Tax reforms and revenue mobilization in Kenya

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Abstract

One of the key objectives of tax reforms in Kenya was to ensure that the tax system could be harnessed to mitigate the perpetual fiscal imbalances. This would be achieved through tax policies intended to make the yield of individual taxes responsive to changes in national income. In addition, it was expected that the predominant taxes in the revenue would be those with highly elastic yields with respect to national income (or proxy bases). This study applies the concepts of elasticity and buoyancy to determine whether tax reforms in Kenya achieved these objectives. Elasticities and buoyancies are computed for the pre-reform period as well as the post-reform period. Evidence 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, the reforms failed to make VAT responsive to changes in income, although VAT was predominant in the tax structure.

1. Introduction

An analysis of Kenya's fiscal structure reveals a number of important aspects. First, compared with a sample of low-income sub-Saharan countries, Kenya's tax/GDP ratio is higher than the sample average.[1] Second, the imbalance between government revenue and expenditure results in large and chronic fiscal deficits. In theory, the financing of a deficit especially through foreign borrowing or additional foreign financing may have considerable effects on interest rates, the balance of payments and the external value of the currency, in this case the shilling. Third, Kenya initiated reforms in the tax structure with diverse objectives. Unfortunately, the reform process began at a time when the macroeconomic environment was unstable. When there is a rapid and significant change in macroeconomic policies, it is much more difficult for tax reforms to have important and identifiable revenue effects (Tanzi, 1988).

Although Kenya embarked on massive tax reforms in 1986, little is known about the performance of the reforms in terms of raising the revenue mobilization capacity of the tax system. It is not known how the reforms have affected each tax source. This study attempts to fill this gap in knowledge. It poses the following policy questions: What has been the process of tax reform in Kenya? Has Kenya's tax reform effort enhanced the flexibility (i.e., buoyancy and elasticity) of the tax system? If so, which components of the tax structure have been the most responsive, and why? If not, which tax handles have been rigid, and why? What lessons do the outcomes have for policy makers in Kenya and elsewhere?

The broad objective of the study is to examine the impact of Kenya's tax reform programme in light of the in-built revenue mobilization capacity of the tax system. Specifically, the study analyses the trend of tax reforms for each tax category, and evaluates the impact of tax reforms on the overall tax system and on individual tax handles.

The remainder of the paper is organized as follows. Section 2 gives the magnitude of the fiscal gap and the reaction of the government to this problem, while Section 3 provides the rationale and process of tax reforms in Kenya. Section 4 presents a framework for estimating revenue productivity, an empirical analysis is provided in Section 5 and Section 6 offers some concluding remarks.

2. Fiscal operations

Confronted with acute resource gaps, which have over time impeded growth, developing nations have to play an even greater role in promoting economic development. As a prerequisite, these countries must mobilize their own internal resources. This has the implication that among other approaches, they adopt and implement effective tax policies. If well designed, taxation has the capacity to raise the incremental savings ratio, which is one of the main determinants of growth (Prest, 1985).

The growth in tax revenue must approximate the growth in expenditure for macroeconomic stability to hold (World Bank, 1990). On its part, the tax structure must be stable and flexible. Stability of a tax structure allows revenue to be predicted with certainty. Revenue instability can complicate fiscal management especially if expenditures are inflexible downwards, and the options open to policy makers are limited.

During the period 1964–1977, the government of Kenya was able to finance all its current expenditure and part of its development expenditure using recurrent revenue receipts, and hence incurred minimal fiscal deficits. This was made possible by a healthy flow of donor assistance in terms of grants and project/programme aid. From the late 1970s, after a series of both internal and external shocks, the government experienced chronic fiscal deficits. The persistence of these deficits has been attributed to uncontrolled public expenditure and possibly an inelastic tax system. Neither tax policy nor tax administration managed to mobilize additional resources on a sustainable basis. To bring down the deficit, it was imperative that the government improve domestic revenue mobilization while keeping public expenditures under control.

Kenya's fiscal operations for the period 1986 to 1998 are highlighted in Table 1. The table shows that for all years, expenditures exceeded revenues. Similarly, both government revenue and expenditure maintained consistent growth patterns. Government revenue increased by Ksh170.1 billion compared with an increase of Ksh174.4 billion in expenditure. In absolute terms, the growth in expenditure exceeded revenue. In relation to GDP, government revenue averaged 29.8%, while mean expenditure was 34.4%. This generated a resource gap of about 4.6% for the period 1986 to 1998.

On a year-to-year basis, the deficit–GDP ratio rose from 4.5% in 1988 to a high of 11.3% in 1993 and then fell to a low of 1.5% in 1996. The persistence and magnitude of this deficit have baffled the revenue authorities. The deficit has persisted even though the fiscal target has been to achieve a balanced budget through measures such as lowering current expenditures on salaries and wages and on total interest, ensuring efficiency in tax collection, and raising the flexibility of the overall system. To attain a balanced budget, however, a structural transformation is required to define the core functions of government expenditure.

Table 1: Budgetary revenues and expenditures in Kenya, 1986–1998

	1986–88	1989	1990	1991	1992	1993	1994	1995	1996	1997[a]	1998[b]
						In billions Kenya shillings					
Revenue	27.2	37.2	44.1	54.4	69.1	100.8	122.4	125.1	145.5	181.7	193.4
Expenditure	33.5	54.1	51.7	58.7	86.2	129.6	131.5	135.2	152.2	178.5	202.4
Deficit	6.3	16.9	7.6	4.3	17.1	28.8	9.1	10.1	6.7	-3.2	9.0
						Memo items (in % of GDP)					
Revenue	23.6	25.1	25.8	27.8	31.4	37.2	37.5	32.2	33.3	34.1	32.1
Expenditure	29.2	36.4	30.3	30.0	39.2	47.9	40.3	34.7	34.8	33.4	33.6
Deficit	5.6	11.3	4.5	2.2	7.8	10.7	2.8	2.5	1.5	-0.7	1.54

Notes: a: Provisional figures; b: Estimates.
Sources: Wagacha (1999); GOK, *Economic Survey*, 1999.

The financing of a budget deficit can have serious ramifications in an economy. In a bid to ease such a deficit, the government may resort to one or more of the following approaches: opt for discretionary tax measures (DTMs); monetize the debt; sell the debt to the public; or raise international borrowing. The government could also fall back on its reserves on the assumption that the problem is short term.

The first option tends to raise the tax burden and is usually politically unpopular. Borrowing from the Central Bank fuels inflationary tendencies, whereas borrowing from the public, especially through high yielding treasury bills, exerts an upward pressure on other interest rates hence impeding private sector borrowing. Bearing in mind debt servicing problems and the stiff conditionalities imposed on foreign loans by donors, the fourth option is considered expensive. It is, therefore, clear that chronic deficits stifle economic growth and impinge on other macroeconomic aggregates (Broadway et al., 1994).

