contributing towards a decline in economic growth in the subsequent years. From 2003/04, the ratio however, rose. It is worth noting that during this period, the country experienced major change on the political front witnessing change of guard at the political arena. With the political change, the economy gradually started recovering from negative growth that had earlier experienced. Similarly, there was mixed results in terms of the various tax categories. In 1994/5 fiscal year, the ratio of the excise duty to GDP was highest at 4.5 per cent, before declining to 3.25 per cent in 2008/9. Over the same period, the ratio of import duty to GDP was highest at 4.27 per cent.

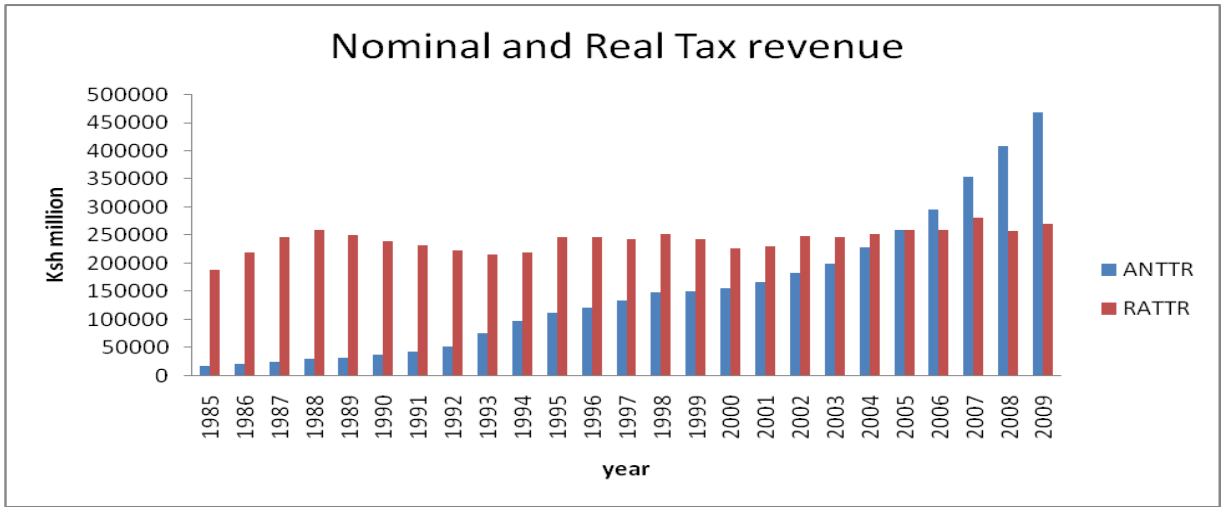
However, from the figure, it is clear that there has been gradual downward trend. This trend is a clear indication that in the country, there has been a shift away from international trade taxes towards taxes on domestic goods and services. This could partly be explained by the various economic integration blocks that Kenya joined over this period. As a result of joining these groupings, tariffs were either eliminated or reduced to the bare minimum. Further, this could be attributed to fact that like other countries in the Sub-Saharan Africa (SSA), the Kenyan government has realize the importance of taxes on domestic commodities



Source: Compiled from various issues of Economic Surveys and Statistical Abstracts

Trends in Tax Yield both in Nominal and Real Terms

Figure 1.2 shows the trend in tax yield in both nominal and real terms. As shown in the figure, it is clear that there has progressive growth of tax revenue from the major tax components over the period under consideration in both nominal and real terms. Specifically, the figure shows that whereas nominal total tax from major tax component increased throughout the period under the study, real tax revenue from major tax components depicted a fluctuation trend over the same period.



Source: Compiled from various issues of Economic Surveys and Statistical Abstracts

From the figure, tax revenue in real terms showed a rising trend between 1985 and 1988 before experiencing a decline. This trend continued until 1995 when an increase was realized. The revenue however, remained fairly stable over the years before declining in 2008. This trend could be explained by the various macroeconomic developments that were experienced over the same period.

