



**Tax buoyancy:
A comparative study between Kenya and South Africa**

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Abstract

One of the most important measures of efficiency of any tax system in public finance is tax buoyancy which is simply the total response of tax revenue to changes in national income. Tax revenue in Africa have been relatively low on average as a percentage of GDP. Since buoyancy echoes the capacity of a tax structure to generate revenues during economic growth, in this study an attempt was made to estimate the buoyancies of income tax, value added tax, import tax, excise tax and total tax revenues in using annual data from 1972 to 2014 in the largest economies in the eastern and southern parts of Africa. It applies the error correction model to measure the short run estimate of tax buoyancy, the long run estimate of tax buoyancy and the level of convergence between the short run estimate and the long run estimate. The results suggest that the tax systems for both countries are buoyant both in the long run and short run with an average speed of adjustment between the long run and the short run estimates.

Key words: buoyancy, short-run estimate, long-run estimate, speed of adjustment

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1. Introduction

1.1. Background of the Study

South Africa and Kenya face significant fiscal challenges. The simple fact that fiscal deficits have been increasing in each and every financial year highlights this fact. Figure 1 below shows the deficits the governments of South Africa and Kenya have been running for the past 7 years.

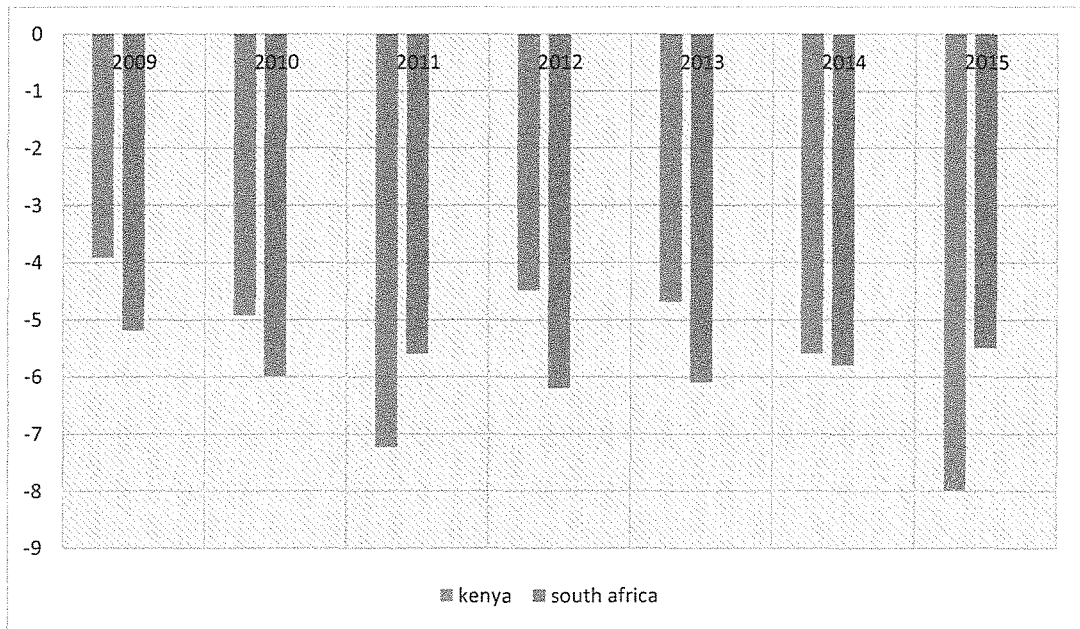


Figure 1: Government deficit as a percentage of GDP

There has been economic growth in many of these counties which means that national income has been on the rise. This however raises the question to what extent higher economic growth can help bring down fiscal deficits. From the revenue side of the budget, the answer depends on tax buoyancy. This is the measure of how tax revenues vary with changes in national income.

Tax buoyancy is an indicator that measures efficiency and responsiveness of revenue mobilization in response to growth in national income. A tax system is the legal system for assessing and collecting tax. A tax system is said to be buoyant if the tax revenue increase more than proportionately in response to a rise in national income. A desirable

property of a tax system is that buoyancy should be equal to or higher than unity. Such property ensures that revenue growth keeps pace with that of Gross Domestic Product without frequent discretionary changes. It also imparts a build-in stability in the middle tax system which ensures mitigation of cyclic variations in national income over the space of the business cycle.

Shome (1988) states that the need to raise revenues and concurrently, tax revenues, becomes imperative in the macro environment that many developing countries face today. This is indeed true since it is in a state's interest to raise enough revenue to finance its activities which spur economic growth. According to Bahl & Bird (2008), a good internal tax system provides not only revenue but an essential element in developing a capable state. Economic growth would mean more tax collection thus the pursuit of economic growth is central to many if not all economies. Figure 2 and 3 below show tax growth versus GDP growth in Kenya and South Africa respectively.

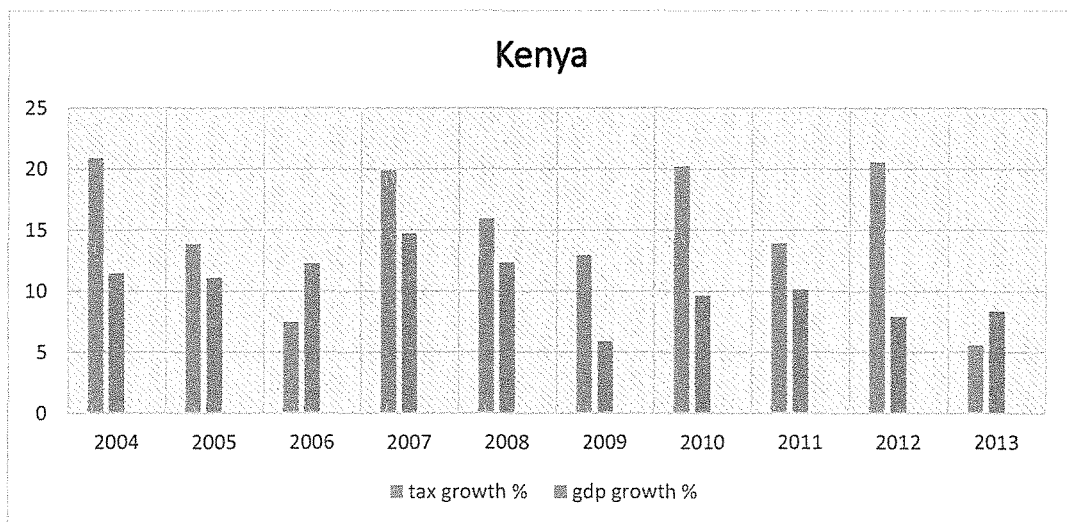


Figure 2: Tax growth versus GDP growth for Kenya.