Against this background, the Kenya government adopted the Tax Modernization Programme in 1986 and the Budget Rationalization Programme in 1987. While the modernization programme sought to enlarge the government revenue base in order to enhance the elasticity of the tax system, rationalization involved regulating expenditure through strict fiscal controls. Specifically, the modernization programme sought to: (a) raise the tax revenue–GDP ratio from 22% in 1986 to 24% by the mid 1990s, (b) reduce compliance and administrative costs through low and rationalized tax rates and wider tax bases, (c) improve tax administration by sealing leakage loopholes, making wider use of computers and enhancing audit surveillance, and (d) enhance the institutional capacity to manage tax policy by establishing effective database management systems. However, by 1992, these objectives were expanded to include: (e) raising the revenue–GDP ratio to 28%, (f) invigorating the growth of the fledgling capital market, (g) emphasizing self-assessment systems, (h) strengthening taxpayer education and service, and (i) implementing organizational reforms that would modernize tax administration.

The Central Bank of Kenya Amendment Act (1996) became law after its signing on

14 April 1997. This act limits CBK direct credit to the government to no more than "five percent of the gross recurrent revenue of the government as shown in the appropriation accounts for the latest year for which those accounts have been audited by the Controller and Auditor General". The amendment grants the CBK autonomy and reduces the authority of the Minister of Finance to override CBK's decisions. Only a Cabinet resolution can do so. The implications of this act are that the government has to meet its expenditure wholly by relying more on revenue collected by the Kenya Revenue Authority (KRA). Second, the act gives CBK more independence in controlling money supply, which is the main source of inflation and price instability. Third, the amendment requires the government to spend within its budgetary limits or risk borrowing expensively from the open market where the repayment will further constrain its development expenditure. Given the problems associated with foreign borrowing, especially in the 1990s, the overall reaction has been to mobilize greater resources internally through the tax system.

3. Elements of tax reform

The revenue structures of most developing countries have not been as productive as desired. Too often the growth in revenue has failed to catch up with government spending pressures, a situation that has occasioned huge imbalances between the demand and supply of public budgetary resources. These countries have then had to reform their tax structures, with the general objectives of revenue adequacy, economic efficiency, equity and fairness, and simplicity (Osoro, 1993). The main elements of the reform programmes include:

- Imposing a small number of taxes with the broadest possible base and moderate rates (World Bank, 1990).
- Using VAT to replace commodity taxes in order to minimize disincentives for investments and exports (Thirsk, 1991).
- Not only avoiding raising taxes on the poor, but also reducing their tax burden. This is achieved by levying excise duties on luxury items and exempting foodstuffs to protect the low-income groups.
- Avoiding tax incentives and shifting to broader, simpler tax bases on which lower rates are applied.
- Minimizing corporate tax evasion (some countries levy minimum taxes on a company's net worth).
- Lowering distortions that reduce economic welfare and growth.

More often, policy advice directed towards countries desiring to reform their tax systems has emphasized the introduction of either new taxes or new rates on existing bases, more stringent administrative changes to seal loopholes that encourage tax evasion, and the need to widen tax bases and reduce exemptions. Other measures include the allocation of more budgetary resources to the revenue authorities, paying higher salaries to revenue officers and imposing relatively prohibitive penalties. Generally, special attention is also directed to the simultaneous reduction of the tax rates and widening of the base as one of the most effective approaches for addressing the twin problems of the disincentive effects of high marginal tax rates and tax evasion.

Tax reform measures are mainly undertaken in order to restore buoyancy to revenues, strengthen modern taxes, and drastically reduce the complexity and lack of transparency of the system (World Bank, 1990). The main factors contributing to an improved revenue performance are changes in tax legislation, tax administration and minimal tax evasion (Morrisset and Izquierdo, 1993).

Generally, tax reform in developing countries involves broad issues of economic policy as well as specific problems of tax structure design and administration (Musgrave, 1987). In this sense, tax reform has to grapple with complementarities between revenue structure and development policy including issues such as the impact of alternative taxes on saving and investment and the resultant challenges for macro balance (domestic and foreign) of the economy. Reforms may also address the issue of equity in the distribution of the tax burden as well as composition of the tax structure. There is, as well, the question of the administrative adequacy of the tax system—usually approached within the wider context of political structures and feasibilities.

Specific reform measures

Though the Kenyan tax structure had changed tremendously over the years, massive reforms commenced in 1986 following the publication of Sessional Paper No 1 of 1986. Since then, the implementation of major tax reforms introduced the following changes to the tax system. There has been a reduction in direct taxes through a widening of tax brackets and gradual lowering of income tax rates. Indirect taxes have been increased to cover the shortfall in revenue. Since indirect taxes are regressive and therefore impose a greater burden on the poor, this shift has been criticized as reducing the redistributive effect of the tax system.

Notably, there has also been a shift from taxes on international trade to taxes on domestic goods and services. Value added tax (VAT) has become the primary source of revenue, generating about two-thirds of domestic taxes on goods and services. It is argued that VAT is an indirect tax on consumption and therefore has less adverse impact on investment and exports. In the 1988–1994 period, VAT was the most important tax, constituting 37% of total tax revenue. However, this fell to about 28% in fiscal year 2000/2001.[2] Since VAT relies heavily on proper recording, the willingness of traders to avail their accounts to the scrutiny of the tax authorities is crucial. As such, transparency in the running of business concerns is inevitable. A limitation of VAT relative to the sales tax is that the compliance process is longer. Such a tax (requiring lengthy processes) is more open to graft since each stage of verification, approval and validation avails an opportunity to extort bribes. Sequencing is therefore a symptomatic problem with VAT. Similarly, corruption erodes its efficacy.

Kenya's tax reform programme, Wagacha (1999) argues, should seek to (a) improve the efficiency and productivity of taxation, (b) improve tax collection and administration while lowering the rates, and (c) gain tax effectiveness through greater tax elasticity. On the basis of tax/GDP ratios for the period 1992/93–1996/97, this author observes that Kenya's tax burden (averaging 26.6%) is high by international standards and therefore the ultimate objective of a reform scheme should be to lower the excessive tax burden and efficiency costs of taxation. The specific reforms are described below.

Customs reform

Kenya's customs taxes underwent significant changes during the reform period in the direction of restricting duty exemptions, encouraging exports, reforming the tariff structure and strengthening the administration of customs duties. Broadly, these reforms were aimed at encouraging a free market atmosphere and therefore increasing the level of foreign direct investment. During the period 1987 to 1998, the top tariff rate was reduced systematically from 170% to 25%,while the rate bands were reduced from 24 to 5 (including duty free). As a result of these changes, the simple average rate fell from 40% to 16%.

Before 1991, the exemption system had been rather generous, and several measures were implemented to restrict this generosity. Such restrictive policy included the reduction in the range of exempt goods, making imports by all parastatals tax deductible, abolishing discretionary exemptions[3] (in 1992) and eliminating exemptions on agricultural commodity aid (except during cases of a national disaster or refugee support) in 1995. The reforms during the period 1994 to 1998 also targeted the non-government organization (NGO) sector by imposing restrictions on NGO exemptions, introducing the bonding of major project aid-funded imports and initiating post project reconciliation. Similarly, NGOs and other relief organizations were required to register for purposes of income tax in order to qualify for exemption.

The reforms were also aimed at expanding the export capacity of the country by among other things introducing duty/VAT exemption on direct and indirect imports of raw materials for use in the production of exports, duty-free items for the domestic market, and inputs for aid-funded projects. Under the manufacturing under bond facility, machinery and raw material were classified under duty/VAT exempt products so long as the manufactured products were meant for export. If the products were sold in the domestic market, then normal duties plus 2.5% surcharge would apply. Other export support programmes included export compensation (from 1974 to 1993), export processing zones (from 1991), full import liberalization (from mid 1993) and full foreign exchange liberalization (from late 1993). Export compensation was abolished in 1993 to save government revenue and to limit the abuse of the incentive by some unscrupulous local manufacturers. Export duties were abolished to give impetus to export growth, while export licensing was also abolished to minimize the delays and inconveniences that had been a common feature under the system.