Whereas in the early 1980s, considerable economic growth was experienced in the country, the trend was reversed in the late 1980s spilling over to early 1990s to the extent that the country was put under the watchful eye of IMF and World Bank culminating in putting the country under the Structural Adjustment Programmes (SAPs). This had some implication on the revenue collected over the same period.

Regression Results for Elasticity and Buoyancy

As earlier indicated, the general objective of this study was to analyze the responsiveness of tax revenue to changes in national income in Kenya. This was guided by two specific objectives namely i) determining elasticity of the tax system as a whole and of its major components, and, (ii) determining the buoyancy of tax revenue of the tax system as a whole and of its major components. This was achieved by testing the hypotheses that: (1) the tax revenue of a tax system as a whole and of its major components is unit elastic and, (2) tax revenue of the tax system as a whole and of its major components is unit buoyant. Table 1.1 provides the regression results in terms of p-values, the difference, and t-ratios for both tax elasticity and buoyancy.

Table 1.1: Elasticity of major tax categories in both Nominal and Real terms

Type of tax	Tax-to-income elasticity	t-ratio	p-value	Buoyancy	t-ratio	p-value	Difference[A]
Income tax	$0.525^{\Delta n}$	1.871	0.075	$0.5958^{\Delta n}$	1.541	0.138	0.475
	0.238^{r}	2.659	0.015	0.419^{r}	3.149	0.000	0.181
Import duties	$0.525^{\Delta n}$	1.871	0.075	$1.572^{\Delta n}$	3.634	0.001	1.047
	0.238^{r}	2.659	0.015	-0.535^{r}	-3.110	0.006	-0.773
Excise duties	$0.525^{\Delta n}$	1.871	0.075	$0.528^{\Delta n}$	1.023	0.317	0.475
	0.238^{r}	2.659	0.015	1.376^{r}	4.360	0.000	1.138
Sales/VAT	$0.525^{\Delta n}$	1.871	0.075	0.879^{n}	29.728	0.000	0.348
	0.238^{r}	2.659	0.015	-0.0414^{r}	-0.193	0.852	0.279
Overall tax	$0.509^{\Delta n}$	1.966	0.062	$0.525^{\Delta n}$	1.871	0.075	0.016
	-0.108	-0.859	0.400	$0.261^{\Delta n}$	2.659	0.015	0.369

Note: Δn implies that the index was obtained after differencing nominal figures; r: indicates results in real term; while A provides the difference in percentage points between the buoyancy and tax-to-income elasticity

Elasticity in nominal term for the whole tax system was 0.509 with a p-value 0.062 while the buoyancy in nominal term of the whole tax system was 0.525 with a corresponding p-value of 0.075. These results were statistically significant different from 1 at 10 % test level but statistically insignificant at 5% level of significance. The value of the difference in percentage points between the buoyancy and tax-to-income elasticity was 0.016. On the other hand, elasticity and buoyancy in real terms for the whole tax system was -0.108 and 0.261 with corresponding p-values of 0.402 and 0.0151, respectively. The results clearly show that it was only buoyancy that was statistically significant different from 1 at 1% level of significance.

Income tax had a buoyancy of 0.596 with p-value of 0.138, meaning it is not statistically significant different from 1 at both 5% and 10% level of significance. The difference in percentage points between the buoyancy and tax-to-income elasticity of income tax was 0.475. In real term, income tax elasticity had an elasticity of 0.238 with p-value 0.015 which was however, statistically significant at 5% level of significance. Its buoyancy on the other hand, was 0.419 with a p-value of 0.000 implying that it was statistically significant different from 1 at 5% test level. Import duty had a buoyancy of 1.52 with a p-value of 0.001 in nominal terms and statistically significant different from 1 at 1% level of significance. The difference in percentage points between the buoyancy and tax-to-income elasticity was 0.995.