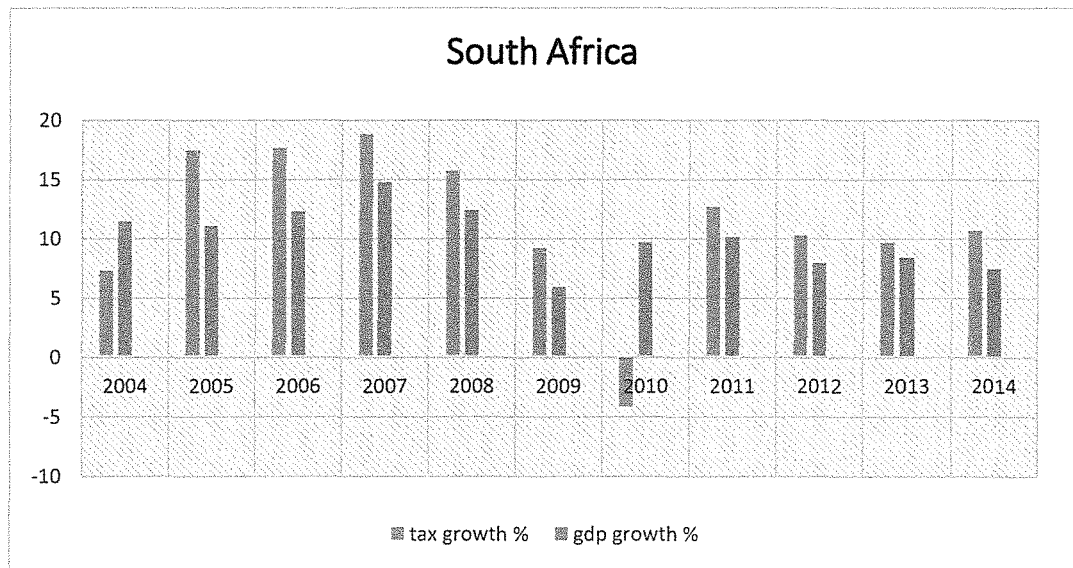


Figure 3: Tax growth versus GDP growth for South Africa.

Generally, tax revenue comprises the major portion of central government budgetary revenues and thus the need to increase revenue is apparent in developing countries.

Wagner’s law stipulates that public expenditure is a natural consequence of economic growth. This statement goes hand in hand with reality since many developing countries in their attempt to spur economic growth have increased public expenditure but this has not been matched with revenue mobilization resulting in huge budget deficits. Most of these deficits are financed by debt instruments which possess a future economic burden to the incoming generations. Various efforts aimed at obtaining optimal fiscal policies with emphasis on the role of taxation as an instrument of economic development has been implemented. A possible explanation for low revenue collection despite the reforms undertaken as stated by Osoro (1991) is that most of these reforms focused on tax structure rather than on tax administration geared towards generating more revenue from existing tax sources. Kenya for instance had the Tax Modernization Program which among other things hoped enhance revenue collection, improve tax administration and reduce compliance and collection costs.

One of the important implications of planning in a developing economy is to devise a fiscal policy for the provision of infrastructure and the promotion of public savings and

investment (Jain, 1969). Kenya and South Africa are both pursuing infrastructural development as an important pillar economic development but it is such an expensive yet necessary pursuit. Despite the expenditure of such infrastructural expenditure being too high, a stable and buoyant tax systems would allow for a country to cover its increasing financial commitments as its gross domestic product grows. If the tax revenue of a country is stable and buoyant, there is a high probability that its public expenditure needs will be adequately met over time.

1.2. Purpose of Study

Many economies run budget deficits so as to spur economic development which would in turn bring in more tax revenues. Mawia and Nzomoi (2013) point out that the backdrop of high expenditure has necessitated the need to raise more revenue when compared to other sources of resource mobilization such as deficit financing and money creation. A growing economy should signify a growing tax revenue stream but how much is that revenue growth? The purpose of this research is to measure how tax revenues actually vary with changes in national income. A buoyancy of one would imply that a one percent change of Gross Domestic Product would change tax revenue also by 1 percent, thus the tax-to-Gross Domestic Product ratio would remain unchanged. A tax buoyancy exceeding one, however, would mean that tax revenue changes by more than Gross Domestic Product and potentially lead to reductions in the deficit ratio in the case of an increase in national income which is expected due to economic growth.

1.3. Problem Statement

Kenya depends heavily on foreign debt as well as domestic debt, while South Africa depends heavily on domestic debt for their development expenditures. In turn, as this dependence grows, their governments may end up facing the predicament of having to bear a net outflow of funds as interest and amortization payments begin to exceed borrowing. Economic theory posits that instability in an economy may arise out of deficit financing mainly through foreign borrowing which may affect domestic interest rates, balance of payments and the exchange rate of the domestic currency relative to other currencies and consequently may plunge the economy into crisis. There is therefore a need

to measure by how much tax revenues vary with changes with national income which in this case is its growth as per the pursuit of economic panning in many if not all economic growth. Measurement of tax buoyancy goes to show the change mentioned above.

