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TAX REFORMS AND REVENUE PRODUCTIVITY IN KENYA

By

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A research project submitted to the School of Economics, in partial fulfillment of the requirements of the award of degree of Masters of Arts in Economics at the University of Nairobi

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DECLARATION

This is my original work and has never been presented for any degree award in any other university.

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This research paper has been submitted with our approval as university supervisors.

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Signed.



Date

Mr.ongcri

DEDICATION

To my family.

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LIST OF ABBREVIATIONS AND AC RONA MKS

ADF	Augmented Dickey Fuller test
BOP	Balance of Payment
CRS	Constant Rate Structure
DIM	Divisia Index Method
DVT	Dummy Variable Technique
ETR	Electronic Tax Register
HTSTD	Historical Time Series Tax Data
KJPPRA	Kenya Institute for Public Policy Research and Analysis
KRA	Kenya Revenue Authority
PAM	Proportional Adjustment Mechanism
PIN	Personal Identification Number
PMBO	Programme Management and Business Analysis Office
PP	Phillips Perron test
PSV	Public Service Vehicle
RARMP	Revenue Administration Reform and Modernisation Program
TMP	Tax Modernisation Program
VAT	Value Added Tax

ABSTRACT

An appraisal of the fiscal structure analysis in Kenya reveals a very large imbalance between government revenue and expenditure which has over the years resulted in large and chronic i fiscal deficits. This persistent fiscal deficit has greatly hampered government performance in its primary objectives of provision of public goods and services and also in funding of both the recurrent and development expenditures. Under this threat of fiscal crisis, many developing countries have had to make projections of additional revenue that can be realized within the existing tax structures. These projections indicate the need to activate additional means of revenue generation. Tax reforms have been the agenda of many developing countries. This study, therefore, sets to establish the implication of tax reforms on revenue productivity for the period 1990-2010 in Kenya using elasticity and buoyancy models. Proportional adjustment method (PAM) was used due to its superiority in adjusting tax revenue figures in order to estimate elasticity. Iimpirical findings suggest that for the period under study, the Kenyan tax system was in general not productive despite several reforms and measures undertaken. This is highlighted by buoyancy and elasticity less than unity for all taxes except for excise duty. VAT and direct I taxes were the mostly affected by reforms as the difference between elasticity and buoyancy was above 0.2

CHAPTER ONE

INTRODUCTION

1.1 Background of the study

The fiscal structure analysis in Kenya reveals a very large imbalance between government revenue and expenditure which has over the years resulted in large and chronic fiscal deficits.

This persistent fiscal deficit has greatly hampered the performance by government in its primary objectives of provision of public goods and services and also in funding of both the recurrent and development expenditures. Borrowing, consumption of fiscal reserves, and sale of fixed assets are among the several major ways a government can finance its deficit. Owing to the shortcoming associated with deficit financing methods, if not carefully addressed it can lead to severe distortions in the economy such as inflationary tendencies, which can sequentially affect interest rates, the balance of payments and the external value of the currency.

IMF (1997) in its structural adjustment policies to the developing countries advocates or harnessing domestic resources and fiscal reforms to mobilize more revenue especially in the area of tax policy reforms as one way of reducing fiscal deficit. Ariyo (1998) has argued that in reducing the fiscal imbalance, it is vital to be able to project the additional revenue that can be mobilized within the existing tax system as the economy grows. Several attempts have been made in Kenya at improving the tax system since independence, one principal objective among these attempts has been to enhance revenue productivity to finance government expenditures, in spite of the enormous efforts the fiscal authorities have engaged in trying to boost government revenue in the country, productivity of revenue generated has been very low.

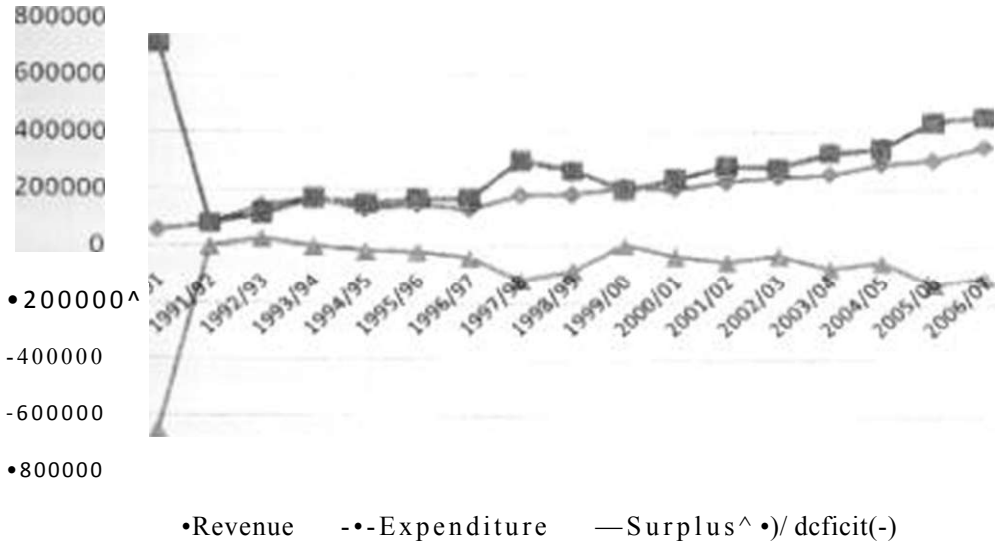
Taxation is one major source of government revenue in Kenya and according to KIPPRA (2006) it funds approximately 80% of government total expenditure. The magnitude of the total revenue generated from taxation has made tax reforms a key ingredient to various fiscal policies especially in the area of deficit financing. Apart from raising revenue, other core objectives of tax system are redistribution of wealth or income and to encourage or discourage certain activities through the use of tax provisions. However, in many countries saddled in fiscal deficit phenomenon, revenue generation overrides the other functions.

Revenue from different forms of taxes in Kenya varies from year to year. Haughton (1998) argues that taxes which are relatively stable in generating revenue, or whose revenue is negatively correlated with the revenue from other taxes, are likely to be particularly helpful in giving stability to the overall stream of revenue. Stability of revenue is therefore desirable, at least from the government's perspective, in that it makes it easier to put together plausible spending and borrowing plans for the year ahead. Over the last three decades Kenya tax system has been very unstable with regards to revenue generation. This is evident by the fact that there is always a very big deviation between the targeted revenue and the actual revenue collected.

According to Bird (1992) the problem of economic growth can be overcome by having a stable budget position of which many developing countries are yet to achieve. This has in many ways hampered various government undertakings both in development and recurrent expenditures which are usually pegged on the expected revenue in a given year. The situation worsens especially when the expected revenue doesn't match with the actual revenue collected or where the total expenditure is way above the budgeted expenditure in a fiscal year.

Figure 1.1 elucidates the trends in Kenya's fiscal performance which is important in shedding light on the salient drivers of the various revenue reforms.

Figure 1.1: Government of Kenya fiscal operations (in millions of Ksh), 1990-2007



Source: Kenya Bureau of Statistics

The country could neither approach IMF nor float sovereign bonds, following low credit ratings and high interest rate on such loans. Other channels such as printing money have dire consequences. The government has, therefore, preferred internal borrowing to foreign aid as a supplement to Kenya's budget deficit over the recent past. Perhaps also due to the realization that excessive reliance on foreign aids as an instrument of financing fiscal deficit may in the long run lead to problems of debt sustainability. Kenya and other developing countries will therefore need to rely substantially on domestic revenue mobilization to improve its fiscal budget position.

Government expenditure patterns have also contributed to fiscal deficit in Kenya. The rate at which government expenditure has increased over the years is way much higher compared to increase in revenue generation. This is expected to scale up further as the country seeks to implement both the vision 2030 programs and the new constitution. Unless Kenya seeks sustainable way to finance these expenditures fiscal deficit will always prevail in the country. It's in this line that the Medium Term Expenditure Framework (MTEF) was introduced in budgeting in 2000. MTEF therefore, replaced the previous forward rolling budgeting system by introducing a balanced approach that matched government revenue to expenditure with the hope of achieving greater fiscal discipline.

1.2 Tax structure in Kenya

Kenya tax structure currently is composed of two main direct taxes composing of individual income tax and corporate tax; and three main indirect taxes value added tax (VAT); excise and custom duties. Just like many developing countries, government uses taxation to ensure it has enough revenue to finance public expenditure and while doing this, it also aims at ensuring that it meets the various principles of taxation and also reduces various tax disincentives.

Achieving all the various canons at ago is a big challenge not only in developing countries but also in the developed world. Most tax policy in developing world has sufficiently failed in ensuring equality among the population since most of the emphasis on tax reforms is on revenue adequacy. This is quite evidenced in Kenya where the gap between the rich and the poor is still

,-cry wide and the tax bracket especially on income is not evenly spread among the different level of income

Currently, the informal sector employs approximately 70-75% of Kenya population and contributes 18.9% of the total GDP (as per the World Bank's 2008 statistics). Despite the size and amount of revenue generated from this sector, KRA is yet to develop a tax policy for this sector and where it has, there are many loopholes and rampant tax evasion. This failure has led to low revenue productivity in the country consequently worsening the overall budget position. This sector is diversified with activities ranging from farming, transportation industry to small scale traders (hawkers) which have also made it difficult to developing a tax policy which encompasses all activities involved. Eliud and Eric (2006) have also echoed this and argue that, the larger the size of the informal economy, the more challenging taxation becomes.

3 Kenya tax reforms

A tax reform is defined as the process of changing the way taxes are collected or managed by the government. Ariyo (1997). Moyi and Rongc (2006) have also defined tax reforms as the change in status qua. The need for tax reform arises from the deficiency of the existing tax system in line with achieving the various canons of taxation. Generally a tax reform is therefore beneficial if it increases both revenue and social welfare. According to one of the general theory of tax reform, it's always valuable to switch taxation at the margin from i to j , if the marginal cost of tax i exceeds that of tax j .