In order to achieve these reforms, the administrative capacity of the tax system had to be strengthened. The measures undertaken towards this end include the re-introduction of the selective examination/rapid release system and the re-establishment of the intelligence and investigation functions. Others were strengthening the transit controls system,[4] revising the pre-shipment inspection programme (from 1994),[5] implementing limited "modularized" computerization on selected functions, introducing warehouse controls and strengthening cargo control[6] at Mombasa port (from 1996).

VAT and excise duty reform

VAT was introduced in Kenya in 1990 to replace sales tax.[7] This shift was motivated by the argument that VAT (relative to sales tax) had a higher revenue potential, and that its collection and administration were more economic, efficient and expedient. Since 1991, a number of steps have been taken to rationalize and strengthen the VAT, most importantly by moving several items subject to VAT from specific to ad valorem rates and broadening VAT coverage in the service sector. Generally, four measures were applied to broaden the base of VAT. First, retail-level sales tax was changed to manufacturer-level VAT including business services (from 1990). Second, the tax point was gradually moved from the manufacturer to the retail level in a number of sectors including jewellery, household appliances and entertainment equipment, furniture, construction materials, vehicle parts, and pre-recorded music. As a result, the coverage of VAT on goods supplied at retail level expanded tremendously from 1990 through 1995. Third, "goods" were re-defined to exclude the supply of immovable tangible and all intangible property and rental or immovable property. Fourth, the coverage of the service sector was expanded (from 1991) to include business services; hotel and restaurant services; entertainment; conferences; advertising; telecommunications; construction; transportation; the rental, repair and maintenance of all equipment (including vehicles); and a range of personal services.

Measures aimed at VAT rationalization included the reduction of the maximum rate from over 150% to 15% (between 1990 and 1997) and the reduction of the rate bands from 15 to 3.[8] Whereas the low rate was increased from 50% to 78%, all the other rates were reduced; the top rate from 150 to 15% and the standard rate from 18% to 16%. Additional measures included raising the minimum turnover level for compulsory registration from Ksh10,000 to Ksh40,000 and introducing stiff penalties for defaulters in the following areas: late VAT returns, failure to issue VAT invoices and failure to maintain proper books of account.

Another aspect of VAT that elicited much interest from the taxpayers was the tax refund system. At the time of inception, the refund system was characterized by weak controls and corruption that led to loss of revenue (Nyamunga, 2001). Administrative changes were undertaken thereafter (mid 1990s) to streamline the refund system. The improved management that followed has been behind the introduction of tighter verification measures and the elimination of the large backlog of claims.

Since 1991, the coverage of excise duties has expanded from domestic production to include imports. Excise duties were rationalized to cover the luxury goods tax element on wine, beer, spirits, mineral water, tobacco products, matches, luxury passenger cars and minibuses. Automotive fuels and cosmetics were also introduced into the excise tax net.

Income tax reform

Income tax is a direct tax charged on business income, employment income, rent income, pensions, investment income and so on. The main goal of income tax reforms has been

to enhance collection by broadening the tax base while reducing the maximum rates. The top rate for individual tax was reduced from 65% (in 1987) to 32.5% in 1998. Further, basic tax allowances (tax credits) were increased and simplified while the single credit per individual was introduced in 1997. Changes in the company tax structure included reducing the top rate from 45% to 32.5% between 1989 and 1998. The rate was rationalized by unifying the structure across all types of business. There were efforts to lower and equalize company and individual marginal tax rates. This was aimed at increasing the disposable income for both corporate and individual capital investments, thus encouraging private investment through the consumption transmission mechanism.

The income tax structure was integrated in the following ways. First, there was a shift from the classical system that encouraged double taxation to the current system that encourages single-stage taxation. The taxation of dividends was limited to a final tax while a compensating tax was introduced to ensure all corporate distributions are made out of after-tax income. The interest and penalty system[9] has been rationalized along with the introduction of the instalment and self-assessment tax systems, as well as the re-introduction of the personal identification number (PIN) for purposes of tax assessment. The PIN was aimed at improving tax information management by identifying all taxable persons in the country so that any transaction made by them could be systematically identified and the appropriate tax captured.

Another element of income tax reforms was the timing of collections and rationalization of the withholding tax system.[10] The system of paying tax on business income was changed from delayed payment to current payment through a seven-year phase-in (from 1990 to 1996). The withholding tax net was expanded to cover interest income from discounts on debt instruments, royalties, payments to contractors and self-employed persons without the PIN. Again, withholding tax on interest was raised from 10% to 15% but was made a final tax when received by an individual from a financial institution.

Measures to expand the income tax base included taxation of employer provided benefits, PAYE amnesty (in 1993), application of presumptive income tax on selected agricultural produce and taxation of foreign exchange gains. Businesses having assets and liabilities denominated in foreign currency were required to pay tax on such assets and liabilities on a realization basis. Presumptive income tax on agricultural produce (which was abolished in 1993 and re-introduced in 1995) required farmers of direct agricultural exports to pay 20% of their total earnings in tax. Currently, the rate of the deduction is 2% of the gross amount paid. Presumptive income tax was used to expand coverage of farmers while also raising tax compliance.

The Income Tax Act provides for personal relief to taxpayers. Since 1990, tax brackets and tax relief have been reviewed with the objective of cushioning low-income earners against bracket creep while ensuring that high income earners bear a larger proportion of the tax burden. In the period 1990 to 1997, there were sustained increases in the single and family relief. Thereafter, a single personal relief of Ksh7,200 was introduced to replace the family relief, single relief and insurance relief. The personal tax relief introduced in 1997 has been subjected to 10% annual increments. These increments have had the effect of raising the minimum monthly income at which income tax becomes payable from Ksh6,000 to Ksh8,000.

Organizational reform

One of the main objectives of the tax modernization programme (1986) was to implement organizational reform that would modernize tax collection. Before the reform period, tax administration was under five separate departments (custom duty, excise duty, sales tax, income tax and corporation tax departments) in the Ministry of Finance. The Kenya Revenue Authority was incorporated in 1995 in order to strengthen revenue collection and harmonize the separate tax collection arms. It was expected that KRA would put in place an efficient and effective system to seal the widespread loopholes in the tax system, bring down the vice of tax evasion, and enlist as many eligible taxpayers into the tax net as possible. To accomplish this, it was allocated more budgetary support to enhance the pay structures of the revenue officers and attract and retain professional staff. Structures for identifying and dismissing incompetent or corrupt staff were strengthened. This was necessary since efficient revenue collection was seen as a means to lower government borrowing and, therefore, of easing pressure on inflation and interest rates.

4. Methodology

As the government embraces the *tax modernization* and *budget rationalization* programmes, it is crucial that the revenue structure be designed to be flexible enough to guarantee increased revenues during the growth process without necessarily resorting to discretionary policy or inflationary financing. Such a structure would ensure that tax revenue grew faster than national income as required by the growth in expenditure. To achieve this, the tax policy has to ensure two things: one, that every individual tax be designed so that its yield is responsive to national income changes, and two, that predominant taxes in the revenue be those with a highly elastic yield with respect to national income (or proxy bases). If these attributes feature in a tax system, then the tax weapon can be applied to mitigate the dangers of perpetual fiscal imbalances.