1.4. Research Objectives

The objectives of this study were:

- To examine how buoyant the tax system is both in the short run and long run.
- To determine the speed of adjustment of short run gross tax revenue deviations and its components from respective long run equilibrium values and their implication.

1.5. Research Hypothesis

Keeping the objectives of this study in view, the following hypothesis was examined.

- Buoyancies of gross tax revenue are non-buoyant both in the short run and in the long run.
- Income tax is the best automatic stabilizer while import duty is the worst.

2. Literature review

2.1. Introduction

This chapter looked at not only the theoretical literature on tax, tax policy and tax systems but also the empirical literature on the models used to measure buoyancy of a tax system and their findings.

2.2. Theoretical literature review

2.2.1. Tax systems and tax policy

A tax system is simply a legal system for assessing and collecting tax. Bruce & Tuttle (2006) state that 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. The importance of taxation in an economy means that its structure should be good enough to meet the revenue collection needs of an economy. A good tax system must generate sufficient revenue to fund projected government expenditures. Unless tax revenues grow sufficiently quickly to finance desired services over the long term, governments must reduce expenditures, raise tax rates, or alter other structural characteristics of the system. As a working rule, revenue growth should be roughly equal to the overall economic growth rate, unless a country wants to increase or to reduce the size of its government (Bird & Zolt, 2008).

A good tax system according to Mirrlees, et al., (2011) is one that considers the system as a whole, is progressive and is neutral. In considering the entire system, a good tax system should be structured in such a way that it meets overall spending needs of the particular economy. A tax system that treats similar economic activities in similar ways for tax purposes will tend to be simpler, avoid unjustifiable discrimination between people and economic activities, and help to minimize economic distortions is a tax system that actually seeks neutrality. The third element of a good tax system is one that is progressive. A progressive tax system is one which considers distribution of not only income but also expenditure. This distribution brings in the point of how responsive a tax system is and the trade off between expenditure and income.

Tanzi & Zee (2000) point out that a tax policy study is concerned with the design of a tax system that is capable of financing the necessary level of public expenditure in not only the most efficient way but also the most equitable way possible. They go on to add that Developing countries aiming to becoming integrated with the international economy must have a tax policy that plays a sensitive role in three ways. One is to raise enough revenue to finance essential expenditures without recourse to excessive public sector borrowing. The first point in relation to a developing economy whose public expenditure has grown resulting to a large deficit would have an impact on the public debt. Growing public expenditure generates a large fiscal deficit especially in the case of developing countries. These developing countries thus experience an ever increasing debt service which is a consequence of a growing public expenditure. A growing public debt has implications on the tax potential of a country as the debt has to be serviced. Level of taxation has to go up at the point where the interest on the debt exceeds net borrowing plus the possible reduction in non-interest expenditure. Two is raise the revenues in ways that are not only equitable but also minimize the disincentive effects on economic activities. Three is the tax policy should not deviate substantially from international norms.

A good tax policy is one that minimizes unnecessary cost of taxation according to (Bird & Zolt, 2008). In order to minimize the unnecessary costs, the tax policy should follow three general rules. First, the tax base should be as broad as possible. A broad base for income tax for example treats incomes from similar sources uniformly which would result in a higher collections compared to one that is not as broad. Second, given revenue needs, tax rates should be set as low as possible. The efficiency cost of taxes arises from their effect on relative prices and generally increases proportionally to the square of the tax rate. The relationship between efficiency cost and square of rate simply implies that doubling the tax rate increases the efficiency costs fourfold. From an efficiency perspective, it is better to raise revenue by imposing a single rate on a broad base rather than by dividing that base into segments and imposing differential rates on each segment. This cost of differential treatment must be balanced against the equity argument for imposing graduated rate schedules. Third, taxes on production such as corporate income taxes and sales taxes, other than value added tax, should be limited since such taxes are

distorting because they may affect the location of businesses, alter the ways in which production takes place, and change the forms in which business is conducted.

To add on to the above points, a good tax system is one that seeks to minimize the real cost taxes impose to society. These real costs are only incurred when the amount of resources available for society's use is reduced by taxes. These costs can be viewed from the cost of collection, compliance costs or administration costs. Taxes cost something to collect which is done through the revenue agencies who are tasked with the said tax revenue collection. Taxpayers incur compliance costs in meeting their tax obligation. An increase in compliance costs reduces administrative costs since if tax payers are required to provide more information which increases compliance costs but it makes administration easier and less costly. A good tax system should be fair. Fairness of a tax system can be looked at from two points of view which are vertical equity and horizontal equity. Horizontal equity embraces the notion that those who have the same ability to pay should bear the same tax liability. On the other hand vertical equity supports the idea that taxpayers in different situations should be treated appropriately differently.

2.2.2. Tax Revenues

The responsiveness of tax revenue to the change in the economic activity of the country cannot be understated as a factor towards development of the country. Making a fiscal policy decision without having the knowledge of the magnitude of the percentage change of tax revenues with its base will undermine or over exaggerate the expectation of policy makers about the capacity of the economy to generate revenue. This will result fiscal imbalance. This fiscal imbalance is as a result of the rapid expansion in expenditure and low revenue collection (Bayu, 2015). How responsive a tax system is to economic changes is important but so is its resilience. Jayawickrama (2008) states that a unit tax buoyancy parameter is a necessary condition for resilience, as it implies that the tax–income ratio remains constant over time. If the buoyancy parameter is less than unity, it would result in a falling tax–income ratio and vice versa. The tax–income ratio is bounded between 0 and 1, taxes may grow faster than the gross domestic product in some periods and slower in other periods. Resilience should thus be deduced from the point of consistent growth

for not only the economy but also tax revenues. An economy's declining trend in the tax-income ratio, however, does not necessarily imply the non-resiliency of the tax system.