Tax reforms in Kenya have been going on since independence albeit at different scales and pace. The need for reforming tax is rooted upon the need to protect domestic revenue, achieve financial sovereignty and ultimate national pride. It's for this reason that tax reforms are a necessary tool to ensure that our domestic revenue base is regularly protected and nurtured. It is also to ensure dignity on the part of government in national budget management

Tax reforms in Kenya were introduced way back in 1986 under the, Kenya's Tax Modernization Program. The main aim of TMP was to increase tax revenue base so as to enhance the elasticity of the tax system. Since then the tax system in Kenya is ever changing, it has been steadily reformed for the last three decades with the hope of making it more efficient. Tax reforms has been an ingredient in almost every structural and fiscal policy in both the developed and third world countries. However despite this, Musgrave (1980) argues that there is no consensus on an ideal profile of a developing country tax system, and therefore the criteria mostly used in public finance are revenue adequacy, allocative neutrality, equity and efficiency of the tax administration.

One key role of tax reforms is to ensure that the tax systems put in place are efficient which means the policy should uphold equity among people in the society. They should also be effective in mobilization of revenue thus effectively reduce fiscal imbalances in Kenya. This can be achieved if the government can come up with tax laws and policies intended to facilitate responsiveness of individual and overall tax system to national income.

The introduction of Kenya's Tax Modernization Program in 1986 began a series of indirect tax reforms to redistribute wealth and create a new and more sustainable tax system with an overall goal to generate more revenue. The most crucial of the many reforms implemented by the modernization policy included: lowering top marginal rates, extending tax relief to low-income recipients and widening of tax brackets.

There have also been various tax policy reforms ranging from changes in tax rate, development of new Tax Acts, broadening the tax brackets, overhaul of overall tax administration systems and introduction of new ones e.g. Sales tax and VAT. These amendments and reforms have introduced major changes in the Kenya tax systems as explained below.

1.3.1 *VAT and excise reforms*

The VAT Act was introduced in 1990 to replace Sale Tax. This replacement was because VAT has higher revenue potential while collection and administration is very economical compared to

the Sale Tax. It has undergone a number of significant changes and reforms particularly in the area of rate structure and base expansion. Initially VAT had a different rate for over 50 items at a rate of 105%. but this has been harmonized and the rate was reduced overtime (1990-97) to 15% and revised to the current 16%, except for items such as power and electricity. The rate bands have also been reduced from 15% to 3%. In 2005 FTR machines were introduced to address the perennial problem of poor record keeping for business transactions and tax evasion. ETR system greatly enhanced compliance and by extension VAT revenue collections. The VAT revenue collection increased by 24 % from kshs 42 billion to kshs 52 billion between 2004/05 and 2005/06.

After the inception of KRA in 1995 the excise tax regime was changed from specific to ad valorem to raise additional revenue. This was also to ensure additional revenue and to guarantee equal treatment for all excisable goods and rationalize the number of tax rates. Another notable reform in this area has been the introduction of excise stamps especially on high risk excisable commodities such as tobacco spirit and wines. KRA has also installed flow metering devices in all firms which produces excisable commodities to reduce tax evasion and improve on compliance

1.3.2 *Income tax reforms*

Reforms in this area has emphasized on broadening the tax base while reducing the minimum rates. In 1998 the top rate level was reduced from 65% to 32.5% for individual income 45% to 30% for companies. There has also been introduction of personal identification numbers (PIN) which was aimed at improving tax information management by identifying all taxable persons and also reducing both tax collection and administration costs. This has also seen great reduction on tax evasion cases.

Over the years KRA has put more focus on the formal sector leaving out a large group of tax payers in the informal sector. To address this challenge targeted but simplified reforms has been developed. In 2007, to incorporate the booming public transport system an annual Advance tax on Public service vehicle (PSV) crew was instituted. To tap revenue from tax payer below the

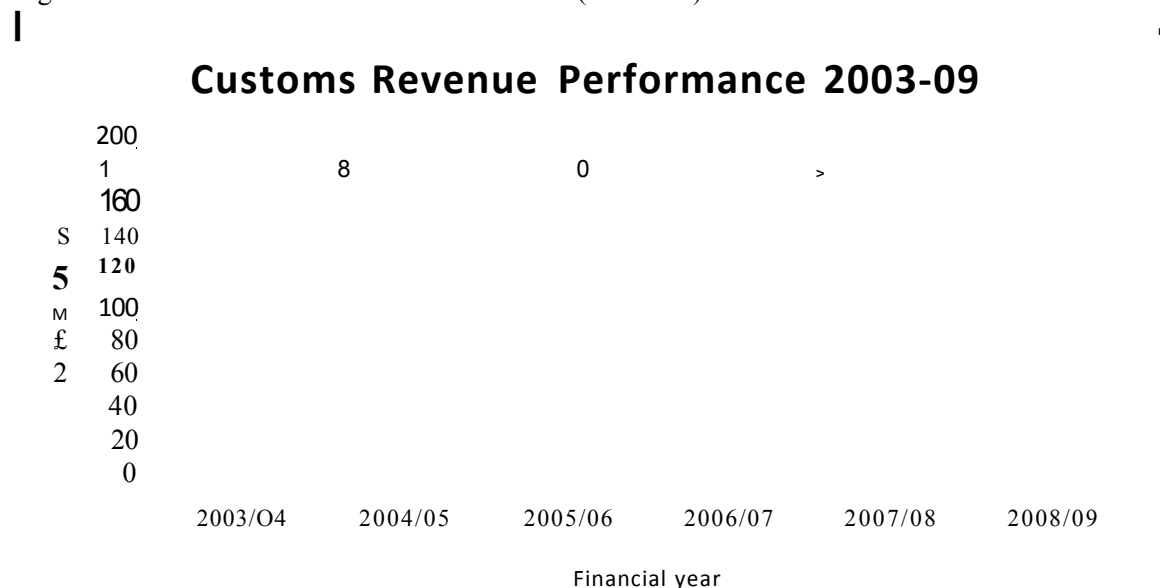
VA T threshold e.g. with annual turnover below 500 000 per annum a presumptive tax regime was initiated This is u turnover tax targeting the informal sector however little has been achieved from this initiative.

1.3.3 Custom reforms

This department has not also been left out in tax reforms it has also witnessed various significant changes in the direction of restricting duty exemptions, encouraging exports, reforming the tariff structure and strengthening the administration of custom duties. Most of the customs administration reforms are guided by international conventions, agreements, and framework like the Kyoto Convention 2000, which addresses harmonization of custom procedures. World Customs Organization (WCO) for safe framework of standards, which addresses relations among customs administrations and business to facilitate trade.

In 2005 the customs services business automation introduced the Simba 2005 system. This system according to KRA has been at the centre of customs modernization in Kenya and has enabled the automation of about 90% of customs operations, As a result, over the recent years a lot of gains have been realized with customs revenue growing from kshs % billion in 2003/04 o kshs P9 billion in 2008'09. This is well illustrated in the figure 1.2 below

Figure 1.2 Custom Revenue Performance (2003-09) in Billion Kshs



1.3.4 Tax administration reforms

Tax administration is the tool with which tax policy is implemented and the means with which governments raise revenue to finance spending on public goods and services. It has more to do with the framework that supports day to day management of revenue administration or the nuts and bolt of revenue collection machinery. Reforms on tax administration has been geared on making the tax system simple to both the administrators and tax payer for compliance and also to ensure that it is easier to manage hence minimize administration costs. Among the major weaknesses in the administration in Kenya include tax evasion, inability to determine defaulters accurately and on real time basis and corruption

Tax laws are still very complicated to many Kenyans. Most of the laws are very hard to interpret or understand. If all these tax laws and acts are simplified, administration resources could be concentrated on audit and collection function with likely gains on both revenue and equity.

In 2004/05 KRA established Revenue Administration Reform and Modernisation Program (RARMP) with the objective of transforming KRA into a modern, fully integrated and client-focused organization. With an aim of making RARMP successful, the program was hinged on a strong administrative structure that created and enhanced ownership. To make it easier to track progress in the reform initiatives and enhance project ownership and acceptance RARMP adopted project management and business analysis techniques which saw the creation of the Programme Management and Business Analysis Office (PMBO).

Since its commencement RARMP has seen the realization of the various reform projects which have greatly impacted on total tax revenue. One of the projects is Domestic Taxes Department Reform and modernization project which has led to creation of a domestic taxes department. It is structured along the key tax administration functions of taxpayer education and services, returns and payments processing, audit, enforced collection and tax operations policy.

Compliance and enforcement reform and modernization project is another project which has been initiated by the RARMP. This initiative has seen the development of a modern business

intelligence unit that analyses data to assess the risks inherent in transaction and ownership relationships which constitute basis for various evasion schemes. Generally the project has in a great way strengthened the prosecution unit and has come up with a KRA wide enforcement strategy to discourage tax malpractices by imposing maximum penalties and publicise recurrent evaders to deter future tax evasion. Other projects which RARMP seeks to implement in its second phase are: Customs reforms and modernisation project. KRA Business Automation Project Road Transport Reform and Modernisation Project; KRA Infrastructure development project and Human Resource Revitalisation Project.

According to KRA 2005/06 revenue performance report, lack of sufficient funding. Stakeholders resistance to reform initiatives, need for sustained efforts in fighting corruption and tax fraud are some of challenges facing the RARMP. Despite these challenges the program has achieved many development especially on revenue administration, for instance in 2005/06 financial year revenue collection increased by 1 per cent of the GDP from Kshs. 202 billion in 2002/03 to Kshs. 297 billion.

1.4 *Statement of the problem*

Unrelenting and rising fiscal deficits have serious consequences on any economy. Kenya's fiscal deficit has largely been attributed by the increasing and uncontrolled government expenditure which is always unmatched by available revenues. The government set the tax rate and also makes decisions on the mode of deficit financing to be adopted. However, despite there being various ways to finance deficit each of these methods has its own shortcomings, in addition, heavy borrowing is also not viable in the long run since it can lead to unsustainable debts level. Efforts have however been made to harness domestic resources through fiscal reforms to mobilize more revenue especially in the area of tax policy reforms with the aim of designing a tax system that responds adequately to the revenue needs of the government.

In this sense, the government has therefore relied largely on discretionary tax changes to increase the revenue productivity of the tax system. This reliance on the tax system has been greatly

emphasized by the fact that other external sources of financing government expenditure have not been forthcoming and their availability is expected to aggravate in future.

Despite various tax efforts, actual revenues have continued to fall short of the expected revenue, which has made it impossible for the government to offset the fiscal deficit in the country. There are also concerns that the challenges that confront the Ministry of Finance and Kenya Revenue Authority with regard to revenue generation today are not much different from the challenges that faced these revenue authorities before the reforms.