In addition, a flexible tax system has been regarded as one of the most efficient methods of attaining economic stabilization (Ole, 1975). During a boom period, discretionary measures are taken to guarantee a higher rise in tax revenue relative to growth in the national income, thus reducing dangers of inflation. In a recession, tax rates and tax bases are adjusted so that revenue from taxation falls faster than the fall in income. Such an action mitigates a deflationary situation by maintaining aggregate demand, prices and profits above what they would otherwise be.

In this study, the productivity of the tax system is determined by applying the concepts of tax buoyancy and elasticity. Assessing tax productivity is important not only because it allows us to examine the responsiveness of the tax system, but also because it affects the system's equity and efficiency effects (Amin, 2000). The income elasticity of a tax can be broken down into tax-to-base and base-to-income elasticities. Therefore, the elasticity of a tax is essentially the product of the elasticity relative to the base and the elasticity of the base-to-income.

The decomposition of elasticity into tax-to-base and base-to-income is useful for two reasons. First, it allows us to identify the source of either fast revenue growth or lagging revenue growth. Second, it highlights that component of growth that is amenable to policy manipulation. For example, while the tax-to-base ratio is within the control of the authorities, the base-to-income elasticity lies beyond the scope of their control. It is worth noting that significant macro instability could dampen the authorities' control over the tax-to-base component.

Mansfield (1972) assumes a system of n taxes to show in Equation 1 that the tax revenue–to income elasticity is the weighted sum of the individual tax elasticities. This can be expressed as follows:

$$E_{T_t Y} = \frac{T_I}{T_t}\left[\frac{\Delta T_I}{\Delta Y} \text{x} \frac{Y}{T_I}\right] + ... + \frac{T_k}{T_t}\left[\frac{\Delta T_k}{\Delta Y} \text{x} \frac{Y}{T_k}\right] + ... + \frac{T_n}{T_t}\left[\frac{\Delta T_n}{\Delta Y} \text{x} \frac{Y}{T_n}\right] \quad (1)$$

where the elasticity of total tax revenue to income is defined in Equation 2 as:

$$E_{T_t Y} = \frac{\Delta T_t}{\Delta Y} \text{x} \frac{Y}{T_t} \quad (2)$$

while the elasticity of the *k*th individual tax to income can be expressed as:

$$E_{T_k Y} = \frac{\Delta T_k}{\Delta Y} \text{x} \frac{Y}{T_k} \quad (3)$$

In Equation 1, T_t is the total tax revenue, T_k is revenue from the *k*th tax, Y is income or GDP, B_k is the base of the *k*th tax, and Δ is the change operator.

As indicated above, the elasticity of *k*th tax is the product of the elasticity relative to the base and the elasticity of the base-to-income. This can be stated algebraically as:

$$E_{T_k Y} = \left[\frac{\Delta T}{\Delta B_k} \text{x} \frac{B}{T_k}\right]\left[\frac{\Delta B_k}{\Delta Y} \text{x} \frac{Y}{B_k}\right] \quad (4)$$

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:

$$E_{T_t Y} = \frac{T_I}{T_t}\left\{\left[\frac{\Delta T_I}{\Delta B_I} \text{x} \frac{B_I}{T_I}\right]\left[\frac{\Delta B_I}{\Delta Y} \text{x} \frac{Y}{B_I}\right]\right\} + ... + \frac{T_k}{T_t}\left\{\left[\frac{\Delta T_k}{\Delta B_k} \text{x} \frac{B_k}{T_k}\right]\left[\frac{\Delta B_k}{\Delta Y} \text{x} \frac{Y}{B_k}\right]\right\}$$
$$+ \frac{T_n}{T_t}\left\{\left[\frac{\Delta T_n}{\Delta B_n} \text{x} \frac{B_n}{T_n}\right]\left[\frac{\Delta B_n}{\Delta Y} \text{x} \frac{Y}{B_n}\right]\right\} \quad (5)$$

Having demonstrated (in equations 1, 4 and 5) how the tax elasticity can be decomposed into two components, we proceed to describe how the elasticities and buoyancies will be computed.

Estimation procedure

Elasticity

This study estimates elasticities (tax-to-base and base-to-income) for each tax and for the overall tax system. Generally, the elasticity concept assumes the following functional relationship:

$$T^* = \alpha B^{\beta} \varepsilon \qquad (6)$$

Where T = tax revenue, B = Tax base (or GDP in aggregate level), α and β represent parameters to be estimated, and ε is the multiplicative error term. Taking logs, we obtain a log-linear specification of the form:

$$Log\ T = Log\alpha + \beta LogB + Log\ \varepsilon \qquad (7)$$

which is of the standard form

$$Log\ T^*_t = \alpha + \beta LogB_t + \upsilon_t \qquad (8)$$

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

To obtain T^*_t, the proportional adjustment (PA) method is used to eliminate (isolate) the discretionary effects from the revenue series. The PA method is used because of its superiority over other available methods, which also explains its prevalence in earlier studies. The following steps will be used:

First we compute:

$$T_{t,t} = T_t - D_t \qquad (9)$$

where:

T_t = the actual tax yield in the tth year

D_t = the budget estimate of the discretionary change (s) in the tth year

$T_{t,t}$ = the actual collection of the tth year adjusted to the structure of that year.

Since the PA method 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 (this study adopted 1973 as the base), $T_{t,t}$s were converted to the reference year.

Then, to obtain the adjusted series for the tth year, $T_{t,t}$ is multiplied by the previous year's ratio of the adjusted tax revenue with reference to the base year $(T^*)_{t-1}$ over the actual tax revenue (T_{t-1}), i.e.

$$(T^*)_1 = T_{1,1}$$

$$(T^*)_2 = [(T^*)_1 / T_1] \cdot T_{2,2}$$

$$(T^*)_t = [(T^*)_{t-1} / T_{t-1}] \cdot T_{t,t} \qquad (10)$$

Buoyancy

Buoyancy of taxes with respect to their bases (or GDP) is derived from logarithmic regressions of unadjusted revenue data on these bases (or GDP), i.e.:

$$LogT_t = \beta_0 + \beta_1 Log(B)_t + \varepsilon_t \qquad (11)$$

where β_1 is the buoyancy ratio

Proxy bases and data

The proxy bases for income taxes are domestic factor incomes derived from the data on the sources of income side of the national accounts. Since the sales tax/VAT has been levied at retail and wholesale levels, private final consumption was used as the proxy base. Private final consumption was also taken as the proxy base for excise duties. The proxy base for import duty was taken to be imports from the balance of payments. The proxy base for the overall tax system was GDP.

The data on GDP, inflation, imports, private final consumption, domestic factor incomes and tax revenues were derived from *Economic Surveys* and *Statistical Abstracts*, both published by the Ministry of Finance and Planning. These are also available in Government Financial Statistics (a publication of the International Monetary Fund). The revenue impact of DTMs was obtained from annual budget speeches produced at the Treasury.

Appendix A summarizes Kenya's actual and adjusted tax revenues for 1973–1999, while Appendix B presents tax revenue obtained through discretionary measures.