Tax revenues are the most important element responsive to government policy and in effect the major instrument for mobilizing the increments in national income for investment or expenditure by the state Khan (1973). The level of tax revenue collected is a critical determinant of the quantity of real resources a government can mobilize for public initiatives. Tax revenue collection and economic development have a strong positive correlation. Anastassiou & Dritsaki (2005) complement what was stated by Khan (1973) by stating that tax policy is a necessary component of economic policies for every country that wants to sustain and strengthen and grow internationally. A competitive tax structure would attract capital, specialized work and technology which are essential elements for maximizing economic growth. Economic growth comes at the expense of financing an ambitious yet reasonable fiscal budget. The ease of financing the budget of a state is determined by how much revenue in form of taxes the government has collected. Chaundry & Munir (2010) state that the economic resources available to a state are limited, and so an increase in government expenditure normally means a reduction in private spending. One method of transferring resources from the private to the public sector is through taxation, but there are others which include creation of more money, to charge for the goods and services it provides or to borrow just to name a few. Taxation has its limits as well, but they considerably exceed the amounts that can be raised by resorting to the printing press, charging consumers directly, or borrowing. So while governments often use all four methods of raising resources, taxation is usually by far the most important source of government revenue.

Raising government revenue means that people have to pay taxes. When it comes to raising tax revenues Chelliah (1971) states that a governments taxable capacity depends not only on its ability to collect tax but also on the people's ability to pay tax. People's ability to pay tax is dependent on the types of services offered by the government The public goods and services required are supplied by government authorities "with varying degrees of participation on the part of the people acting as citizens" (Steenekamp, 2008).

Societal institutions can be regarded as indicators of the citizens' 'voice' in influencing government policy according to Hirschman (1980) who states that Taxpayer's willingness to pay taxes grow if they feel that their immediate and long term interests are served by government. On the other hand if corruption is widespread and the government is not trusted, they would not be prepared to contribute. The level of taxation, however, is also related to tax morale and income inequality, which enhance the 'exit option', that is, the decision to participate in the informal sector which implies that there is minimal participation in the formal sector where the government is. The lower the degree of tax morale and the more unequal the distribution of income and wealth, the larger the informal sector and thus the lower the tax effort.

Generating sufficient revenue to finance public sector activities in a noninflationary way is the main purpose of taxation. Taxing choices depend not only upon level of development but also the need and desire for increased public services and the capacity to levy taxes effectively. The choices made also depend upon the availability of less politically painful sources of revenue , for instance natural-resource revenue, as well as preferences about public policy goals such as attaining a desired distribution of income and wealth and increasing the rate of national economic growth. Tax policy goes beyond economics as it also reflects political factors such as concern about fairness and the government's desire to stay in power. In addition, notwithstanding what a particular country may want to or should do with its tax system with respect to taxation from one perspective or another, it is always constrained by what it can do. Tax policy choices are shaped by both economic structure and administrative capacity factors that constrain the options available (Bird & Zolt, 2008). An economy's expansionary policy with an ambition to increase economic growth should be guided by the cost of running such a policy, particularly the net benefits. If the policy is being run at a net cost then in the long run it may not be sustainable as these costs may be too expensive for the economy to bear especially if the economy is developing or emerging.

2.2.3. Tax policy implications

The magnitude of government surplus or deficit is probably the single most important statistic measuring the impact of government fiscal policy on an economy. Economies look to address fiscal deficits by raising more money through their tax systems, the importance of getting the structure of taxes right can only increase. The way in which these huge sums of money are raised matters enormously for economic efficiency and for fairness (Mirrlees, et al., 2011). In the case of developing countries over the past several decades financing fiscal policies using deficits is a major issue for most of these developing countries. The reason behind the large increase in fiscal imbalance is the rapid expansion in expenditure and low revenue collection (Mohammed & Ahmed, 2010). The struggle to balance economic growth and tax revenue is a common phenomenon in many of the developing countries. Tax systems fail to generate sufficient revenue to finance recurrent expenditure hence leading to budget deficits which could be attributed to lack of responsiveness in tax revenue to changes in national income (Kotut & Menjo, 2012).

To add on the point on growing fiscal deficit is Bahl & Bird (2008) who states that a critical constraint on tax reform in most developing countries has long been their precarious macroeconomic conditions. Slow economic growth accompanied by pressures to upgrade efficient public service levels and to invest in infrastructure that would enhance growth. But a slow economic growth, a tax base that was hard to reach, and a weak tax administration results to a results to slow revenue growth. Such economies therefore raise revenue foreign grants, borrowing or financial measures like seigniorage and inflation than from taxes resulting to a cycle of low revenue growth, deficits, and ever-increasing debt service and repayment claims on available revenues.

Typically, annual budgets tend to include lists of discretionary tax measures with the objective of making up, at least partially, for growing fiscal deficits. Yet, a major gap remains in the design of a tax system that will automatically yield tax revenue with the growth of gross domestic product (GDP), thereby removing the uncomfortable obligation of introducing generally unpopular tax measures in every annual budget. (Shome, 1988). To add on to the point of automatic nature of a good tax system is Jain (1969) who states

that as an economy of a country develops and its national income grows, because of the emergence of 'built-in structure' in the tax system, increases in tax revenues may, and almost invariably will, come about automatically as a result of the interaction of the tax structure and the changes in national income. Khan (1973) goes ahead and adds that in order to meet the ever expanding expenditure requirements of the public sector, the tax structure must rely on its built-in flexibility. The structure of taxation should be such that an increasing portion of the increments in national income gets automatically channeled into the public exchequer without basic budgetary alteration. The point that this writers are trying to make is that the built in structure of a tax system and how it automatically adds to the overall tax revenue with increase in national income is important when it comes to reducing the government deficit.