In real term the buoyancy for import was 0.535 with a p-value 0.06 and an elasticity of 0.238 while its p-value was 0.015. This reveal that both elasticity and buoyancy were statistically significant different from 1 at 5% level of significance. Excise tax on the other hand, had a buoyancy of 0.528 with a p-value of 0.317 which was however, not statistically significant different from 1 at both 5% and 10% level of significance. The difference in percentage points between buoyancy and tax-to-income elasticity was 0.475. In real term, excise tax had an elasticity of 0.23 with a p-value of 0.015, which was statistically significant at 5% test level, while its buoyancy was 1.376 with a statistically significant p-value of 0.000. On the other hand, VAT tax had a buoyancy of 0.879 in nominal terms with a statistically significant p-value of 0.000 at 1% level of significance. The difference in percentage points between its buoyancy and tax-to-income was 0.348. In real terms, VAT had a buoyancy of -0.0414 with an insignificant p-value of 0.85 at 10 % level of significance.

Regression results for tax-to-income elasticity of major tax components

The last two specific objectives of the study were i) to determine tax-to-base elasticity of major tax components, and ii) to determine base-to-income elasticity of major tax components. This was achieved by testing the hypotheses that i) tax-to-base elasticity of major tax components is unit; and ii) base-to-income elasticity of major tax components is unit. The regression results of the analysis are shown in table 1.2.

Table 1.2: Tax-to-income Elasticity of Major Tax Components

Type of tax	Tax-to-base-Elasticity	t-ratio	p-value	Base-to-income-Elasticity	t-ratio	p-value
Income tax	$0.192^{\Delta n}$	0.674	0.507	$0.988^{\Delta n}$	12.913	0.000
	0.221^{r}	2.475	0.022	1.065^{r}	49.276	0.000
Import duties	$0.016^{\Delta n}$	0.537	0.596	$2.519^{\Delta n}$	1.241	0.228
	0.165^{r}	2.575	0.018	1.238^{r}	8.293	0.000
Excise duties	$0.159^{\Delta n}$	0.715	0.482	$1.121^{\Delta n}$	7.155	0.000
	0.166^{r}	2.741	0.013	1.188^{r}	10.437	0.000
Sales tax/VAT	$0.159^{\Delta n}$	0.715	0.482	$1.121^{\Delta n}$	7.155	0.000
	0.166^{r}	2.741	0.013	1.188^{r}	10.437	0.000

Note: Δn: Implies that the index was obtained after differencing nominal figures while r: implies results in real term

Income tax had a tax-to-base elasticity of 0.192 with p-value of 0.507 while its base-to-income elasticity was 0.988 with a p-value of 0.000 in nominal terms. In real terms, the tax-to-base elasticity and base-to-income elasticity of income tax were 0.221 with p-value of 0.002 and 1.065 with a p-value 0.0000 respectively. The results implied that tax-to-base elasticity and base-to-income elasticity of income tax in real term were statistically significant different from 1 at 1% level of significance. On the other hand, import duty had a tax-to-base elasticity of 0.016 with p-value of 0.596 while its corresponding base-to-income elasticity was 2.519 with a p-value of 0.228, in nominal terms. The results revealed that import duty was not statistically significant different at both 5% and 10% level of significance. In real terms, its corresponding tax-to-base elasticity was 0.165 with a statistically significant p-value of 0.018. The base-to-income elasticity was 1.238 with a statistically significant p-value of 0.000. Excise tax on the other hand, had tax-to-base elasticity and base-to-income elasticity of 0.159 and 1.121, respectively in nominal terms with corresponding p-values of 0.715 and 0.000. This means that tax-to-income elasticity of excise duty was not statistically different from 1 at both 5% and 10% level of significance.

In real term, excise tax had tax-to-base elasticity of 0.166 with p-value of 0.013 while base-to-income elasticity was 1.188 with p-value of 0.000, implying that excise tax was statistically significant different at 5% level of significance. Lastly, sales/VAT tax had a tax-to-base elasticity of 0.159 while its p-value was statistically insignificant different from 1 at 10% level of significance. The corresponding base-to-income elasticity was 1.121 with a statistically significant p-value of 0.000 in nominal terms 1 at 1% level of significance. In real terms, the tax-to-base elasticity and base-to-income elasticity of sales/VAT tax was 0.166 with p-values of 0.013 and 1.188 with p-value of 0.000 respectively. Both of them are statistically significant different from 1 at 5% level of significance.