5. Reforms and elasticity estimates

The response of a tax system to changes in national income (or a proxy base) can result from two effects: either in-built flexibility (elasticity) or the buoyancy of the tax structure. A tax structure is said to be buoyant if the buoyancy index is greater than unity, suggesting that as national income (or the proxy base) changes, tax revenue changes by a larger proportion as a result of both built-in elasticity and discretionary changes (changes in the tax rates, widening and extension of the base, legislative enactment, and improvement in collection techniques).

Elasticity measures the responsiveness of revenue yields to movements in economic activity alone. It is important to note that discretionary measures are manifested in tax increases rather than base expansions. This being the case, their contribution to revenue elasticity is minimal. The following sections provide before- and after-reform buoyancy and elasticity estimates (tax-to-income, tax-to-base and base-to-income) as well as buoyancies for the combined period. Full regression results are provided in Appendix C.

Combined period

The results, presented in Table 2, indicate that the elasticity for Kenya's overall tax system is 0.645. On this basis, it can be argued that the growth in GDP spurred a less than proportionate automatic increase in tax revenue. Specifically, this means that the tax system yielded a 0.645% change in tax revenue (resulting from economic activity alone) for every 1% change in GDP. Thus, a decreasing proportion of incremental income was transferred to the government in the form of tax revenues, meaning that the tax structure in Kenya was inelastic. As will be seen later, this result is due to the high inelasticity of 1973–1985 (see Table 3), which overwhelmed the fair elasticity of 1986–1999.

Table 2: Kenya: Elasticity of main taxes and the total tax system, 1973–1999

	Elasticity indexes				
	Tax to income	Tax to base	Base to income	Buoyancy	Difference [a]
Direct taxes	0.555	0.546	1.009	1.379	0.824
Import duties	0.406	0.387	1.004	1.131	0.725
Excise duties	0.421	0.394	1.032	1.595	1.174
Sales tax/VAT	0.104	0.210	1.032	0.682	0.578
Overall	0.645	–	–	1.112	0.467

Note: a: Gives the difference (in percentage points) between the buoyancy and tax-to-income elasticity.

A number of other observations can be made on the basis of the figures in Table 2. First, the low tax-to-income elasticity of direct taxes, import duties, excise duties and sales tax/VAT adversely affected the overall elasticity of the total tax. Clearly, the overall inelasticity of the tax system is a consequence of the inelastic individual taxes. A comparison of the tax handles reveals that direct taxes had the highest tax-to-income elasticity coefficient, while sales tax/VAT had the lowest. The low tax-to-base elasticity of sales tax/VAT elasticity probably reflects the combined effect of evasion and inefficient tax administration over the period.

Excise duties reported a low tax-to-income elasticity of 0.421. This is the product of a low tax-to-base elasticity of 0.394 and an almost unitary base-to-income elasticity. The low tax-to-base elasticity indicates either inefficiency in tax administration or the existence of a black market for dutiable goods in the neighbouring countries.[11] These goods include beer and cigarettes sold to Tanzania and Uganda through illegal channels. Otherwise, a high proxy base-to-income reflects a faster growth in manufacturing output relative to GDP. Given that the effects of the DTMs tend to be short-lived, major tax reforms should be initiated to encourage a long-run process that will take advantage of high base-to-income indexes.

The combined period (1973–1999) indicates that individual tax bases responded favourably to changes in income. Unfortunately, the growth in tax revenue lagged behind the growth in individual bases. This further dampened the responsiveness of tax revenue to changes in GDP. Direct taxes, which had a somewhat unitary elasticity of base-to-income, reported an inelastic tax-to-base of 0.544. This probably signifies tax evasion.

A comparison of buoyancy and elasticity estimates is important as it reveals the revenue impact of discretionary policy. The results in Table 2 indicate that buoyancies exceed the tax-to-income elasticity in all cases. The largest difference between buoyancy and tax-to-income elasticity relates to excise duties. In fact, for excise duties, discretionary policy yielded a 1.174% change in revenue arising from a 1% GDP growth.

Thus, the growth in revenue from excise duties was mainly explained by the discretionary changes undertaken over the period. The other taxes also indicate that DTMs had a somewhat favourable effect on the growth of the tax revenue as reflected in the buoyancy exceeding the tax-to-income elasticity. This is also the case for the overall tax structure, which yielded a difference of 0.467.

Table 2 gives a decomposition of the tax-to-income elasticity into its constituent parts (i.e., tax-to-base and base-to-GDP). It is evident that the inelasticity of the Kenyan tax system is due to the low tax-to-base elasticity of individual taxes. Since the base-to-income elasticities for all taxes are slightly greater than unity, the critical concern for the tax authorities will be to raise the responsiveness of the individual taxes to the base. Notably, sales tax/VAT recorded the lowest tax-to-base elasticity.

Pre-reform period

This period represents the era before major tax reforms were adopted in Kenya, that is, the period before the mid 1980s. The period recorded the lowest elasticity indexes

for the whole tax structure compared with other periods. The growth in proxy bases was lower than the growth rate of GDP for all the taxes. Notably, low tax-to-base elasticities dampened the responsiveness of the tax system. Any growth in tax revenues was the contribution of the discretionary policy in all the tax handles. Although the tax-to-base elasticities are less than base-to-GDP elasicities, both tax-to-base and base-to-GDP indexes are less than unity for individual taxes. It can be concluded that during this period, the response of the tax system was sluggish, not only because of the low response of the taxes to their bases but also owing to the low response of the bases to GDP.

During this period, the overall tax system was inelastic with respect to GDP, as shown in Table 3. Whereas all the individual taxes reflect the same trend, the main contributors to the overall inelasticity are sales tax/VAT (0.062) and excise duties (0.073). Similarly, the main source of the low tax-to-GDP elasticity for excise duties and sales tax/VAT (and also for the other taxes) is the low tax-to-base elasticity. This result does not differ markedly from findings for the 1973–1999 period. However, it is notable that the overall tax-to-GDP elasticity coefficient for the 1973–1985 period is almost half of the tax-to-GDP elasticity ratio for the 1973–1999 period.

Table 3: Kenya: Elasticity of main taxes and the total tax system, 1973–1985

	Elasticity indexes				
	Tax to income	Tax to base	Base to income	Buoyancy	Difference [a]
Direct taxes	0.488	0.349	0.998	0.933	0.445
Import duties	0.380	0.422	0.887	0.933	0.553
Excise duties	0.073	0.076	0.952	1.002	0.949
Sales tax/VAT	0.062	0.065	0.952	1.216	1.154
Overall	0.276	–	–	1.023	0.747

Note: a: Gives the difference (in percentage points) between the buoyancy and tax-to-income elasticity.

The buoyancy index for the overall tax system during the 1973–1985 period was almost unity (1.023) but slightly lower than the one for the 1973–1999 period. This finding stemmed from the high buoyancies of sales tax/VAT and excise duties. An analysis of the difference between the buoyancy and tax-to-income elasticity indexes reveals that sales tax/VAT had the highest difference. This indicates that during the period the DTMs implemented in sales tax/VAT resulted in a large revenue impact, so that for every 1% increase in GDP, the DTMs mobilized an additional 1.154% in (sales tax) revenue. Conversely, the DTMs had the lowest impact on the yield from direct taxes.