Aside revenue shortfalls, Kenya is among the most tax unfriendly countries in the world with high tax rates and there is this belief among Kenyans that they are overtaxed which then suggests appropriate government expenditures patterns.

In view of the fiscal problems facing the country and the continued drive to tax policy reforms, there is a need to examine the impact of various tax reforms on revenue generation and more so in assessing their contribution to shares and efforts. This is more important if the tax system is to be exempted from the blame of having failed to generate sufficient revenues. Hence the productivity of the various tax reforms in revenue generation forms the basis of this study

1.5 *Research questions*

In analyzing tax reforms and revenue productivity in Kenya the following questions will be addressed:

- i. What were the tax revenues trends from 1990 to 2010?
- ii. What impact did discretionary tax measures (DTM) have on revenue productivity*?
- iii. From the results of the above analysis, what measures should the government of Kenya adopt to improve revenue productivity?

1.6 Objectives of the study

The general objective of this paper is to examine the impacts of tax reforms on revenue productivity in Kenya. The specific objectives which have been pegged on the main objective are to:

- 1 Analyse tax buoyancies with a view to evaluate relative yield of tax reform
- 2 Analyse tax elasticity in order to evaluate the flexibility of the overall tax system
- 3 Analyse and compare the tax elasticities and buoyancies thereby assess the effect of tax reforms on tax productivity
- 4 Draw policy recommendations on future tax reforms that improve revenue productivity

1.7 Significance of the study-

The study will contribute in understanding the tax reform process and how it has impacted on revenue productivity in Kenya. This study will entail calculation of tax elasticities and buoyancies of the major taxes in Kenya from 1990 to 2010. The results from this analysis will help us identify which taxes are more or less elastic which will help the policy makers to know which among the taxes can be used to tap and harness more revenue.

The more elastic a tax system is with regards to income, the more appropriate it is to any country because it implies that tax collection will grow automatically with growing incomes without need to resort to discretionary measures. Due to this importance of tax elasticity it is noble therefore, that before any revenue generating tax reform is put in place it shall be necessary to identify the elasticity of the tax structure. Empirical results from tax elasticity and tax buoyancies will therefore assist in informing the Kenya revenue authority the following: (a) The process of tax reforms in Kenya, (b) components of tax structure that has been most responsive and reasons for their responsiveness and (c) establish the tax handles which are rigid and the reason for their rigidity.

In reducing the fiscal deficit as part of a structural adjustment programme, it is imperative to be able to project what additional revenue can be mobilized within the existing tax system as the economy grows. This will require a thorough analysis of the revenue sources and their responsiveness to GDP growth. The analysis will therefore, provide Kenyan policy makers additional information useful in policy implementation especially in the area of tax reforms.

CHAPTER TWO

LITERATURE REVIEW

2.1 Theoretical literature

There have been major changes in tax systems of countries with a wide variety of economic systems and levels of development during the last two decades. Rao (2000) states that the motivation for reforms varies from one country to another and the thrust of reforms differ from time to time depending on the development strategy and philosophy of the times. In many developing countries, the immediate reason for tax reforms has been the need to enhance revenues to meet impending fiscal crises. As Bird (1993) states, "...fiscal crisis has been proven to be the mother of tax reform". Such reforms, however, are often ad hoc and are done to meet immediate exigencies of revenue.

Government Revenue is an essential component of development to effectively meet the increasing demand for public good and services. According to Emmanuel (1981) the role of revenues in the overall development programme is to finance the operational and development needs of the public sector. Obtained through the tax system, these revenues affect the growth of almost every aspect of the national economy; and as such the desirable level and structure of taxation must, therefore be viewed from the perspective of the objective of development policy. According to William (2006) generating sufficient revenue to finance government service delivery is arguably the most important characteristic of state tax systems because revenue collection is the primary purpose for most taxation. Revenue productivity has been the yardstick of various tax systems in many developing countries. This is due to the effort by respective revenue authorities in trying to have a balanced fiscal budget. According to Osoro (1993), tax reform has been one of the major preoccupations of most developing countries fiscal policies. He also adds that tax reform is not only a desired or preferred task but it's a necessary task for any government which wants to achieve a sustainable growth.

Gupta (2007) identifies various determinants of tax revenue efforts in developing countries. His results confirm that structural factors such as per capita GDP, agriculture share in GDP, trade

openness and foreign aid significantly affect revenue performance of an economy. Other factors include corruption, political stability, share of direct and indirect taxes.

In the 1980s increasing expenditure requirements forced developing countries to undertake tax reforms, of which, most of these reforms focused on tax structure rather than on tax administration geared towards generating more revenue from existing tax sources as observed by Osoro (1991). World Bank (1990) suggests that the growth in tax revenue must at least approximate the growth in expenditure for macroeconomic stability to hold. Various fiscal policy and structural adjustments programmes over the years in Kenya have been towards achieving a balanced fiscal economy that spurs and sustains growth and development. The policies have therefore not left out the tax system which has experienced various reforms to be in line with overall government aim.

World Bank (1987) Points out that, all governments need to take responsibility of producing a range of goods and services. Governments need to raise revenue and regulate the economy for a variety of reasons and they invariably have to make compromises between an ideal set of economic rules for a market economy and their own objectives. The tax system thus comes into play as it provides one of the major sources of revenue for financing various government undertakings. World Bank (1980) also points out that the growth in tax revenue must approximate the growth in expenditure for macroeconomic stability to hold.

Efficient tax system is one key goal that every country tax Reforms policies hopes to achieve. Bhatia (1971) adds that these taxation policies can be manipulated to meet specific economic objectives. It is for this reason that tax systems are reviewed and adjusted accordingly from time to time.

One criteria of a good tax system is revenue adequacy and it is also the basic elementary standard that a tax system ought to achieve. Khan (1973) argues out that taxation policy is the "most important element for mobilizing the increments in national income for investment or expenditures by the state.

Afther (1989) identifies two concepts which are used to measure tax productivity: buoyancy and elasticity. There are two factors that can cause tax revenue to rise: rate of tax can be changed to more revenue from same base or else the base on which the tax imposed may grow. The growth of tax in response to GDP can therefore be divided into two components: the automatic growth as the base on which the tax is charged grows in response to GDP, and the growth resulting from discretionary changes in tax rates and legislations. The combined effect of the two is the buoyancy of a tax.

Tax handles are tools that the governments utilize to influence magnitude of changes in tax revenues. They include such options as changes in tax rate, introduction of new taxes and improving of tax machinery. These changes can influence collection independent of the built in response due to national income changes. Since there are severe administrative and political limitations to the extent to which additional taxation measures such as expansion of the base, increasing of the rates or imposing of new taxes can be resorted to, the built in elasticity of the system is imperative. This has been echoed by Mansfield (1972), Prest (1962), Sahota (1961), Njoroge (1993) and Bryne (1983) and they all agree that response of the tax revenue to changes in national income is vital ingredient of a tax system.

1.1 Empirical literature review

Scholars have developed various techniques that have been extensively used to measure tax productivity especially in calculating elasticity where one must explain from the effects of changes in tax legislation over the period. One major aim has been, first, to eliminate discretionary tax changes from the historical time series tax data (HTSTD). These techniques include the Divisia Index Method (DIM), constant rate structure Method (CRS), the Dummy Variable Technique (DVT) and the Personal Adjustment Method (PAM).

According to Bahl (1972), Andersen (1973), Chelliah and Shetty (1974) and Choudhry (1975) the CRS method requires data on income bracket (or commodity) rates and sufficiently disaggregated information on the growth and distribution of the reported tax bases. Choudhry (1975) adds that, if such information is available, a constant rate base representing hypothetical

tax revenue under a system is assumed to remain unchanged during the period under review and can be constructed.

The model used is as follows

*

⇐

Where: $I_p(t)$ -aggregate assessed personal income tax in the period t,

$Y_i(t)$ -the assessed income on the i^{th} group, r- reference year

CRS method has several shortcomings: It is revealed that it incorporates only the discretionary tax changes resulting from changes in statutory tax rates; thus, it ignores those discretionary tax changes which emerge from changes in administrative efficiency and in tax base, tax credit and tax allowances.

The method also assumes that inter-class or inter groupings of the base will remain unchanged during the period under review. Naturally, Ehdai (1990) argues that the validity of this assumption will decline as the number of income groups or commodity groupings fall due to aggregation, Choudry (1979) proves that the CRS method becomes inefficient where a tax has many progressive elements and second, where tax bases grow at the same rate. Under the first circumstance, the method does not guarantee that the tax elasticity will be larger (smaller) than the buoyancy even when discretionary changes produce an overall negative (positive) revenue effect. Under the second circumstance there is the possibility that the elasticity estimate fails to detect the effect of discretionary changes.

The other approach has been to estimate tax elasticity directly in which time trends or dummy variables are introduced as proxy for DTMs in the tax and base functions, this is referred to as the index method. Choudry (1979) has extensively derived and applied this method. He uses the following function:

$$\log(T) = \alpha + \beta \log(Y) + u$$

Where T - tax revenue,

Y - tax base or GDP in aggregate level,

L), - dummy variable (simple or mixed) as proxy for the i^{th} DTM taken during the period under review, and p_t . tax elasticity, in aggregate level.

The problem with the DIM is that the formula derived to estimate the tax elasticity is a line integral and, in practical application, its discrete version is used, causing bias in the estimate of the revenue impact of discretionary changes. Choudry proves this Divisia index method can undermine (over state) the positive (negative) revenue effects of such measures. If the discretionary measures produce very large effects, then this method does not give satisfactory results. Despite these limitations the index is expected to provide a reasonable measure of the effects of such measures. The main advantage of the method is that it requires no specific information on the revenue effect or on the frequency of past discretionary tax changes.

In an alternative approach, dummy variable technique. Chand and Wolf (1973) Khan (1973) and Artus (1974) incorporate one dummy variable (simple or mixed) as a proxy for each of the DTMs introduced during the periods of their review to estimate tax elasticity by means of a single-equation model. This technique was developed by Singer (1968) where he suggested that any reform be considered as an exogenous factor and that each should therefore be represented by a dummy. Elasticity is then worked out by fitting the data on the function. The model takes this form:

$$T = a + \beta Y + \sum_{i=1}^n d_i D_i$$

Which when transformed into log linear form becomes:

$$\log T \approx a + \beta \log Y + d_1 D_1 + \dots + d_n D_n$$

T - Tax revenue; Y - tax base or GDP in aggregate level ;D- dummy variable (simple or mixed) as proxy for the i^{th} DTM taken during the period under review, and P tax elasticity coefficient; in aggregate level, it measures percentage increases in the tax revenue resulting from the endogenous changes in the base caused by a one percent rise in GDP.