Discussion

The results suggest that the overall tax system had a buoyancy of 0.525. This means the tax system yielded a 0.525% change in tax revenue, as a result of both automatic changes and discretionary policy for every 1% change in GDP. Thus a decreasing proportion of incremental income was transferred to the government in the form of taxes, implying that the tax system was less buoyant. From the regression results, both income tax and excise tax in nominal terms had buoyancies of 0.592 and 0.528 respectively which were not statistically significant different from 1. Import duty and Sales tax/VAT had on the other hand buoyancy of 1.572 and 0.879, respectively which were however, statistically significant different from 1. This means that excise tax was buoyant and did yield a 1.572% change in its tax revenue as a result of both automatic changes and discretionary policy, for every 1 % change in GDP. Sales tax/VAT, was however, not buoyant as it yielded only 0.879% changes in its tax revenue as a result of both automatic change and discretionary policy. In real terms all major tax components except excise tax exhibited buoyancy indices below unity, which were however, statistically significant different from 1. This reflects inflexibility of individual taxes in real terms.

Excise tax had a buoyancy of 1.376 in real terms which was statistically significant different from 1. In nominal terms sales tax/VAT was the most rigid with the lowest buoyancy of 0.879. The results clearly revealed that the elasticity for Kenya's overall tax system was 0.509 implying that growth in GDP over the study period spurred less then proportionate automatic increase in tax revenue. The implication is that the tax system did yield a 0.509% change in tax revenue, resulting from economic activity, for every 1% change in GDP. Thus, a decreasing proportion of incremental income was transferred to the government in the form of tax revenues, meaning that the tax system in Kenya was inelastic over the study period. The overall elasticity of the tax system clearly show that tax system in the country is inelastic therefore not responsiveness to changes in national income. All major tax components reported tax-to-base elasticity that was statistically insignificant different from 1 in nominal terms but statistically significant different from 1 in real terms. On the other hand, all these major tax components had a statistically significant base-to-income elasticity above 1 except income tax which had base-to-income elasticity of 0.988 and 1.065 in nominal and real terms respectively.

The low tax-to-base elasticity of sales tax/VAT could be attributed to the combined effect of evasion and inefficiency in tax administration over the period despite the introduction of various tax reforms including the Electronic Tax Register (ETR). Low tax-to-base elasticity of excise tax indicates either inefficiency in tax administration or the existence of black market for taxable goods. Income tax had base to income elasticity of 0.988, but reported tax-to-base elasticity of 0.192. This could further signify existence of tax evasion and tax avoidance. A comparison of buoyancy and elasticity estimates reveals the revenue impact of discretionary policy. As indicated in the tables, buoyancies exceeded the tax-to-income elasticities in all cases. The growth in revenue in revenue from excise tax could partially be explained by the discretionary changes undertaken over the period. The DTMs also favorably affected the growth in revenue from other major tax components as reflected in the buoyancies exceeding the tax-to-income elasticities. Decomposition of the tax-to-income elasticity into its constituent parts especially tax-to-base and base-to-income (GDP) revealed that the inelasticity of the Kenya tax system is due to the low tax-to-base elasticity of individual taxes since the base-to-income elasticities for all taxes is approximately above unity.