The importance of a tax system's built in structure is seen in when a country is running an expansionary policy. An expansionary policy in an ideal world would lead to an increase in the national income. An increase in national income should lead to an increase in tax revenue. One of the lessons to be learnt about tax and development according to (Bahl & Bird (2008) is that it is in all likelihood more important for both economic growth and development (in the broader sense of incorporating an increasing proportion of the population in the growing prosperity) that countries spend well than that they tax well. Of course, this is subject to the caveat that one does not kill the golden goose by over taxation –whether the "goose" be trade, investment, work effort, development of sound public and private institutions, or any of the other factors whose interplay determines economic outcome.

Musgrave & Miller (1948) looks at a tax system's in-built flexibility from the perspective of compensatory fiscal policy whose essence is to adjust level of government receipts and expenditure so as to stabilize total income and employment in the economy. During periods of deflation there should be an increase in expenditure and a reduction in tax revenue while during periods of inflation, there should be a decrease in expenditure and an increase in tax revenue. Such compensatory movements may be brought about by properly timed changes in expenditure programs and in tax rates, but to some extent they

occur automatically hence the thought of in-built flexibility. The automatic compensatory movement of tax revenue is what is termed as built-in flexibility. Tax yields under given statutory rates will fluctuate with changes in national income since the size of the tax base usually varies directly with the level of income which brings in the thought of buoyancy. Similarly certain public expenditures, such as unemployment benefits are geared to move in a countercyclical fashion. The magnitude of automatic compensatory adjustment will depend upon the change in tax revenue resulting from a given change in national income.

The sensitivity of tax collection to income is valuable information for the government, both in terms of planning and formulating public spending and monitoring tax collection. Having a tax system in which the revenue elasticity of taxes is greater than or equal to one is of considerable importance for public finance (Groves & Khan, 1952). If it is elastic, tax collection evolves with growth in national income, reducing the uncertainty associated with tax revenue. If, on the contrary, the tax system is inelastic to income, frequent tax rate changes are required in order to maintain collection at steady levels in the short term. This frequent tax rate changes has a negative impact on resource allocation and distribution in an economy. On the same matter of sensitivity of tax revenue, Seyfried & Pantuosco (2003) estimated the sensitivity of a state tax revenue to cyclical and wealth effects. The stability of a tax revenue over the business cycle is a major concern for policymakers in any given economy. A boom results in an increase in state tax revenue while a recession leads to a slowdown in the growth of state revenue. A tax system that is made less sensitive to changing economic conditions would result to state governments being able to make long-term budgetary plans. Changes in tax structure that emphasize taxes that are less susceptible to changes in economic conditions can enhance stability of revenue over the business cycle and allow for more stable spending and tax policy. Stability of tax revenues from the perspective of a tax system that is less sensitive to business cycles would affect the buoyancy of the tax system since the tax system would not fully adjust the revenue collected when the economy is expanding. A less sensitive tax system to economic fluctuations would lower the tax buoyancy estimate.

2.3. Empirical literature review.

Many of the papers that have estimated the buoyancy coefficient of a tax system have either adopted the error correction model or the cobb-douglas function. Some of the research papers go ahead to measure the tax elasticity coefficient of the tax system.

2.3.1. Error correction model

There are several empirical works that have measured to measure how tax revenues actually vary with changes in national income. Belinga, et al. (2014) examined the tax buoyancy in OECD countries over two equal time periods: 1965-1988 and 1989-2012 using the Error Correction Model. They found that the on average the long run buoyancy was 1.06. The long run buoyancy declined in the more recent periods compared to the 1965-1988 period. The coefficient is no longer significantly higher than one after 1989. This possibly reflects less progression in tax systems after the reforms in the late 1980s and early 1990s. Short-run buoyancy over the entire period equals 1.04 and is not statistically different from one. Before the late 1980s the buoyancy coefficient was way below one but above one since then. However, both of the coefficients were not significant. . The difference in short-run buoyancy between the two periods is statistically significant though, implying that the stabilization function of the tax system has strengthened in the more recent period. For the specific tax components the long run buoyancy corporate income tax was found to exceed one while its short run buoyancy coefficient was 1.96 making it the best automatic stabilizer. For the social security contribution and goods and service tax, it is not significantly different from one, while it lies below one for the personal income tax, excises and property taxes. Short-run buoyancy of the social security contribution is significantly smaller than one while that of property tax is not significantly different from 0. Short-run buoyancy in for the personal income tax and goods and service tax are not significantly different from one, although the higher point estimate for the personal income suggests that it is a better automatic stabilizer than the goods and service tax.

Bayu (2015) also applied the error correction model to determine the long run and the short run coefficients of buoyancy and the also estimate how fast the short run dynamics

converge towards the long run. He went on to use the Johanson maximum likelihood approach to find the determinant of the buoyancy of gross tax revenue. The findings of Bayu's study showed that gross tax receipt grows at a slightly lower rate than GDP both in the short run and in the long run while the speed of adjustment is moderate about half of the disequilibrium adjusted per annum. Direct, domestic indirect, foreign trade taxes were found non buoyant in the short run. While long run results indicate only foreign trade tax revenue was buoyant. Regarding the speed of adjustment parameter of short run deviations, the speed is well pronounced for direct taxes than in the case of domestic indirect taxes and foreign trade taxes. In both cases the speed of adjustments were a bit sluggish only about 46, 38 and 31 percent of the deviations from the long run equilibrium values of direct, domestic indirect and foreign trade tax revenues were adjusted within one year. The result from the Johansson cointegration approach shade light on the statistical relationship between buoyancy of gross tax revenue and a set of explanatory variables including service, industry, import budget deficit and official development assistance as a percentage of GDP. He summarized his findings by stating that the existing persistent budget deficits in Ethiopia suggest that the tax system is not revenue productive, and hence increasing revenue should be the main objective of tax policy. Any tax policy should strive at meeting the fiscal budget such that the deficits are reduced and debt financing is kept at a minimum. Bayu's finding are thus relevant to any developing economy which is finding it difficult to finance their fiscal expenditure.