The method, however, exhibits, some limitation: the estimate of tax elasticity obtained by this technique is not precise and reliable because of the serious multicollinearity problem created as a

result of entering more than one dummy variable into the tax function. This has been echoed by Ehdai (1990), who has argued that the degree of precision and reliability of the elasticity estimate are inversely related to the degree of multicollinearity, which in turn depends greatly on the time interval that existed between two successive discretionary actions taken by the tax authorities. This implies that obtaining a precise and reliable estimate of tax elasticity by means of this approach is empirically impossible, particularly when there are frequent discretionary tax changes during the review period.

Khan (1973) in his paper, the responsiveness of tax yield to increases in national income in Pakistan using this technique found that buoyancy estimates were lower than elasticity estimates (except for income tax and customs duty) implying that the reforms had only dampened the responsiveness of the tax system. Only some of the dummy variables had coefficients statistically significant. This means that only some of the tax reforms had appreciable effects on the buoyancy while the others were either minor or so recent that their effects had not been registered. However he notes that this result was consistent with tax policy for the period.

Proportional adjustment method (PAM) is another technique used in eliminating discretionary tax changes from the historical time series tax data (HTSTD). It requires that the revenue yield for each year in the sample period be adjusted to generate a revenue yield based on the structure of a reference year. According to Ehdai (1990) this is done by subtracting the budget estimate of the impact of discretionary measures implemented in a particular year from the actual tax revenue collected that year. Then, to convert the actual revenue to the first-year base, the adjusted tax revenue for the particular year is multiplied by the previous year's ratio of the adjusted tax revenue according to the first year's structure over the actual tax yield. This method has also been suggested by Sahota (1961), Prest (1962) and Mansfield (1975) and has also been used by Omuruyi (1983), Osoro (1993) and Ariyo (1997), among many others.

Muriitlu and Moyi, (2003) applying this approach found that reforms had a positive impact on the overall tax structure and on the individual tax handles. In fact, the elasticity of indirect taxes was low and that of direct taxes was high, especially after the reforms.

Mtafikolo (1990) uses this technique to report results close to those of Kutayisirc (1982) and Osoro (1985) who conducted a similar analysis in Tanzania. Osoro (1985) utilized the PAM and DVT technique together. Mtafikolo reports generally low elasticities of major taxes but high buoyancies. There were differentiated efforts directed at taxable targets with the biggest efforts directed at taxation of imported items. The most interesting results however was that of income tax where buoyancy estimates is smaller than elasticity estimate suggesting evasion and/or avoidance.

PAM technique cannot be applied to broad tax categories but only to individual products within these categories. This method is useful for instance in cases where revenue of neutral tax simplifications are being worked out and disaggregated data on tax rates and tax bases are available. Rasheed (2006) also observes that this method also requires the use of budget estimates of tax yield arising out of discretionary changes, but such data is often not available in many countries and under such scenario, it thus restricts the applicability of this method.

Among the four techniques above, Faiz (2006) adds that a complete adjustment of historical revenue series is still not possible in any of the above methods. Ehdaie (1990) has also pointed out that all techniques incorporate only the discretionary tax changes resulting from changes in statutory tax rates, thereby ignoring the own- and cross-DTMs indirect responses of tax revenues and the impact of changes in the degree of tax evasion.

Optimal tax theory is another way of accessing a country tax system apart from elasticity and buoyancy. This theory puts the emphasis on analysis of the impact of tax reform on the objective of minimizing the efficiency cost of taxation through changes in social welfare function. The theories of optimal taxation are analogous to the examination of the principles of taxation, where lump-sum taxes are impossible.

The analysis of optimal tax theory began with Ramsey (1927), but the subject expanded in the 1970s, following the Diamond-Mirrlees papers of 1971. Ramsey argued that the efficiency cost of taxation could be minimized under a system that equalized the welfare cost (dead weight loss) per unit of tax revenue for all commodities. Newberry and Stem (1987) have attempted to utilize this analysis in evaluating tax reforms. Although the reforms suggested by optimal taxation are based upon rigorous economic theory. Thirsk (1995), Deaton (1988), and McLure (1989) have stressed that, putting them into operation leads to an intractably large number of rates, which would be difficult to calculate and infeasible to administer effectively. Slomrod, (1990), has argued that the optimal tax theory can serve as a guide to designing "optimal tax systems", only if one considers the technology of tax collection.

2.2.1 Empirical literature on tax reform

Tax reform experience has taken various faces among various countries both in the developed and developing world. This diversification involves broad issues of economic policy as well as specific problems of tax structure design and administration Musgrave (1987). At the theoretical level, Mahon (1997) adds that tax reforms are initiated either following an economic crisis or as a response to international pressure. Despite there being no standard criteria in judging a system with regard to reforms, many scholars agree that revenue adequacy, neutrality and equity should be the most important objective that a tax system ought to serve.

A number of studies both empirical and theoretical have attempted to assess the importance and impact of tax reforms to revenue productivity in various nations Kusi (1998) evaluated Tax reform and revenue productivity in Ghana both on the overall tax system and of individual taxes by estimating of tax buoyancies and elasticities using the proportional adjustment technique. Results showed a pre reform buoyancy of 0.72 and elasticity of 0.71 for the period 1970 to 1982. After the reforms. 1983 to 1993, there was an increase to both buoyancy and elasticity up to 1.29 and 1.22 respectively. The analysis showed that the tax reform has had significant impact on the productivity of both the individual taxes and the overall tax system.

In an aim of devising a reasonably accurate estimation of sustainable revenue profile in Nigeria. Anyo (1997) evaluated the productivity of the Nigeria tax system from 1970 to 1990. In his analysis he found that on the overall, productivity level was satisfactory, however he noticed there were wide variations in the level of tax revenue to tax source which was due to the laxity in administration of non oil tax sources during the oil boom period.

Milambo (2001), using the Divisia Index method to study the revenue productivity of the Zambia tax structure found out that elasticity and buoyancy was 1.15 and 2.0 respectively which confirmed that tax reform had improved revenue productivity of the overall tax system. However the results were not reliable because time trends were used as proxies for discretionary changes and this was the study's major weakness.

In a study of tax reforms on tax yield in Malawi 1970 to 1994 Chipeta's (1998), analysis indicated a buoyancy of 0.95 and an elasticity of 0.6 and the study concluded that the tax base had grown less rapidly than GDP.

Kaldor (1956) developed a proposal to solve the problem of taxation in developing countries. In a report for the Indian Ministry of Finance, he proposed a comprehensive tax return based on simultaneous taxes for income, capital gains, wealth, consumption, and general gifts. A much modified Kaldor plan was introduced in India for the 1957 tax year. It was not a success; fewer than 8,000 taxpayers filed tax returns in the first year, raising less than two-tenths of 1 percent of central tax revenue Kclley (1971). Despite the small number of taxpayers, the expenditure tax was ultimately condemned by the Indian Finance Minister for creating too great a burden of administration and compliance for the government and taxpayer. The plan was suspended in 1962, reinstated in 1964, and finally repealed in 1966. Currently the expenditure tax is levied on hotel industry

Since the formation of tax reform commission in 1991, India tax reforms have been very rampant. These reforms have greatly reversed the declining trend of revenue in India. According to Rao's (2000) study on tax reforms in India which showed that in spite of significant reductions in the rates of various taxes, productivity of revenue showed significant increase. The share of

revenue from direct taxes showed a significant increase as a proportion of GDP as well as total tax revenue. The contribution of revenue from direct taxes, which was less than 14 per cent in 1990-91, increased sharply to 24 per cent in 1997-98.

Tax reforms have played an important role in the economic reformation in India. Shankar (2005) in his paper "thirty years of tax reforms in India" sketches the contours of India's tax reform story from the mid-1970s to the present. He finds that with the guidance from the Tax Reforms Commission, the Indian government has made enormous progress in the last 30 years, of which can be judged by the standards of economic efficiency, equity, built-in revenue elasticity and transparency.

Osoro (1993), did an analysis of revenue productivity of tax reforms in Tanzania, using the proportional adjustment approach on elasticity and double log form equation on buoyancy the overall elasticity was found to be 0.76 with buoyancy of 1.06, which indicated that tax reforms had failed to raise revenue productivity in the country

Ahmed and Mohamed (2010) seek to identify the determinant of tax buoyancy of 25 developing countries. Their study concludes that growth in import and manufacturing sector has positive impact on growth of tax collection. The effects of the other sector like agriculture are insignificant but they found positive and significant impact on tax buoyancy due to the development of service sector in 1990s. Increase in budget deficit has positive influence on tax collection by demanding more resource mobilization from the governments however, at the same time the growth in grants inversely influences on tax collection because government in developing countries avoids unpopular steps of imposing taxes for domestic resource.

2.3 Literature specific to Kenya

Olc (1975) in his study on income elasticity on tax structure in Kenya 1962-1973 found that during this period, the tax structure was income inelastic at 0.81 and was not very buoyant. This implied that the tax system could not be relied upon to finance rapidly growing government

expenditures and one of his recommendations was that, the government should rely on foreign assistance to fill in the deficit.

In her bid to establish the revenue productivity implications of tax reforms from 1972 to 1991, Njoroge (1993) used buoyancy and PAM technique in estimating elasticity. For the period 1972 to 1981 the tax structure was quite buoyant at 1.19, income elasticity of overall tax structure was found to be 0.67. For the period 1982 to 1991 buoyancy was 1.0 and overall tax elasticity increased to 0.86. The conclusion was the tax was inefficient in revenue generation and thus further reviews are necessary to conform to the changes in the economy.

Adari (1997) in his study did an analysis on the structure performance and administration of value added tax both the elasticity and buoyancy were below unity thus response of vat to GDP very low.

Wawire (2000) estimated both buoyancy and income elasticity of Kenyan tax system. In his analysis he concluded that the tax system had failed to raise necessary revenues. One of the shortcomings was that he didn't separate tax revenue data by either base or source thus making it impossible, first, to identify the source of either fast revenue growth or lagging revenue growth and secondly in highlighting the component of growth that is amenable to policy manipulation.