Conclusion

From the foregoing it can be concluded that the Kenya tax system is neither income elastic nor buoyant. This supports earlier findings by Moyi and Ronge (2006) and Muriithi and Moyi (2003). Whereas Moyi and Muriithi (2006) found buoyancy as being 0.662, Muriithi and Moyi (2003) found elasticity of tax system to be 0.645. Additionally, the study further affirmed that all major tax components in the country are inelastic. Income tax and excise tax had unity buoyancies over the study period contradicting Muriithi and Moyi (2003) who found the two taxes to have had buoyancies of above 1. This difference could be explained by the various tax reforms that were introduced after the study by Murrithi and Moyi (2003) including the introduction of ETR facility, Simba system among others. Further, from the study, import duty was the most buoyant tax component while the VAT was the least buoyant. Major tax components were found to be inelastic based on tax-to-base inelastic however, import duty, excise duty and VAT had base-to-income elasticity of above 1, while income tax had approximately unity base-to-income elasticity. This leads to the conclusion that, DTMs impact favorably to all major taxes meaning that a large percentage of tax revenue comes from discretionary tax policy and not from pure responsiveness of tax revenue to changes in national income.

Although various tax reforms have been initiated since 1985, tax system in Kenya is yet to be responsive to changes in economic growth as envisaged in theory. It is worth noting that the reforms were initiated and implemented to ensure that this is realized in the country. The study has empirically affirmed that this characteristic of a good tax system is yet to be achieved. It recommended that the Fiscal Policy Makers reevaluate the policy reforms undertaken over the period covered by this study and see where the problem arose from. In Kenya major tax administration reforms occurred in 1995 with the aim of enhancing efficiency in tax collection and reduction of tax evasion. Based on the finding of the study the problems of inefficiency in revenue collection and administration are common. It is thus recommended that the tax administrator in Kenya in this case KRA, need to examine why this situation still exist and therefore put in place necessary measures to correct the situation.

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Appendices

Appendix 1

Table A1: Table 1: Raw data of total tax revenue and of various taxes for fiscal year 1984/85 - 2009/10 (Ksh million)

Fiscal year	Direct tax revenue (nominal)	Import duties (Nominal)	Excise duties (Nominal)	Sales tax/VAT (Nominal)	Total tax revenue (Nominal)
1984/85	6019.36	3044	1576	5472	16111.36
1985/86	7102.38	4236.8	1780.84	6065.89	19185.91
1986/87	7714.7	4934.2	2125.4	7950.4	22724.7
1987/88	9089.58	5473.72	2461.12	11765.74	28790.16
1988/89	10240.5	6005.56	2748.92	12866.9	31861.88
1989/90	11983.06	6956.36	2987.16	12866.9	34796.48
1990/91	14261.68	6693.6	3703.28	15321.42	39979.98
1991/92	17027.9	5118.78	6309.2	18555.4	47511.28
1992/93	19970.5	9183	8367.1	22142.72	59663.32
1993/94	36767.3	14792.78	11125	28994.34	91679.42
1994/95	43505.84	18598.28	19332.26	24533.86	105970.24
1995/96	48082.32	21175.68	22611.84	28403.72	120273.56
1996/97	48375.02	22594.06	23687.22	29850.08	124506.38
1997/98	55577.9	27167.1	28381.6	34448.1	145574.7
1998/99	55234.9	28443.92	28733.16	39204.76	151616.74
1999/00	53316.99	28605.16	28493.06	40944.19	151359.4
2000/01	53428.93	28803.74	28317.99	50220.95	160771.61
2001/02	55861.98	27302.31	39979.8	50871.68	174015.77
2002/03	70140.28	24396.09	44042.89	56135.34	194714.6
2003/04	77402.73	30264	40085.26	58853.37	206605.63
2004/05	99312.42	30831.72	44151.22	75995.66	250291.02
2005/06	114629.06	29861.43	46645.62	79925.91	271062.02
2006/07	130179	40235	56123	96497.01	323634.01
2007/08	165078	45857.77	61905.51	111904.5	384745.79
2008/09	184446.78	51201.6	69872.05	126854.1	432374.5
2009/10	220281	57746	78066	148353	504446