Direct taxes were inelastic with respect to both the base and GDP. This finding is explained by the following factors. First, the pre-reform period was characterized by narrow bases of individual and corporate taxes. Second, the top rates were also high (up to 65%). Third, the structure of taxation was highly differentiated, with many rates across the different businesses, and in most cases exposed taxpayers to double taxation (for example, on dividend income). Fourth, the income tax system had been generous on exemptions, especially employer provided benefits. Fifth, there were weaknesses in income tax administration since taxpayer information management systems were poor.

These factors made the tax system complex, leaving loopholes for tax evasion and corruption.

Post-reform period

In this period, the overall tax system was elastic, with buoyancy and tax-to-GDP elasticity exceeding unity. The same was the case for individual taxes. The only exception was sales tax/VAT, which recorded less than unity buoyancy and tax-to-GDP elasticity. The most elastic taxes were direct taxes (2.165) followed by excise duties (1.699) and import duties (1.661). Though the overall tax-to-GDP elasticity was greater than one, the low tax-to-income elasticity for sales tax/VAT dampened the overall responsiveness of tax revenue to changes in GDP. Thus, the high tax-to-base elasticity of direct taxes, import duties and excise duties reflects productivity of the tax reforms.

Table 4 indicates that direct taxes, import duties and excise duties performed well mainly because of a high tax-to-base elasticity. On the other hand, sales tax performed poorly because of the sluggish response of revenue to changes in the base (private consumption). Thus, the high tax-to-GDP elasticity of the overall tax system, despite the below unity sales tax/VAT tax-to-base elasticity, was due to the high tax-to-base elasticity of direct taxes, import duties and excise duties, as well as a high base-to-income elasticity for sales tax/VAT.

Table 4: Kenya: Elasticity of main taxes and the total tax system, 1986–1999

	Elasticity indexes				
	Tax to income	Tax to base	Base to income	Buoyancy	Difference [a]
Direct taxes	2.165	2.496	0.679	2.333	0.168
Import duties	1.661	2.124	0.779	2.329	0.668
Excise duties	1.699	1.323	1.086	1.497	(0.202)
Sales tax/VAT	0.547	0.369	1.086	0.674	0.127
Overall	1.495	–	–	1.661	0.166

Note: a: Gives the difference (in percentage points) between the buoyancy and tax-to-income elasticity.

The tax-to-GDP elasticity for excise duties exceeded the buoyancy, suggesting that the DTMs affecting excise duties had an adverse impact on the revenue yield. Despite this, excise duties maintained an elastic structure. It could be the case that excise duties were positively affected by other government policies that influence private consumption such as trade taxes, exchange rate and so on.

The high base-to-income elasticity of the sale tax/VAT reflects the responsiveness of private final consumption to growth in GDP. However, the low tax-to-base elasticity could portray loss of tax revenue from this source. Therefore, tax reforms may not have helped to seal the loopholes through which revenue loss occurred.

Pre-reform vs. post-reform: A comparison

During the pre-reform period, the overall tax system yielded an elasticity of 0.276 against a buoyancy index of 1.023 (a difference of 0.747). In comparison, the post-reform period recorded a buoyancy and elasticity of 1.661 and 1.495, respectively (a difference of 0.166). It is apparent that the buoyancy index increased by almost 62% between the two periods, while the elasticity ratio increased by over 400%. The reforms seem to have had a bigger impact on the elasticity than on the buoyancy, suggesting that the growth in tax revenue during the reform period was accounted for by automatic changes rather than discretionary policy. This is expected because one of the central objectives of tax reform is to raise the automatic response of the tax system to changes in GDP rather than the response of the tax structure to discretionary action of government policy.

On the basis of the change in the buoyancy and elasticity indexes, it can be concluded that the reforms improved the response of the tax revenue to both automatic changes in GDP and DTMs. However, the difference between the buoyancy and elasticity indicates that the revenue impact of DTMs during the pre-reform period exceeded the post-reform impact of the DTMs. As such, the growth in revenue accounted for by discretionary action was greater before the reforms than after. It thus seems that the reform period was accompanied by a sluggish response of the tax system to discretionary policy.

The reforms improved the tax-to-income elasticity of direct taxes (from 0.488 to 2.165), excise duties (from 0.073 to 1.699), import duties (from 0.380 to 1.661) and sales tax/VAT (from 0.062 to 0.547). Clearly, one of the greatest achievements of tax reforms was to make both the whole tax structure and the individual tax handles more elastic. Whereas all other taxes became elastic after the reforms and the elasticity of sales tax/VAT improved, this latter revenue source remained inelastic. It is notable that the reforms had different impacts on different taxes. Some taxes became more responsive than others.

The elasticity of indirect taxes was low and that of the direct taxes was very high, especially after the reforms. This is explained by the relative tax-to-base elasticity, which is high for direct taxes and low for indirect taxes. This suggests that revenue leakage is still a major problem for indirect taxes. For direct taxes, it can be attributed to the relative effectiveness of the reforms in direct taxes, which not only made the tax system simpler but also reduced avenues for evasion and corruption. Such reforms include the introduction of PIN, lower rates, reduction of exemptions and shift away from multiple rates across many categories.

Generally, the computed tax-to-base elasticities for the pre-reform period are lower than the corresponding post-reform tax-to-base elasticities for all taxes. This suggests that the post-reform tax structure was generally more flexible. There are also variations between pre- and post-reform base-to-income elasticities. For direct taxes and import duties, the base-to-income elasticities for the pre-reform period are higher than the corresponding post-reform elasticities. The opposite is true for excise duties and sales tax/VAT. In this case, the pre-reform base-to-income elasticities exceed the corresponding post-reform elasticities.

It can be argued that whereas the reforms had an overall positive impact on tax responsiveness, this result worked more effectively through increased flexibility of the tax-to-base component and less effectively through the elasticity of the base-to-income component. There is a marginal increase in the responsiveness of private consumption to changes in GDP, however, which improved the flexibility of excise duties and sales tax/VAT.

The pre-reform findings of our study tend to coincide with earlier results.[12] However, the results for the post-reform period differ from most of these studies. Again, unlike the current study, past studies were more concerned with the impact of DTMs on the tax revenue. Specifically, they derived elasticity and buoyancy indexes of the tax system and computed the difference. In contrast, the current study went further to compute the buoyancy and elasticity indexes for both the pre- and post-reform periods as well as the combined period. In so doing, our approach provided a broader framework through which the impact of the reforms on each index (elasticity and buoyancy) between the two periods could be discerned.

6. Conclusion

Kenya has been modernizing its tax system since 1986, while budget rationalization started in 1987. One of the key objectives of the modernization programme was to ensure that the revenue structure was flexible enough to guarantee increased revenues during the growth process without the necessity of resorting to discretionary policy or inflationary financing. For the tax weapon to mitigate the dangers of perpetual fiscal imbalances, it was expected that the structure would ensure that tax revenue grew faster than national income as required by the growth in expenditure. Tax policy was expected to ensure, first, that every individual tax is designed so that its yield is responsive to national income changes and, second, that the predominant taxes in the revenue are those with a highly elastic yield with respect to national income (or proxy bases).