Moyi and Muriithi (2003) applies the concepts of elasticity and buoyancy to determine whether tax reforms in Kenya mobilized or generated sufficient revenue. The period of study was divided into two pre-reform periods (1973-1985) as well as the post-reform period (1986-1999). The pre-reform period registered the lowest elasticity indexes of 0.276 for the whole tax structure compared with other periods and a buoyancy of 1.023. In comparison, the post-reform period recorded buoyancy and elasticity of 1.661 and 1.495, respectively. The analysis suggests that reforms had a positive impact on the overall tax structure and on the individual tax handles. In fact, the elasticity of indirect taxes was low and that of direct taxes was high, especially after the reforms. Despite this positive impact, they argued that despite VAT being predominant in the tax structure, reforms failed to make VAT responsive to changes in income.

Moyi and Ronge (2006) in their study Taxation and Tax Modernization analyzed the tax buoyancy in Kenya between 1995 and 2005. The main objective of the study was to review tax revenue performance as well as tax design and administration changes during this period in order to identify priorities for further tax reform. The results suggested that the overall tax system had a buoyancy of 0.662. 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.

As seen, a complete adjustment of historical revenue series is not possible in any of the methods discussed in this chapter. From Choudry's (1979) comparison of various techniques of estimating elasticity, the proportional mechanism method technique stands out among all the other three, and thus it is deemed superior over other available methods which also explains its prevalence in earlier studies by various scholars. This method also requires use of budget estimates of tax yields resulting from discretionary changes which is readily available in Kenya. From the analysis done the PAM method it is also believed to have similar results as those from the Divisia index method. Therefore in this study I have used the proportional adjustment mechanism.

CHAPTER THREE

MODEL SPECIFICATION AND ANALYTICAL FRAMEWORK

3.1. *Theoretical framework*

Tax buoyancy and elasticity, just as manifested in our literature review are two components that are used in analyzing tax revenue productivity in a country. In line with achieving our objective, this chapter explains both the technique and methodology to be used in this study.

3.2 *Elasticity*

To analyse elasticity it is important to break down the income elasticity of each separate tax into two elements that is:

- (a) The elasticity of the tax to the base, and
- (b) The elasticity of the base to income.

This decomposition of elasticity is of help for two main reasons. First, it will help us to identify the source of either fast revenue growth or lagging revenue growth. Secondly, it will also help to identify that component of growth that is amenable to policy manipulation.

The model used to estimate elasticities has been borrowed from Mansfield (1972) and which has been used by some other scholars such as Moyi and Munithi (2003). They assume a system of n taxes to show that the tax revenue to income elasticity is the weighted sum of the individual tax elasticities and is shown as below:

$$\frac{dT}{T} = \sum_{j=1}^n \frac{T_j}{T} \epsilon_{T_j, Y} \quad (eqn.1)$$

The elasticity of total tax revenue to income is defined as

$$\epsilon_{T, Y} = \frac{dT}{T} \cdot \frac{Y}{dT} = \sum_{j=1}^n \frac{T_j}{T} \epsilon_{T_j, Y} \quad (eqn.2)$$

Elasticity of the K^h , individual tax to income can be expressed as:

$$ET_i Y = \frac{\Delta T_k}{\Delta Y} \times \frac{Y}{T_k}$$

(eqn.3)

From the equations above T_i is the total tax revenue;

T_k is revenue from the K^* tax;

Y is income or GDP;

and Δ is the change operator.

Since the elasticity of K^h tax is the product of the elasticity relative to the base and the elasticity of the base-to-income. This can be shown as:

is the base of the K^h tax

$$ET_i Y = \left[\frac{\Delta T}{\Delta B_i} \times \frac{B_i}{T_i} \right] \left[\frac{\Delta B_i}{\Delta Y} \times \frac{Y}{B_i} \right]$$

(eqn.4)

Therefore, in a system of n taxes, the elasticity of the total tax system will be given by the product of the tax-to-base elasticity and base-to-income elasticity for each separate tax, weighted by the significance of the respective tax in the tax system. This can be stated as follows:

$$ET_i Y = \frac{T_i}{T} \left[\frac{\Delta T_i}{\Delta B_i} \times \frac{B_i}{T_i} \right] \left[\frac{\Delta B_i}{\Delta Y} \times \frac{Y}{B_i} \right]$$

$$\left[\frac{\Delta T_i}{\Delta B_i} \times \frac{B_i}{T_i} \right] \left[\frac{\Delta B_i}{\Delta Y} \times \frac{Y}{B_i} \right]$$

(eqn.5)

3.3. Estimation procedure

The equations above explain how elasticity is decomposed into two components. The model explained below will be used to compute the elasticity for each tax and for the overall tax system

$$r^* = aJPt \quad (\text{eqn.6})$$

T' is the tax revenue. B is the Tax base (or GDP in aggregate level), a and p represent Parameters to be estimated and c is the multiplicative error term.

Introducing logs, we obtain a log-linear specification which will allow direct estimate of elasticity and is also a preferred functional form in other studies Khan (1973) and Bryne (1983). It takes the following form:

$$\text{Log } T = \text{Log } a + p \text{Log } B + U \quad (\text{eqn. 7})$$

r is the tax revenue; η Tax elasticity is defined as the responsiveness of revenue yields to movements in the base (or GDP in aggregate level).

To obtain T^* we have to adjust the tax revenue figures to eliminate the Discretionary tax measures, this will be achieved by using the proportional adjustment method (PAM). In this approach, the following steps will be used:

First we compute:

$$T_{t,t} = T_t - D_t \quad (\text{eqn. 8})$$

Where

$T_{t,t}$ is the actual collection of the t^{th} year adjusted to the structure of that year

T_t - actual yield in the t^{th} year and

D_t - is the budget estimate of the discretionary change(s) in the t^{th} year

Using this method it is required that the revenue yield for each year in the sample period be adjusted to generate a revenue yield based on the structure of a reference year. T_M will be converted to the reference year.

To obtain the adjusted series for the t^{th} year. T_{1t} is multiplied by the previous year's ratio of the adjusted tax revenue with reference to the base year ($T \setminus i$) Over the actual tax revenue ($T|_j$) that is:

$$T . S - T . - D ,$$

(eqn.9)

3.4 Buoyancy

Tax buoyancy measures the responsiveness of tax revenue to changes in Income or output with no attempt to control for discretionary changes in tax Policy. Buoyancy of taxes with respect to their bases (or GDP) is derived from logarithmic regressions of unadjusted revenue data on these bases (or GDP); this is calculated using the double log function as follows:

$$\text{Log}T, = a + P . \text{Log} (B), + E, \quad (\text{eqn. } 10)$$

The only difference being that in the case of buoyancy actual and not adjusted tax revenue figures are utilized. P measures buoyancy coefficient The ordinary least square is used to estimate the coefficients a and p

Buoyancy coefficient of let's say 1.2 would imply that for every 1% increase in GDP. revenue from the tax liability on average grown by 1.2%. The effect of automatic growth alone, after abstracting from discretionary changes an elasticity coefficient of 1.2% would imply that for every 1% increase in GDP. revenue from tax would have grown by 1.2% if the legislation and the rate of tax had remained unchanged

3.5 Tax bases and data sources

In this study Private final consumption was used as the VAT and Excise tax base since it has been levied at retail and wholesale levels. Bases for direct tax used are domestic factor incomes derived from the data on the sources of income side of the national accounts. Import duty base was taken to be imports from the BOP account and lastly tax base used for the overall tax system was GDP.

This study uses data from 1990 to 2009 since this is the period we saw the implementation of various TMP reforms initiatives like formation of. Data on various tax revenue, GDP and tax bases was derived from KRA publications, Economic surveys, and statistical abstracts. The revenue impact of discretionary tax measures was obtained from annual budget speeches produced at the Treasury.

CHAPTER FOUR

EMPIRICAL ANALYSIS

4.1 *Introduction*

This chapter is devoted to the empirical analysis of this study. It checks time series properties of all variables, cointegration analysis and error correction modeling, diagnostic test and the discussion of results obtained

4.2 *Time series properties of variables*

As time series are used in this study, it is paramount to check for their stationarity in order to avoid several problems which can arise due to the presence of unit roots. The use of non stationary variables can lead to the problem of non sense or spurious regression Verbeek (2004). Therefore, to overcome this problem, stationarity analysis is conducted through two tests namely Augmented Dickey Fuller test (ADF) and Phillips Perron test (PP).

4.2.1 *Unit root tests*

Unit root tests for all variables are performed using ADF test and PP test. First, data was transformed into logarithms according to the models in the previous chapter. Given that we don't know the true mean of each variable, we included a constant in the regression. Besides, a trend was also introduced in the case where it was found to be statistically significant as to ignore the eventuality of presence of trend and a constant that may lead to over rejection of the null hypothesis of the existence of unit root(s). In the case of ADF test, the optimal number of lags was chosen basing on the Schwarz Information criterion (SIC) whereas for the PP test it is the Newey West technique. The results for the ADF test are presented in the table 4.1 below.

Table 4.1 ADF unit root test for variables in levels

Variables	Trend	Lags	ADF	Probability	Decision
Log of customs duties	No	0	-1.792	0.37	Non stationary
Log of direct taxes	Yes	0	-1.872	0.629	Non stationary
Log of excise duty	Yes	0	-4.201	0.018**	Stationary
Log of GDP	Yes	0	-1.708	0.707	Non stationary
Log of GDP at factor income	Yes	0	-2.394	0.37	Non stationary
Log of imports	Yes	2	-4.207	0.020	Non stationary
Log of private consumption	Yes	3	-3.235	0.112	Non stationary
Log of VAT	Yes	1	-1.542	0.774	Non stationary
Log of adjusted customs duties	Yes	0	-3.061	0.142	Non stationary
Log of adjusted direct taxes	No	0	-0.089	0.937	Non stationary
Log of adjusted excise duty	Yes	1	-2.894	0.186	Non stationary
Log of adjusted VAT	Yes	1	-0.668	0.959	Non stationary
Log of total taxes	Yes	0	-2.184	0.470	Non stationary
Log of adjusted total taxes	Yes	0	-2.075	0.525	Non stationary

- ** means stationary at 5% level

As shown in table 4.1 above, the ADF test results indicate that all variables transformed in logarithms are not stationary in their levels except excise duties. For the latter, the null hypothesis of the presence of unit root can be rejected at 5% level basing on MacKinnon probability values. Thus excise duties are found to be stationary. To confirm these results, the PP test was performed and results displayed in table 4.2 below.