2.3.2. Cobb-Douglas function

Many of the papers that have measured tax buoyancy use the following cobb-douglas function to estimate it, $e^{\alpha} Y^{\beta} e^{\varepsilon} = T$ where Y is gross domestic product, T is tax revenue, e is the natural number, β is estimated parameter which in this case is the measure of buoyancy and ε is the error term. Jain (1969) used a slightly different cobb-douglas function to estimate tax buoyancy of the Indian tax structure. He used $Y = \alpha X^b$ where Y is tax revenue, α is a constant, b is the measure of buoyancy and X is national income. The results of his study showed that the overall Indian tax system was buoyant with an estimate of 1.858. On the tax categories only income tax and excise tax were found to have a buoyancy estimate of less than unity. Akbar & Ahmed (1997) used the cobb-

douglas function to estimate buoyancy found that the overall tax system was not that buoyant as it has an estimate of 1.07. On the tax categories only excise duty had a buoyancy estimate of less than unity. Other papers to use the cobb-douglas function to measure tax buoyancy are; Twerefou, et al. (2010) who estimated that the overall tax system of Ghana is not buoyant and all the tax categories apart from personal income tax were also not buoyant as they all had an estimate of less than unity, Mawia & Nzomoi (2013) estimated the tax buoyancy of Kenya to be 2.58 which means the tax system is buoyant and Wawire et.al (2014) who found that tax reforms in Kenya made the tax system more buoyant. Ndedzu et.al (2013) also used the cobb-douglas function to estimate the buoyancy coefficient of the tax system. The results showed that Zimbabwe's overall tax system is not buoyant as its estimate of buoyancy is 0.708. When it comes to the tax components, only custom duty had an estimate of more than unity.

2.3.3. Tax buoyancy and elasticity

Tax buoyancy is normally estimated with tax elasticity. The difference between buoyancy and elasticity is that the latter accounts for discretionary measures taken by the state. That is revenue is calculated as it would have been had there not been any change in the tax laws. Tax elasticity tries to reconstruct what would have happened if there had been no changes in the tax rules. Shome (1988) estimated both the elasticity and buoyancy of several Asian countries. He estimated buoyancy using a log linear equation linking a time series on tax revenue to its corresponding GDP series. On the other hand elasticity was estimated using a log-linear equation but in this case the time series on tax revenue is adjusted for discretionary tax measure. The results showed out of the five countries only Malaysia and Thailand had a buoyancy estimate of more than unity, 1.23 and 1.13 respectively. All the five countries: Bangladesh, Malaysia, Philippines, Sri Lanka and Thailand had an elasticity estimate of less than one.

Twerefou, et al. (2010) in their paper estimated both elasticity and buoyancy. They used the error correction model to estimate the short run and long run estimates of elasticity of the Ghanaian tax system. The results stated that all the individual tax categories are not base to income elastic in the long run except import duty whose estimate was more than

unity. In the short run all the individual tax categories are base to income inelastic as reflected by a less than unity estimate. Wawire, et al. (2014) also estimated both buoyancy and elasticity although their research was on the effect of reforms on the buoyancy and elasticity estimate. They used dummy variables to show the effect of the reforms on the tax elasticity. Their results showed that reforms had a positive effect on the tax elasticity. They went on further to get the long run relationship between tax revenues and gross domestic product using the Johansen Cointegration Test. The results showed that the coefficient of the error correction term is 0.775 and it is also significant. This implies a high speed of Adjustment as 77 percent of the previous errors in tax revenue are corrected in the current period.

This research is therefore necessary as it sought to answer how buoyant is the tax system of the largest economies in the eastern and southern parts of Africa. It employed the error correction model which not only gave a long run estimate of buoyancy of the tax system but also the short run estimate and how fast the short run estimate converges to the long run estimate. All this estimates are necessary as policy makers need to know how buoyant the tax system is both in the short run and in the long run. As economies pursue an expansionary fiscal policy which has led to increasing fiscal deficits, it is still in an economies interest to know by how much an increase in an national income would increase tax revenue collection.

3. Methodology.

3.1. Research design

This study aimed at establishing how buoyant the tax system in Kenya is between the years 1980-2014 and also South Africa between the years 1972-2014. The study adopted a causal relationship design. A causal analysis is concerned with how one variable affects, or is responsible for changes in another variable. The research used causal analysis since it helps in answering the question this research seeks to answer which is by how much do tax revenues change due to changes in national income.

3.2. Data description.

The research used secondary data from World Bank, Federal Reserve Economic Data, International Monetary Fund and the central banks/reserve banks of each of the two countries. The significance of the sample period is to capture the effects of some of the tax modernization programs adopted in the economies. Data on gross domestic product, tax revenues and the specific components of tax revenue were annualized. Secondary data was used in this study because of the advantages it has over primary which include: data accessibility, feasibility of both longitudinal and international comparative studies and it is economical as it saves effort, expenses and also time.

Gross domestic product (GDP)	It is the monetary value of all goods and services produced within a country's geographic borders over a specified period of time normally one financial year.
Tax revenue	Government income due to taxation.
Income tax	It is a type of tax that is levied on business profits and other forms of income
Value added tax (VAT)	An indirect type of consumption tax that is placed on a product whenever value is added at any production stage and also at the final sale.

Import duty	a government tax on imports or exports which is collected by the customs authorities of a given country
Excise duty	A tax levied on manufacture, sale, or use of goods that are locally produced.

Table 1: Description of the variables that will be used in this study.

3.3. Model specification.

One of the most common and most important empirical issues in applied public sector economics is to estimate the likely behavior of tax revenue in relation to changes in national income. Tax buoyancy is generally measured by regressing the log of tax revenue on the log of GDP, sometimes with controls for other factors influencing revenue performance. The method this research employed, mimics the one used by Belinga, et al. (2014) which they used to estimate the long run and short run buoyancies of OECD countries and how fast the short run dynamics move towards the long run dynamics. This method's superiority over the cobb-douglas function model is captured by the fact that it not only measures the long run estimate of tax buoyancy but also the short run estimate and how fast the short run estimates converges with the long run estimate. The superiority of the error correction model is the reason why this research used it. Other researchers who employed the error correction model to estimate tax buoyancy of a given economy are (Bruce & Tuttle, 2006), (Bayu, 2015) and (Jayawickrama, 2008).