This study analysed the productivity of Kenya's tax structure in the context of the tax reforms. The findings suggest that tax reforms had a positive impact on the overall tax structure and on the individual tax handles, even though the impact of the reforms was not always uniform. The reforms had a bigger impact on direct taxes than on indirect taxes, suggesting that revenue leakage is still a major problem for indirect taxes. The better responsiveness of direct taxes can be attributed to the relative effectiveness of the reforms in direct taxes, which not only made the tax system simpler but also reduced avenues for evasion and corruption. Such reforms include the introduction of PIN, lower rates, reduction of exemptions and a shift away from multiple rates across many categories.

It is worth noting that for direct taxes and import duties with base-to-income elasticity lower than unity, the tax authorities had few options for improving the coefficients. The growth of these bases is a macroeconomic problem outside the control of the tax authority. Increasing formal imports of dutiable goods and perhaps improving the growth of wages could enhance proxy bases of these taxes.

Though the reform experience seems encouraging, there is still scope for improvement. The most rigid tax system was VAT. Empirical analysis indicates that tax reform has raised the productivity of the tax system with the exception of sales tax/VAT. The low elasticity of sales tax/VAT in both periods is surprising given that the base grew faster than income. This suggests collusion between the tax collectors and the taxpayers among other things. Despite substantial reform, significant review and rationalization of the rates under VAT, further improvements are required in the area of reduction of rates and exemptions, increasing VAT administration capacity through a higher budgetary outlay, increasing tax collectors' salaries and reviewing collusion penalties upwards, and strengthening the development of audit skills. Additional capacity is required in areas such as automation, audit and risk profiling, and general skill development.

The tax authorities should pay more attention to taxpayer education, compliance and tax audits. With complex tax laws, taxpayers have to bear additional costs in order to interpret the law and process tax returns. This tends to give the taxpayers an incentive to evade tax and, therefore, provides a rationale for aggressive taxpayer education. For example, the Income Tax Act has not been reviewed since 1989 even as many social and economic changes have taken place over the period. Tax audits ensure that individuals and corporations maintain proper books of account for tax purposes.

Notes

1. Compared with a sample of low-income sub-Saharan countries, Kenya's tax share (estimated at 27.34% over the period 1980–1997) was higher than the sample average of 22.61% over the same period.

2. The share of VAT in total tax revenue fell from 41% in 1990 to 23% in 1994/95–1999/2000. This decline is partly attributed to the change in the VAT standard rate.

3. Only programme-based exemptions or 10% minimum duties were allowed.

4. This included the use of numbered tamper proof seals, independent shipment of documents by courier or fax, shorter transit periods, more frequent internal inspection, limited inspection of high risk cargoes (from 1995), tighter bonding requirements, using pre-shipment inspection (PSI) documents of neighbouring countries for targeting examinations, introducing data sharing on cargo manifests and imports with neighbouring countries to limit transit and export fraud (from 1997), and special licences for transit agents and special transit warehouses.

5. Revisions, some of which were independent included rapid supply of "clean report of findings—CRF" documents, reconciliation of CRF and customs documents, targeting high risk shipments with intensive pre-shipment inspection, intelligence sharing between customs and PSI companies (cooperative programme management), PSI company provided training, and strengthening of valuation capacity.

6. This involved reconciliation of bills of lading with goods off-loaded, information exchange between port authorities and customs, and tighter controls on disposal of unclaimed goods and contracting out of goods auctions.

7. VAT replaced sales tax in 1990. The general structure of VAT adopted in Kenya follows the credit method or invoice method. The tax is chargeable on imports and domestic production or supply of goods and services (Nyamunga, 2001).

8. The rate bands are categorized into high, standard, low and zero.

9. The following penalties apply: (a) A fine not exceeding Ksh100,000 or a prison term not exceeding six months or both for failure to furnish return of income in relation to any year; (b) A penalty of 200% of the difference between the actual return made and the correct tax chargeable for failure to disclose income.

10. Withholding tax is charged at source on interest income, dividends, royalties, management fees, commissions, pensions and rent.

11. There is increasing incidence of sale of counterfeit products in the local market and the cross-border trade of dutiable goods through illegal channels. Price differentials between Kenya and neighbouring countries have been the root cause of these practices. This has undoubtedly narrowed the tax base.

12. Most of these studies were conducted in the pre-reform period. They include a study by Choudhry (1979) that applied the divisia index (DI) method on 1962–1974 data to estimate buoyancy and elasticity at 1.42 and 1.32, respectively. Ole (1975), using 1962/63–1972/73 data, computed elasticity at 0.81 against a buoyancy of 1.25. Njoroge (1993) estimated buoyancy and elasticity at 1.1999 (for 1972–1982) and 0.67 (for 1972–1991). An analysis of VAT generated a ratio of 0.97 for both buoyancy and elasticity (Adari, 1997).

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Appendix A: Kenya: Actual and adjusted tax revenues, 1973–1999

	Actual direct tax	Adjusted direct tax	Actual import duty	Adjusted import duty	Actual excise duty	Adjusted excise duty	Actual VAT	Adjusted VAT
1973	58.8	57.575	39.8	32.46	20.8	18.674	32.0	16.25
1974	77.2	65.849	42.1	33.447	22.7	19.415	46.9	22.229
1975	90.2	69.048	49.2	36.267	20.6	18.517	59.3	22.064
1976	108	75.095	52.9	36.046	28.22	14.376	65.4	21.878
1977	143	78.745	104.2	50.355	38.5	16.129	92.8	24.478
1978	151.7	70.129	101.3	48.35	49.0	17.323	99.8	23.087
1979	173.6	75.191	102.5	48.064	59.5	17.128	154.9	28.153
1980	198.3	79.89	146	57.793	60.2	15.962	179.4	28.017
1981	201.1	82.468	183.7	60.307	64.0	15.856	194.8	26.955
1982	231.8	91.429	175.8	54.907	74.0	16.971	195.9	26.287
1983	251.7	95.353	171.2	56.531	79.4	19.315	253.7	26.423
1984	301	102.38	152.2	53.08	78.8	20.094	273.6	23.387
1985	358.1	112.397	211.8	62.618	89.0	19.494	303.6	22.695
1986	386.7	119.083	246.7	69.403	106.3	19.867	397.6	24.536
1987	454.6	129.307	273.7	73.424	123.1	20.165	520.0	26.811
1988	512.0	136.617	301.0	77.21	137.5	19.993	588.3	24.161
1989	599.2	147.01	348.0	81.744	149.4	17.885	640.3	24.549
1990	713.08	159.655	334.68	82.764	185.16	17.272	766.07	25.787
1991	861.39	175.714	255.93	78.838	340.46	23.117	927.77	26.75
1992	998.52	192.974	459.15	97.77	418.35	25.15	1107.14	27.922
1993	1838.36	269.886	739.64	116.752	556.27	27.435	1449.72	31.061
1994	2175.29	286.889	929.91	121.249	966.61	35.714	1226.69	27.862
1995	2404.12	293.966	1058.78	122.062	1130.59	38.453	1420.19	29.889
1996	2418.75	288.373	1129.7	126.83	1184.36	39.368	1492.5	30.251
1997	2778.98	309.013	1228.35	135.809	1419.08	42.24	1723.41	31.741
1998	2761.74	308.421	1422.2	149.212	1436.66	43.046	1960.24	34.584
1999	2992.2	324.75	1532.5	154.794	1567.5	46.482	2065	37.526

Note: Adjusted figures are the computed amounts using the proportional adjustment technique as described in the methodology section. The amounts are expressed in K£ million (1K£ = 20 shillings).