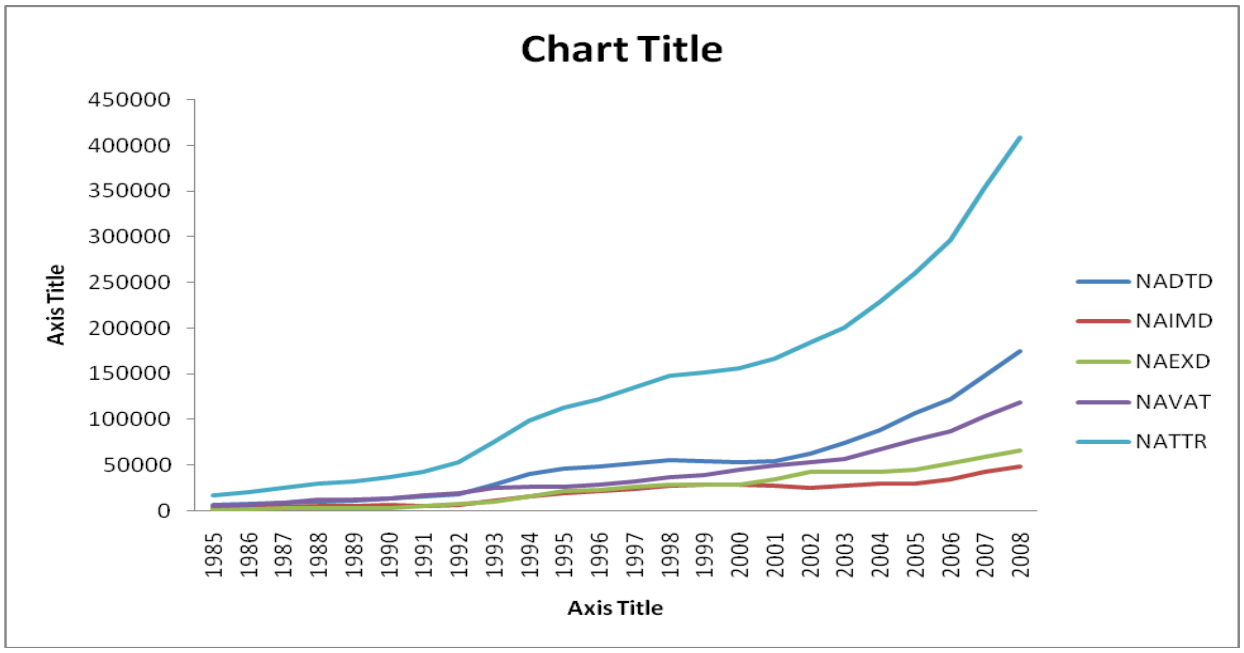
Source: Kenya Statistical Abstracts (Various years)

Table A2: Raw data of GDP, Imports, Private consumption and Domestic factor income

FY	GDP (Noninal) Kshs million	Imports (Nominal) Kshs million	Private consumption (Nominal) Kshs Million	Domestic factor income (nominal) Kshs million	GDP deflator (2005 base year)	CPI (2005 base year)
1985	100746.6	88373.4	23920	58510	0.1317	0.0932
1986	117483.4	102299.2	26757.86	70396.4	0.1432	0.0955
1987	130468.2	112250.2	28617.62	81654.8	0.151	0.1038
1988	149403	127830.2	35802.88	93913.8	0.1638	0.1165
1989	172860	149026	44772.56	111148.6	0.1776	0.1326
1990	195536	167547	50912.6	121655.2	0.1943	0.1561
1991	221249.8	190806.6	52918.26	142418.8	0.2196	0.1875
1992	256142.2	228050.4	59097.25	178571.2	0.2611	0.2387
1993	320150.6	270246	101128.4	210596	0.3282	0.3485
1994	393690	326079.8	115079.8	250097.6	0.3841	0.4489
1995	465272	393766.6	155168.5	322248.8	0.4275	0.4559
1996	526624.8	449621.4	168486.2	359441.9	0.6065	0.4963
1997	627436.4	536264.3	190673.5	453172.7	0.6758	0.5527
1998	707388.6	596539.3	197788.7	513248.7	0.7227	0.5898
1999	906928	801098	206400.6	712664	0.7532	0.6237
2000	967838	854896	24703.9	757727	0.799	0.6859
2001	1025918	905852	290108.2	811793	0.8113	0.7253
2002	1035394	920370	257710	813953	0.8191	0.7395
2003	1138061	1010644	281843.9	872821	0.8747	0.8121
2004	1274328	1135251	364205.2	962433	0.9409	0.9065
2005	1415724	1259028	443100.9	1067448	1	1
2006	1622434	1440649	521482.8	1222686	1.0708	1.1445
2007	1828788	1610900	605116.8	1383677		1.2562
2008	2077433	1828246	770651.2	1567780		1.5859
2009	2273685	2042125	788097	1824764		1.7323