The starting point for the econometric specification was the following autoregressive distributed lag model. This model allows for a flexible dynamic relationship between tax revenue and GDP:

$$\ln Tax_t = \sum_{j=1}^p \phi_{ij} \ln Tax_{t-j} + \sum_{j=0}^q GDP_{t-j} + \varepsilon_t \quad (1)$$

Where Tax_t is tax revenue collected in year t, and GDP_t is for that particular country's level of GDP, and ε_t is the error term. Equation (1) suggests that developments in tax revenue can be explained by a distributed lag of order p of the dependent variable, and a distributed lag of order q of GDP. The research involved taking a great precaution when choosing the number of lags since it addresses the possible issues of serial correlation,

endogeneity and multicollinearity. Many lags will lead to a high probability of multicollinearity among the lagged variables and also reduces the degrees of freedom. If an equation with a lagged dependent variable as an independent variable has a serially correlated error term, then OLS estimates of the coefficients of that equation will be biased even in large samples implying that the OLS estimator will not be consistent. To try and avoid the problems of multicollinearity and serial correlation the research used the akaike information criterion (AIC) to choose the optimal lag structure, i.e. values for p and q, for each country and for each equation.

The study then subtracted the lag tax variables from both sides of equation (1) which transformed that equation into a single error correction model of the form:

$$\Delta \ln Tax_t = \lambda_i (\ln Tax_{t-x} - \beta_i \ln GDP_t) + \theta_{i,0} \Delta \ln GDP_t + \mu_i + \varepsilon_t \quad (2)$$

Where $\beta_i = -\frac{\theta_0 + \theta_x}{\lambda_i}$ and $\lambda_i = -(1 - \phi_x)$. From equation (2), θ_0 measured the short-term buoyancy of the tax, which is the instantaneous effect of a change in GDP on tax revenue. The parameter β_i signifies the long-run buoyancy. The parameter λ_i measured the speed of adjustment. The speed of adjustment is how fast the short run values converge to its long-run equilibrium value. This research paid close attention to the parameters θ_0 , β_i and λ_i as that's where the research's interest lies.

Equation (2) was used to estimate the short run buoyancy, long run buoyancy and speed of adjustment of both the aggregate tax revenues and the tax revenue categories: income tax, value added tax, import duty and excise duty.

4. Data analysis and presentation of results.

This study applied the error correction model tax for estimating buoyancy coefficients and speed of adjustment. To estimate parameters of the model, the equation was linearized by taking the logarithms of the variables in the model.

4.1. Stationarity.

Unit Root test results, as shown in tables one and two below, for the ADF revealed that all the variables are unequivocally integrated of order one indicating that stationary is attained in first difference. In Kenya, only excise duty is an I (0).

Variable	P-value		Order of Integration.
	At level	1 st difference	
GDP	0.9992	0.0214	I(1)
Total Tax	0.5815	0.0000	I(1)
VAT	0.4663	0.0002	I(1)
Excise duty	0.0019	-	I(0)
Import duty	0.3546	0.0000	I(1)
Income tax	0.8652	0.0002	I(1)

Table 2 Stationarity results for Kenya.

Variable	P-value		Order of Integration.
	At level	1 st difference	
GDP	0.9680	0.0010	I(1)
Total Tax	0.7694	0.0000	I(1)
VAT	0.3507	0.0004	I(1)
Excise duty	0.8427	0.0002	I(1)
Import duty	0.0151	0.0151	I(1)
Income tax	0.8449	0.0000	I(1)

Table 3: Stationarity results for South Africa.

4.2. Johansen Cointegration Test Results.

Cointegration tests were carried out to verify whether tax revenue or the tax revenue components had a long-run relationship with GDP or not. Cointegration of any two variables means that the error terms would be stationary. Although the variables are individually 1(1), their linear combination cancels out the stochastic trends in these variables and as a result, such a regression would be meaningful and not spurious.

The results in appendix 1 show that in South Africa, tax revenue and all the tax components are cointegrated with GDP. The results in appendix 2, follow the same trend as the one for South Africa which, shows that in Kenya all tax revenue components and the aggregate tax revenue are cointegrated with GDP.

4.3. Buoyancy Estimates.

Equation (2) was used to estimate the long run buoyancy estimate, short run buoyancy coefficient and the speed of adjustment for the aggregate tax revenue and also the tax components for both Kenya and South Africa. The results are summarized in the tables below as follows:

	Total tax	VAT	Income tax	Excise	Import
Long run buoyancy.	1.77*** (0.09)	1.61 (0.17)	1.70*** (0.03)	1.16*** (0.23)	1.31*** (0.41)
Short run buoyancy.	1.82*** (0.33)	1.42 (0.92)	1.38*** (0.18)	1.23* (0.68)	-4.15 (4.17)
Speed of adjustment.	-0.32** (0.11)	-0.07 (0.06)	-0.81*** (0.11)	-0.23* (0.10)	-0.78*** (0.15)

Table 4: South Africa buoyancy and speed of adjustment results.

	Total tax	VAT	Income tax	Excise	Import
Long run buoyancy.	1.18* (0.68)	1.38*** (0.40)	2.69*** (0.96)	0.81** (0.39)	-0.84*** (0.29)
Short run buoyancy.	2.69*** (0.59)	0.88*** (0.31)	3.09** (1.24)	0.70* (0.36)	2.15 (1.52)
Speed of adjustment.	-0.40*** (0.14)	-0.63*** (0.12)	-0.54*** (0.19)	-0.86*** (0.17)	-0.36** (0.15)

Table 5: Kenya buoyancy and speed of adjustment results.