Table 4.2 PP unit root test for variables in levels

Variables	Trend	PP	Probability	Decision
Log of customs duties	No	-1.795	0.37	Non stationary
Log of direct taxes	Yes	-1.952	0.588	Non stationary
Log of excise duty	Yes	-4.868	0.005***	Stationary
Log of GDP	Yes	-1.708	0.707	Non stationary
l>g of GDP at factor income	Yes	-2.394	0.37	Non stationary
l.og of imports	Yes	-1.861	0.63	Non stationary
Log of private consumption	Yes	-2.007	0.56	Non stationary
Log of VAT	Yes	-2.78	0.219	Non stationary
Log of adjusted customs duties	Yes	-2.976	0.163	Non stationary
l.og of adjusted direct taxes	No	-0.136	0.931	Non stationary
Log of adjusted excise duty	Yes	-3.052	0.144	Non stationary
Log of adjusted VAT	Yes	-0.426	0.977	Non stationary
Log of total taxes	Yes	-2.228	0.448	Non stationary
l-og of adjusted total taxes	Yes	-2.141	0.492	Non stationary

- *** means stationary at 1% level

The PP test results confirm the ADF test results obtained above. In fact, excise duties transformed in logarithms are stationary as the null hypothesis of the presence of unit root is rejected at 1% level basing on MacKinnon p values. For all the remaining variables, the null hypothesis cannot be rejected even at 10% level.

To check for the order of integration of non stationary variables, the latter were differenced once and ADF and PP tests were performed again. The same procedure was followed in choosing the optimal lag length and a constant was also included while no trend was allowed in the regressions. The results of the ADF test are reported in table 4.3 below.

Table 4.3 ADF unit root test for variables in difference

Variables	Lags	ADF	Probability	Decision
A log of customs duties	0	-3.581	0.017**	Stationary. I(1)
A Log of direct taxes	0	-3.394	0.025**	Stationary. I(1)
A log of GDP	0	-4.105	0.006***	Stationary. I(2)
A Log of GDP at factor income	0	-4.637	0.002***	Stationary, I(1)
A Log of imports	0	-4.099	0.006***	Stationary. I(1)
A Log of private consumption	0	-3.433	0.023**	Stationary. I(1)
A Log of VAT	0	-6.203	0.000***	Stationary. I(1)
A Log of adjusted customs duties	0	-5.279	0.000***	Stationary, I(1)
A Log of adjusted direct taxes	0	-3.640	0.015**	Stationary, I(1)
A Log of adjusted excise duty	0	-4.823	0.001***	Stationary. I(1)
A Log of adjusted VAT	0	-8.262	0.000***	Stationary. I(2)
A Log of total taxes	0	-5.959	0.000***	Stationary. I(2)
A Log of adjusted total taxes	0	-4.562	0.002***	Stationary, I(1)

- ** means stationary at 5% level, *** means stationary at 1% level
- I(1) means integrated of order one, I(2) means integrated of order two

Basing on Mackinnon p values, the null hypothesis of presence of unit root was rejected for all variables in their first difference except for log of GDP, log of VAT and log of total taxes which had to be differenced twice to be stationary. For customs duties, direct taxes, private final consumption, adjusted customs duties, adjusted direct taxes, total taxes and adjusted total taxes the null hypothesis was rejected at 5% level. For GDP at factor income, imports, VAT and adjusted VAT the null hypothesis was rejected at 1% level. To validate these results, the PP tests gave us the following results in table 4.4 below

Table 4.4 PP unit root test for variables in difference

Variables	PP	Probability	Decision
A Log of customs duties	-3.648	0.015**	Stationary. 1(1)
A Log of direct taxes	•3.385	0.025**	Stationary, 1(1)
A Log of GDP	-4.041	0.007***	Stationary. 1(2)
A Log of GDP at factor income	-4.744	0.001***	Stationary, I(1)
A Log of imports	-4.117	0.005***	Stationary, 1(1)
A Log of private consumption	-3.413	0.023**	Stationary, 1(1)
A Log of VAT	-6.355	0.000***	Stationary. 1(1)
A Log of adjusted customs duties	-7.736	0.000	Stationary, 1(1)
A Log of adjusted direct taxes	-3.640	0.015	Stationary, 1(1)
A Log of adjusted excise duty	-7.673	0.000	Stationary. 1(1)
A Log of adjusted VAT	-23.383	0.000	Stationary. 1(2)
A Log of total taxes	-6.677	0.000	Stationary. 1(2)
A Log of adjusted total taxes	-4.626	0.002	Stationary, 1(1)

- ** means stationary at 5% level, *** means stationary at 1% level
- 1(1) means integrated of order one, 1(2) means integrated of order two

The PP test confirmed results obtained via ADF test. Hence, variables customs duties, direct taxes, private final consumption, adjusted customs duties, adjusted direct taxes. GDP at factor income, imports. VAT and adjusted total taxes in their logarithms were found to be integrated of order one whereas log of GDP, log of adjusted VAT and log of total taxes were found to be integrated of order two.

Form the above, the presence of non stationary variables in all equations to be estimated compels us to use appropriate econometrics technique to deal with that problem. In that sense, the cointegration technique developed by Englc and Granger (1987) is used in this study. This

technique will help us to avoid the problem of spurious regression and to derive the long and short run relationship between variables via error correction modeling.

4.3 Buoyancy

4.3.1 Cointegration analysis

According to Engle and Granger (1987), if elements of vector X are integrated of order one while their linear combination is stationary, the time series X are said to be cointegrated. In this case there exists a (1×1) matrix α such that $Y - \alpha X$ is integrated of order zero Maddala (1992). Cointegration implies the existence of long run relationship between cointegrated variables.

Engle and Granger (1987) suggested a two step procedure where residuals from the regression of two non stationary variables are checked to find whether they are stationary. We follow this procedure and as in the previous case, ADF and PP test are conducted. For ADF test, the optimal lag length is selected basing on SIC while PP test consider Newey West technique. Starting with the analysis of buoyancy of customs duties, direct taxes, excise duties and VAT, the table 4.5 below presents the results from ADF test on residuals from regressions with their respective bases.

Table 4.5 results of residuals based cointegration test using ADF test

Dependent variable	Independent variable	ADF	Probability	Decision
Log of customs duties	Log of imports	-1.858	0.061*	Stationary in levels
Log of direct taxes	Log of GDP at factor income	-1.925	0.053*	Stationary in levels
Log of excise duty	Log of private consumption	-3.532	0.001**	Stationary in levels
Log of VAT	Log of private consumption	-1.473	0.127	Non stationary
I-log of total taxes	I.log of GDP	-3.032	0.050**	Stationary in 1 st A

• " means stationary at 5% level, * means stationary at 10% level

From the results above, the null hypothesis of presence of unit root in residuals could be rejected for customs duties, direct taxes and excise duties equations at 10%, 10% and 1% level respectively basing on Mackinnon p values. For VAT equation, the null hypothesis could not be rejected. Meanwhile for total taxes equation, as log of total taxes and log of GDP were both integrated of order two (2), the fact that residuals from the equation are stationary in their first difference proves that the two variables are cointegrated. To confirm these results, the PP tests were performed as shown in table 4.6

Table 4.6 results of residuals based cointegration test using PP test

Dependent variable	Independent variable	PP	Probability	Decision
Log of custom duties	Log of imports	-1.858	0.061*	Stationary in levels
Log of direct taxes	Log of GDP at factor income	-2.106	0.036**	Stationary in levels
Log of excise duty	Log of private consumption	-3.423	0.001**	Stationary in levels
Log of VAT	Log of private consumption	-1.554	0.110	Non stationary
Log of total taxes	Log of GDP	-2.994	0.054*	Stationary in 1 st A

• ** means stationary at 5% level, * means stationary at 10% level

Results reported in table 4.6 above confirmed that there is cointegration between direct taxes and GDP at factor income and also between excise duties and private final consumption. In case of customs duties and imports, and total taxes and GDP, we can also conclude to the existence of cointegration as the probability of 0.06 is close to 5% level. In general, this implies the existence of long run stable relationship between those variables and that is illustrated by the coefficients from regression of static long run equations. In addition, the derived coefficients are super consistent Maddala (1992)

Yet, VAT and private final consumption are not cointegrated. Given that both variables are not stationary, the regression results from equation may be spurious. In this case, one of the solutions is to stationarize the variables by differencing or detrending and proceed with regression. Nevertheless, this option would remove any information on long run relationship between VAT and private final consumption.

Following the above, long run buoyancy of customs duties, direct taxes, excise duties and total taxes are derived from their respective static long run equation. For VAT equation we stationarized the series and proceeded with regression. Nonetheless, results obtained were not significant, therefore we decided to run the regression of equation with variables in their level even though they were neither stationary nor cointegrated. The table 4.7 below reports the long run buoyancies.

Table 4.7 long run buoyancies

Tax	Coefficient (tax to base)	Probability	Ftest	R ⁵	D W test
Customs duty	0.559	0.000	50.690	0.737	0.510
Direct taxes	0.564	0.000	110.914	0.860	0.497
Excise duty	0.961	0.000	260.617	0.935	0.597
VAT	0.794	0.000	492.459	0.964	0.557
Total taxes	0.913	0.000	698.83	0.97	0.48

Coefficients in all equations are statistically significant at 1% level of significance with sufficiently high F test value for overall significance and R squared. However Durbin Watson values are lower but given that the coefficients are super consistent, this should not be a problem. About the magnitude of coefficients, the buoyancy of customs duties is 0.55, meaning that 1% increase in value of imports lead to a 0.55% increase in customs duties in the long run. Direct taxes have a long run buoyancy of 0.56 implying that in the long run, a 1% increase in GDP at factor income raise direct taxes by 0.56%. The long run buoyancy of excise duties is relatively

higher as in the long run, 1% increase in private final consumption lead to a 0.96% increase in excise duties. VAT buoyancy in long run is 0.79 implying a rise of 0.79% in VAT from a 1% increase in private final consumption. Finally the long run total taxes buoyancy is 0.91 meaning that a 1% rise in GDP increases total taxes by 0.91%.