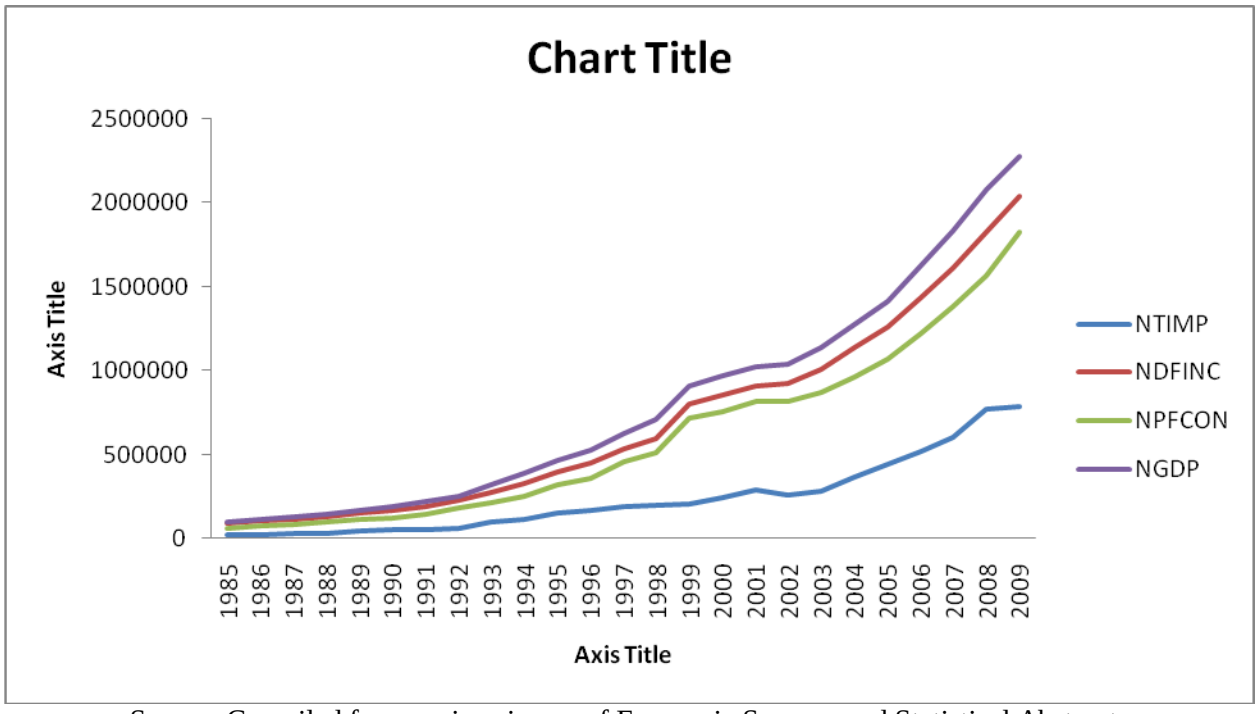
Source: Kenya Statistical Abstracts (Various years) and IFS browser.

Figure A1: Trends of total tax revenue and revenue of major tax components



Source: Compiled from various issues of Economic Surveys and Statistical Abstracts

Figure A2: Trends of various tax bases used in the study



Source: Compiled from various issues of Economic Surveys and Statistical Abstracts