Source: Republic of Kenya, *Economic Surveys* (various).

Appendix B: Kenya: Tax revenue obtained through discretionary measures, 1972–1999

	Discretionary tax revenue			
	Direct taxes	Import duties	Excise duties	Sales tax/VAT
1972/73	0.0045	0.0741	0.0001	0.8148
1973/74	-0.0340	-0.0030	0.0120	0
1974/75	0.0453	-0.0024	0	0.1620
1975/76	0.0222	0	0	0.0927
1976/77	0	0.0812	0.1771	0.0245
1977/78	0.1713	0.0480	-0.0415	0.1105
1978/79	0	0.0039	0.1306	0.0731
1979/80	0	0.0195	0.0874	0.0291
1980/81	0.0151	0	0.0598	0.1226
1981/82	-0.0646	0.1361	0.0156	0.0359
1982/83	0	0	0	0.0192
1983/84	0	-0.0876	-0.1889	0.2050
1984/85	0.0405	0.1110	0.1015	0.0958
1985/86	-0.0391	-0.0566	0.0775	0.0659
1986/87	0	0.0041	0.0659	0.0622
1987/88	0.0033	-0.0094	0.0536	0.0460
1988/89	0.0088	0.0055	0.0720	0.0410
1989/90	0.0083	0.0287	0.2075	0.0141
1990/91	0.0084	-0.0956	0.1377	0.0681
1991/92	-0.0015	-0.0586	0.0441	0.0560
1992/93	-0.0309	0.2076	0.0072	0.0419
1993/94	0.0406	0.0093	0.1059	0.0326
1994/95	0.0141	0.1359	0.0162	0.0231
1995/96	0.0379	-0.0094	0	-0.0094
1996/97	0.0062	-0.0016	0	0.0343
1997/98	-0.0004	-0.0484	0.0436	0.0190
1998/99	-0.0020	0.0077	-0.0686	-0.0534
1999/00	-0.0189	-0.0046	0	-0.0602

Note: Revenue obtained through DTMs is expressed as a proportion of the revenue from the respective source (e.g., column two is obtained by dividing discretionary tax revenue from direct taxes by the total revenue from direct taxes)

Source: Republic of Kenya, Budget Speeches (various).

Annex C: Regression results – Buoyancies and Elasticities

Table C1: Kenya: Buoyancy and elasticity of main taxes and the total tax system, 1973–1999

	Elasticity	t-ratio	R^2	DW	Buoyancy	t-ratio	R^2	DW
Direct taxes	0.555[a]	9.00	0.771	1.80	1.379[a]	4.08	0.410	2.18
Import duties	0.406	30.0	0.974	1.43	1.131[a]	4.17	0.420	2.21
Excise duties	0.421[a]	7.91	0.740	1.40	1.595[a]	2.40	0.207	1.76
Sales tax/VAT	0.104[a]	0.298	0.004	1.98	0.682[a]	3.67	0.360	2.39
Overall	0.645[a]	4.97	0.507	2.11	1.112[a]	5.45	0.553	2.13

Note:
a: Indicates that the index was obtained after applying the Cochrane–Orcutt iterative procedure to solve the problem of autocorrelation.

Table C2: Kenya: A decomposition of the tax-to-income elasticity of main taxes, 1973– 1999

	Tax-to -base elasticity	t-ratio	R^2	DW	Base-to -income elasticity	t-ratio	R^2	DW
Direct taxes	0.546 [a]	9.47	0.789	1.98	1.009	132.1	0.999	1.21
Import duties	0.387	27.7	0.96	1.23	1.004 [a]	7.31	0.970	1.23
Excise duties	0.394 [a]	5.77	0.58	1.86	1.032	99.04	0.996	1.42
Sales tax/VAT	0.210 [a]	0.76	0.02	2.07	1.032	99.04	0.996	1.42

Note:
a: Indicates that the index was obtained after applying the Cochrane-Orcutt iterative procedure to solve the problem of autocorrelation.

Table C3: Kenya: Buoyancy and elasticity of main taxes and the total tax system, 1973–1985

	Elasticity	t-ratio	R^2	DW	Buoyancy	t-ratio	R^2	DW
Direct taxes	0.488 [a]	1.97	0.261	1.84	0.933	42.9	0.994	1.42
Import duties	0.380	9.60	0.885	1.54	0.933	13.0	0.933	1.34
Excise duties	0.073	1.37	0.146	1.01	1.002 [a]	1.67	0.202	1.59
Sales tax/VAT	0.062	1.33	0.139	0.89	1.216	21.7	0.977	1.58
Overall	0.276	17.0	0.964	2.25	1.023	28.1	0.986	1.02

Note:
a: Indicates that the index was obtained after applying the Cochrane–Orcutt iterative procedure to solve the problem of autocorrelation.

Table C4: Kenya: A decomposition of the tax-to-income elasticity of main taxes, 1973–1985

	Tax-to -base elasticity	t-ratio	R^2	DW	Base-to -income elasticity	t-ratio	R^2	DW
Direct taxes	0.349[a]	1.80	0.228	2.09	0.998	34.06	0.99	1.28
Import duties	0.422	10.6	0.903	2.36	0.887	15.6	0.95	1.94
Excise duties	0.076	1.36	0.144	1.01	0.952	34.4	0.144	1.01
Sales tax/VAT	0.065	1.32	0.138	0.92	0.952	0.991	0.991	2.55

Note:
a: Indicates that the index was obtained after applying the Cochrane–Orcutt iterative procedure to solve the problem of autocorrelation.

Table C5: Kenya: Buoyancy and elasticity of main taxes and the total tax system, 1986–1999

	Elasticity	t-ratio	R^2	DW	Buoyancy	t-ratio	R^2	DW
Direct taxes	2.165[b]	5.058	0.699	0.93	2.333[b]	5.71	0.748	1.19
Import duties	1.661[a]	4.239	0.642	1.86	2.329[a]	3.88	0.602	1.72
Excise duties	1.699[a]	1.761	0.220	1.73	1.497[a]	2.01	0.269	1.46
Sales tax/VAT	0.547[a]	7.404	0.833	1.14	0.674[a]	9.76	0.897	1.12
Overall	1.495[b]	4.622	0.704	1.14	1.661[b]	5.09	0.742	0.943

Notes:
a: Indicates that the index was obtained after applying the Cochrane–Orcutt iterative procedure to solve the problem of autocorrelation.
b: Indicates the estimation of the equation after differencing once.

Table C6: Kenya, A decomposition of the tax-to-income elasticity of main taxes, 1986–1999

	Tax-to -base elasticity	t-ratio	R^2	DW	Base-to -income elasticity	t-ratio	R^2	DW
Direct taxes	2.496[b]	4.32	0.63	1.21	0.679[b]	4.86	0.68	1.21
Import duties	2.124[b]	2.31	0.34	1.43	0.779[a]	3.14	0.50	2.03
Excise duties	1.323[a]	1.82	0.23	1.63	1.086	71.8	0.998	2.44
Sales tax/VAT	0.369[a]	2.71	0.40	1.30	1.086[a]	71.8	0.998	2.44

Notes:
a: Indicates that the index was obtained after applying the Cochrane–Orcutt iterative procedure to solve the problem of autocorrelation.
b: Indicates the estimation of the equation after differencing once.

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