4J.2 Short run analysis

According to Granger representation theorem, if variables are cointegrated, short run dynamics can be described by error correction model (ECM) (Maddala, 1992). Hence for each of the three cointegration relationship found above, an ECM was derived. We selected the number of lags basing on SIC and we used Hendry general to specific modelling by eliminating variables which are not significant in order to have parsimonious models. The results obtained are presented in the following table 4.8.

Table 4.8 ECM results

	Coefficient (tax to base)	Lagged Coefficient	E C term	F test	R'	D W test
Customs duty	0.694 (0.07)		-0.282 (0.10)	3.62 (0.050)	0.31	1.73
Direct taxes	-0.03 (0.83)		-0.246 (0.04)	2.40 (0.12)	0.23	1.74
Excise duty	1.15 (0.05)	1.24[-2] (0.02)	-0.48 (0.02)	4.56 (0.02)	0.51	1.63
Total taxes	1.515 (0.006)		-0.28 (0.08)	10.38 (0.001)	0.56	1.58

- Values in () are t test probabilities

As shown in table 4.8, in the short run, customs duties buoyancy is 0.69, meaning that 1% increase in value of imports lead to 0.69% rise in customs duties in the short run. Moreover the error correction term coefficient is -0.28, it is negative, which confirms cointegration and indicates the speed of adjustment in ease of deviation from long run equilibrium. That is each

year; customs duties adjust by 28% of the deviation between their current level and the long run equilibrium.

For direct taxes, the short run buoyancy was not statistically significant and had an unexpected negative sign, However the error correction term coefficient was negative and significant thereby confirming cointegration. It indicated that each year, direct taxes adjust by around 24% of the gap between their current level and their long run equilibrium level.

The short run buoyancy of excise duties is 1.15 implying that in short run, 1% increase in private final consumption lead to 1.15% increase in excise duties. In addition, the lagged coefficient shows that 1% increase in private final consumption lagged twice lead to an increase of 1.24% in excise duties. The error correction term coefficient confirmed cointegration by its negative sign and suggested an adjustment of excise duties to its long run equilibrium by 48% each year.

Total taxes short run buoyancy is 1.51, meaning that 1% increase in GDP lead to 1.51% rise in total taxes in the short run. Moreover the error correction term coefficient is -0.28, it is negative, which confirms cointegration and indicates the speed of adjustment in case of deviation from long run equilibrium. That is each year; customs duties adjust by 28% of the deviation between their current level and the long run equilibrium.

4.3.3 Diagnostic test

The two equations with significant results namely, customs duties and excise duties equations passed all the diagnostic tests, in fact the probabilities for Jarque Bera test for normality were 0.77 and 0.13 respectively, thus the null hypothesis of normality could not be rejected. Besides the probability of F test for Breusch Pagan serial correlation LM test were 0.99 and 0.73 respectively thereby confirming the absence of serial correlation. The F probabilities of white heteroskedasticity test were respectively 0.13 and 0.52 implying the absence of heteroskedasticity. Lastly, the probabilities for Ramsey RESET test for specification error indicated that both models are not mis-specified as the probabilities were 0.32 and 0.109 respectively. The only unsatisfactory results are relatively lower values of R² which were 31% and 51% respectively. However, total taxes equation passed Breusch Pagan serial correlation LM test with probability of 0.65 but fails the Ramsey RESET test as the F probability was 0.001.

4.4 Elasticity

To derive the elasticity of a given tax, it is required to adjust the revenues collected by subtracting that part of revenues raised due to discretionary tax measures. As explained in the methodology part, we used the proportional adjustment method to eliminate the discretionary effects from the revenues from various taxes considered in this study.

After generating the adjusted series, we followed the same process as in the previous case of buoyancy. Given that adjusted series were not stationary as shown previously, we used cointegration analysis to detect any long run relationship.

4.4.1 Cointegration analysis

As in the case of buoyancy, we used Engle and Granger (1987) two step procedure where residuals from the regression of two non stationary variables are checked to find whether they are stationary. Hence, ADF and PP test were performed on residuals. For ADF test, the optimal lag length is selected basing on SIC while PP test consider Newey West technique. Table 4.9 below reports results from ADF test on residuals.

Table 4.9 Results of residuals based cointegration test using ADF test

Dependent variable	Independent variable	ADF	Prob.	Decision
Log of adj. customs duties	Log of imports	-3.132	0.003** *	Stationary
Log of adj. direct taxes	Log of GDP at factor income	-1.684	0.086*	Stationary
Log of adj. excise duty	Log of private consumption	-1.728	0.079*	Stationary
Log of adj. VAT	Log of private consumption	-3.086	0.004** *	Stationary
Log of adj. total taxes	Log of GDP	-4.546	0.002** *	Stationary in I^1 A

- *** means stationary at 1% level, * means stationary at 10% level

The results above are almost similar to those obtained when testing for cointegration in the case of buoyancy. In fact, the null hypothesis of presence of unit root in residuals could be rejected for customs duties, direct taxes, excise duties and VAT equations at 5%, 10%, 10% and 5% level respectively basing on Mackinnon p values. For total taxes equation, the null hypothesis could be rejected in the first difference. Given that log of GDP is integrated of order two (2) this result suggests that adjusted total taxes and GDP are cointegrated. The PP tests were also performed in order to confirm these results as shown in the following table 4.10.

Table 4.10 results of residuals based cointegration test using PP test

Dependent variable	Independent variable	PP	Prob.	Decision
"Log" of customs duties	Log of imports	-3.151	0.003**	Stationary
Log of adj. direct taxes	Log of GDP at factor income	-1.794	0.069*	Stationary
Log of adj. excise duty	Log of private consumption	-1.728	0.079*	Stationary
Log of adj. VAT	Log of private consumption	-2.189	0.031**	Stationary
Log of adj. total taxes	Log of GDP	-4.602	0.002**	Stationary in 1 st A

- *** means stationary at 1% level, ** means stationary at 5% level, * means stationary at 10% level

Results reported above confirmed that there is cointegration between adjusted direct taxes and GDP at factor income, between adjusted excise duties and private final consumption, between adjusted customs duties and imports, between adjusted VAT and private final consumption and between adjusted total taxes and GDP.

For those cointegrating relationship, we estimated the static equations in order to get the long run elasticities which are indeed super consistent. The following table 4.11 displays the results

Table 4.11 Long run elasticities

	Coefficient (tax to base)	T Test	F test	R ²	D W test
Customsduty	0.439	0.000	102.67	0.85	1.41
Direct taxes	0.314	0.000	82.15	0.82	0.60
Excise duty	0.908	0.000	475.11	0.96	0.58
VAT	0.573	0.000	119.71	0.86	0.15
Total taxes	0.592	0.000	360.62	0.95	0.90

From table 4.11 above, the elasticity of customs duties is 0.43, meaning that 1% increase in value of imports lead to a 0.43% increase in customs duties in the long run. Direct taxes have a long run elasticity of 0.31 implying that in the long run, a 1% increase in GDP at factor income raise direct taxes by 0.31%. The long run elasticity of excise duties is comparatively higher as in the long run, 1% increase in private final consumption lead to a 0.90% increase in excise duties. VAT elasticity is 0.57 implying a rise of 0.57% in VAT from a 1% increase in private final consumption in the long run. Finally, total taxes elasticity is 0.59; in other words 1% increase in GDP lead to 0.59% increase in total taxes. As a matter of fact, it should be noticed that these rates of change concern the taxes adjusted to isolate effect of discretionary changes. Coefficients in all equations are statistically significant at 1% level of significance with high F test value for overall significance and R squared. However Durbin Watson values are lower but given that the coefficients are super consistent, this should not be a problem.

Given the above cointegration relationship, short run relationship can be obtained via error correction modeling. As done previously in the case of buoyancy, the following table report results for short term elasticities.

Table 4.12 KCM results

	Coefficient (tax to base)	Lagged Coefficient	EC term	F test	R ⁵	D W test
Customs duly	0.389 (0.20)		-0.70 (0.00)	5.21 (0.018)	0.39	1.92
Direct taxes	-0.18 (0.07)		-0.14 (0.23)	3.29 (0.06)	0.29	1.64
Excise duty	0.34 (0.49)		-0.20 (0.30)	0.60 (0.55)	0.07	1.78
VAT	-0.12 (0.67)		-0.01 (0.86)	0.14 (0.86)	0.018	1.69
Total taxes	0.638 (0.20)		-0.43 (0.09)	2.15 (0.14)	0.21	1.73

- Values in () are t test probabilities

From table 4.12 above, no equation has robust results, coefficients are either not statistically significant or have wrong signs. Therefore, for elasticity we considered the long run relationship obtained in the previous section.

4.5 Discussion of empirical findings

Firstly, the elasticity and buoyancy of different taxes found in this study indicate that in general, the Kenyan tax system was not productive for the period 1990 to 2009 as most of elasticities and buoyancies were less than unity.

Secondly, the comparison between elasticities and buoyancies of customs duties, excise duties, VAT, direct taxes and total taxes revealed that buoyancies are greater than elasticities. This proves that the discretionary tax measures and reforms implemented had a significant impact on revenues generation.

Looking at each tax individually, starting with customs duties, its long run elasticity was 0.43 while its buoyancy was 0.55. Both figures are less than one, implying less productivity. However, the difference between the two shows that discretionary tax measures have significantly improved its productivity. Compared to results from other studies in Africa, elasticity and buoyancy were generally higher in oilier African countries as Ariyo (1997) found 0.72 and 0.84 respectively in the case of Nigeria. Chipeta (1998) obtained customs duties elasticity of 0.7 and buoyancy of 0.86 for Malawi. Other studies considered the period post reforms and found higher elasticity and buoyancy for customs duties. In Ghana, Kusi (1998) found the elasticity and buoyancy of 1.2 and 1.3 respectively for the period from 1983 to 1993 while Muriithi and Moyi (2003) found elasticity and buoyancy of customs duties to its base of 2.12 and 2.32 respectively.

About direct taxes, the long run elasticity was 0.31 whereas its buoyancy was 0.56. Similar to the case of customs duties, they are less than one, implying less productivity, the difference between the magnitude of elasticity and buoyancy revealed a considerable positive impact of discretionary tax measures on the productivity. Compared to results previously obtained in Kenya by Muriithi and Moyi (2003), the elasticity and buoyancy we found are significantly lower as Muriithi and Moyi (2003) found elasticity and buoyancy of direct taxes to its base of 2.49 and 2.33 respectively for the period from 1986 to 1999.

Nevertheless, excise duties performed better compared to other taxes, in fact its long run elasticity was $0 \gg 0$ whereas its buoyancy was 0.%. The short run buoyancy was even greater than unity as it was 1.15. These figures are close to unity suggesting more productivity than in the previous two cases. Other studies in Africa on post reforms found almost similar results. In Ghana, Kusi (1998) found the elasticity and buoyancy of 0.99 and 0.91 respectively for the period from 1983 to 1993 while in Kenya for the period from 1986 to 1999, Muriithi and Moyi (2003) found elasticity and buoyancy of excise duties to its base of 1.32 and 1.4 respectively.

For VAT, the long run elasticity was 0.57 whereas its buoyancy was 0.79. Similarly, they are less than one, implying less productivity. Nevertheless, difference of 0.22 between the magnitude

of elasticity and buoyancy revealed a considerable positive impact of discretionary tax measures on the productivity. Results previously obtained in Africa especially in Kenya, suggested that discretionary tax measures improved VAT productivity. Muriithi and Moyi (2003) found the elasticity and buoyancy of VAT to its base of 0.36 and 0.67 respectively for the period from 1986 to 1999 whereas Gitahi (2007) found VAT elasticity and buoyancy of 0.67 and 1.2 respectively.

If we look at total taxes in general, the buoyancy is 0.91 while the elasticity is 0.59. As in the case of various taxes taken individually, the tax system is not productive in general. Moreover, the difference of around 0.32 between elasticity and buoyancy highlights how important and vital, discretionary tax measures and reforms have been to the Kenyan tax system. Thus we can conclude that reforms have unproved the productivity of tax system in Kenya

CHAPTER FIVE

CONCLUSION AND POLICY RECOMMENDATIONS

5.1 *Conclusion*

Since independence, there have been several attempts in Kenya to enhance revenue productivity to finance government expenditures through various tax reforms. In spite of the enormous efforts from fiscal authorities, productivity of revenue generated has been very low.

Given the fiscal problems facing the country' and the continued drive to tax policy reforms, there is a need to examine the impact of various tax reforms on revenue generation and more so in accessing their contribution to share and efforts. This is more important if the tax system is to be exempted from the blame of having failed to generate sufficient revenues. Thus, this study examines the productivity of the various tax reforms in revenue generation in Kenya

In chapter two, we reviewed the theoretical and empirical literature on productivity of tax systems and the effect from tax reforms. Based on the literature review, a model with several equations to be estimated were derived in chapter three where different taxes namely customs duties, direct taxes, excise duties and VAT were examined, linkages were made to the taxes and related to their respective bases namely imports, GDP at factor income, private final consumption and private final consumption. The specific objective of this study was to analyse both tax elasticity and buoyancies with a view to evaluate impacts of tax reforms on revenue and also to draw policy recommendations on future tax reforms that improve revenue productivity.

Empirical findings from this study suggest that for the period under study, the Kenyan tax system was in general not productive despite several reforms and measures undertaken. This is evidenced by buoyancy and elasticity being less than unity for all taxes except for excise duty-buoyancy in the short run. However, the comparison between buoyancy and elasticity revealed that tax reforms and discretionary tax measures have improved the productivity of Kenyan tax system. VAT and direct taxes were the mostly affected by reforms as the difference between elasticity and buoyancy was above 0.20 points. For direct taxes, this indicates that reforms have contributed to broadening the tax base relative to informal sector activities.

Given that excise duties base is easily detectable by fiscal authorities, the fact that excise duties had the highest elasticity and buoyancy, is a sign of a problem of revenue leakage in other remaining taxes which may be due to corruption, tax evasion and inappropriate tax collection measures especially on informal sector. From the above, it is obvious that there is still room for improvement to make the tax system more responsive to economic growth

5.2. *Policy recommendations*

Given that the productivity of Kenyan system is still low, there is a need to enhance taxpayers' recruitment in order to reduce the size of informal sector economy and thereby increase the tax base. In those informal sectors where it's difficult to tax income earned advance taxes should be introduced. To increase tax revenue the government should broaden the tax base to cover more areas like real estate where tax is yet to be tapped.

A tax system requires constant review as the structure of the economy evolves. Therefore, a tax review commission should be established to guide the process and ensure development of new tax measures which will lead to an effective and efficient tax system. In addition, to raise the productivity of Kenyan tax system, fiscal authorities should further focus on taxes which are more elastic to income.

Constitution directs that all public officers pay tax on all their income, Members of Parliament have not been doing so since the new constitution came into effect. The KRA should take measures to ensure they pay taxes which will increase tax revenue.

There is also a dire need to intensify taxpayers' education, tax audits and simplification of the whole process of tax collection from tax returns to tax payment. Indeed this will make taxpayers to understand tax laws and improve their compliance and lower their incentives to evade.

Effectively, the government should step up measures to fight corruption and tax evasion which have been hampering revenue collection in Kenya. To achieve, this government should review collusion penalties upward, enhance continuous training for KRA officials and strengthen the development of audit skills.

S.J Limitation of the study and areas of further research

The study is solely concerned with tax productivity of the reforms. Reforms can, however, be evaluated on other grounds in order to enable a better appreciation of their contribution to other avenues in the economy. Of great concern might be the reforms' impact on other government revenues and generally on revenue generation.

In assessing the effect of discretionary measures on the economy, the method used to adjust tax revenue figures has made an explicit assumption that a particular discretionary effort only affects a particular tax. However, different taxes are linked to each other through the economic system and a change in one tax may affect yields of another. Effects of particular measures should therefore be studied in conjunction with other taxes and not be limited to the tax they are addressing.

Tax exemptions have been used extensively in Kenya. These exemptions are known to reduce the base on which a tax is levied hence influencing the base to income elasticity. The effects of exemption on elasticity of tax have also not been considered in the study.

However, despite these possible areas of further research, our study's general objective has been demonstrated

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ANNEXTURES

Year	Direct tax	Custom duty	Excise duty	VAT
1990	713.08	334.68	185.16	766.07
1991	851.39	255.93	340.46	927.77
1992	998.52	459.15	418.35	1107.14
1993	1838.36	739.64	556.27	1449.72
1994	2175.29	929.91	966.61	1226.69
1995	2404.12	1058.78	1130.59	1420.19
1996	2418.75	1129.7	1184.36	1492.5
1997	2778.98	1228.35	1419.08	1723.41
1998	2761.74	1422.2	1436.66	1960.24
1999	2992.2	1535.5	1567.5	2065
2000	2671.74	1440.187	1424.053	2511.046
2001	2793.098	1079.184	1603.85	2543.584
2002	3337.214	921.812	1784.206	2806.7625
2003	3707.15	1084.2	2096.95	3020.25
2004	4965.624	1176.586	2207.561	3779.783
2005	5731.453	1025.57	2332.281	3996.261
2006	6535.95	1396.35	2806.15	4824.851
2007	8253.9	1647.218	3095.276	5595.23
2008	9222.339	1809.03	3493.6	6342.7
2009	11014.05	2030	3903.3	7417.65

ANNEX B: TAX BASES FOR VARIOUS REVENUE IN KENYA (1990-2009) IN MILLION (£ KSII)

Year	Private final consumption	GDP	Imports	GDP at factor income
1990	121655	195536	50913	3523.67
1991	142419	224232	52918	4005.25
1992	178571	264475	59097	4672.8
1993	210596	333616	101128	5616.61
1994	250098	400700	115080	7288.2
1995	32262~T	465654	155168	8746.7
1996	359442	528740	168486	9082.82
1997	453173	623235	190674	11083.35
1998	513249	694029	193032	12975.59
1999	540400	743479	198313	14424.4
2000	609862	796343	236613	15717.76
2001	665208	878731	250782	45445.95
2002	701822	962686	255569	50846.1
2003	805163	1091640	282616	57396.3
2004	965528	1274328	364557	64035.6
2005	1077071	1415724	443093	72031.15
2006	1222570	1622434	521483	80584.8
2007	1383366	1825960	605112	92673
2008	1567780	2099798	770651	118272.65
2009	1824764	2167342	788097	127558.05

ANNEX C: DIAGNOSTIC TEST RESULTS

ECM for buoyancy

Customs duties

Hreusch-Ciodfrey Serial Correlation I M Test:

F-statistic	0.005550	Probability	0.994468
(>b)*R-squared	0.015051	Probability	0.992503

White Heteroskedasticity Test:

F-statistic	2.080802	Probability	0.137753
Obs'R-squared	7.084149	Probability	0.131508

Ramsey RESET Test:

F-statistic	1.212174	Probability	0.326948
log likelihood ratio	3.034444	Probability	0.219320

Jarque Bera=0.51, prob=0.77

Excise duties

Hreusch-Godfrey Serial Correlation LM Test:

F-statistic	0.319685	Probability	0.732905
Obs*R-squared	0.933837	Probability	0.626931

White Heteroskedasticity Test:

F-statistic	0.915639	Probability	0.521775
Obs*R-squared	6.027892	Probability	0.420073

Ramsey RESET Test:

F-statistic	2.994902	Probability	0.109134
log likelihood ratio	3.787662	Probability	0.051632

Jarque Bera » 4.0, prob=0.13

Total laics

Hrcusch-Godfrey Serial Correlation LM Test:

F-statistic	0.436355	Probability	0.654885
C)bs*R-squared	1.114895	Probability	0.572669

White Heteroskedasticity Test:

F-statistic	9.899217	Probability	0.000512
Obs*R-squared	14.03702	Probability	0.007178

Ramsey RfcSFT Test:

F-statistic	2626176	Probability	0.000125
l og likelihood ratio	19.22584	Probability	0.000012

F.CM for elasticity

Total taxes

Brcusch-Godfrey Serial Correlation LM Test:

F-statistic	0.171135	Probability	0.844445
Obs*R-squared	0.453423	Probability	0.797151

White Hcteroskedasticity l est:

F-statistic	1 546042	Probability	0.242885
Ohs*R-squared	5.821353	Probability	0.212893

Ramsey RJ-SET Test:

F-statistic	1.574721	Probability	0.241628
l-«g likelihood ratio	3.855257	Probability	0.145493

Jarque Bcra-0.93. prob=0.62