*** implies statistical significance at 1% while ** and * imply statistical significance at 5% and 10% respectively.

The results suggested a significant long run buoyancy coefficient for the total tax revenue of 1.77 in the case of South Africa while 1.18 in the Kenyan case. When it comes to the short run buoyancy coefficients, the results suggested a significant 1.82 coefficient in the case of South Africa while Kenya's coefficient is also a significant 2.69. The speed of adjustments are for South Africa and Kenya are 32% and 40% respectively. The results stated that both tax systems' of Kenya and South Africa are buoyant in the long run and short run. South Africa's tax system is more buoyant than Kenya in the long run suggesting that its pursuit of economic growth means more tax revenue collection to finance government activities in subsequent financial years. However, Kenya's tax system has a better automatic stabilizing capability at the aggregate level due to the higher short run buoyancy coefficient and a higher speed of adjustment.

The results suggested that, in the case of south Africa, income tax is the best automatic stabilizer due to its significant buoyant coefficient both in the long run (1.70) and short run (1.38). The level of convergence between this two 81%. It points out that about 81% of the disequilibrium from the long run path will be corrected in one year. The adjustment of the short-term buoyancy towards the long-term is therefore fast. VAT, on the other hand, doesn't fall far behind income tax on the buoyancy dynamics. Its long run buoyancy

coefficient is 1.61 while its short run buoyancy coefficient is 1.42. However, only 7% of the disequilibrium between the long run and the short run dynamics are corrected in one year. Excise duty has a long-term buoyancy estimate of 1.16 while the short run estimate is 1.23. Only 23% of the disequilibrium is corrected within the fiscal year between the long run and short term buoyancy estimate. The worst automatic stabilizer is import duty since it has the lowest short run buoyancy coefficient. The results for import duty could be due to the fact the fact that laptops, electric guitars and some other electronic products are not subject to this duty.

Kenya's best automatic stabilizer is income tax with a long run and short run buoyancy coefficient of 2.69 and 3.09 respectively, both of which are significant at the 1% level of significance. It is the best automatic stabilizer since it has the highest short run buoyancy coefficient. The speed of adjustment is -0.54 suggesting that 54% of the disequilibrium between the long run and the short run buoyancy estimate is corrected within one year. Income tax performance in Kenya can be explained by the addition of rental income in the tax bracket, which has gone to increase the income tax base. VAT is the only other tax component that has a long run buoyancy coefficient of above one (1.38). Its short run buoyancy coefficient is however less than one (0.88) with 63% of the disequilibrium between the short and long run dynamics corrected within one year. Excise duty and import duty both have a buoyancy coefficient of less than one in the long run. (0.81 and -0.84 respectively). However, the short run buoyancy coefficients of excise duty and import duty are 0.7 and 2.15 respectively. The results suggest that excise duty is the worst automatic stabilizer as it has the lowest short run buoyancy coefficients among the tax components used in the study. However, import duty has a negative long run buoyancy coefficient which can be attributed to the fact that Kenya has leakages when it comes to imports. This simply means that so many of the imports are not subjected to import duty since they are not brought into the country through the proper channels. The results for short run buoyancy coefficient of import duty are however subject to high standard errors and are also insignificant. In the case of excise duty, 86% of the disequilibrium between the short and long run dynamics are corrected in one year while only 36% of the disequilibrium is corrected in the case of import duty. The high speed of adjustment when

it comes to excise duty can be attributed to the fact that excise taxes increase often so as to reduce alcohol and tobacco consumption.

The results shown in this research go partly hand in hand with those of (Twerefou, Fumey, Assibey, & Asmah, 2010) who estimated not only the tax buoyancy but also elasticity of the Ghanaian tax system. They found that the tax system is buoyant in the long run (1.08) but the short run estimate is 0.74 with 34% of the disequilibrium between the long run and the short run estimate corrected in a year. Performance of the tax component showed that personal income tax and VAT are buoyant while excise duty having the lowest buoyancy estimate. (Bayu, 2015) however found that the Ethiopia's tax system was not buoyant both in the long run and short run, 0.89 and 0.65 with around half of the disequilibrium (50.3%) is corrected within a fiscal year. The research divided tax revenue to direct, indirect and taxes on foreign trade. Out of the three categories, only tax on foreign trade was buoyant (1.15) while direct and indirect taxes had a buoyancy coefficients of 0.67 and 0.89 respectively.

5. Conclusion and Recommendations

The results show that both Kenya and South Africa have a buoyant tax system implying that expansionary fiscal policies would yield higher tax revenue collections. Close attention should be paid to excise duty and import duty in Kenya and import duty in South Africa which perform poorly as tax components. South Africa and Kenya's trajectory to long term growth is promising and their pursuit of economic growth is worth the recognition they are receiving. Care should however be taken on how such pursuits are financed since debt and borrowings have long term implications. The benefits of any choice of budget financing should outweigh the costs of such finances. Otherwise, the future generation will fill the pinch of today's financing decisions. A simple way of dealing with the cost of financing to the future generation is coming up with a buoyant tax system which will go a long way in reducing the fiscal deficits.

Persistent budget deficits in Kenya and South Africa suggest that the tax system is not revenue productive, and in such situations increasing revenue should be the main objective of tax policy. Broadening the tax base and bringing new tax payers in to tax net, improving tax administration, eliminating tax distortions, eliminating some of the tax exemptions, creating economic environment that increases revenue and decreases overall budget deficit and foreign reliance are the timely fiscal policy issues that the study would like to remind concerned bodies based on the implications of the analyses.

Measures that the study recommends to ensure a broad tax base include: creating an enabling business environment for companies to flourish which will enhance the company tax base, identifying new items/sectors to bring into the tax net such as the large informal sector and raising rates on items with low excise duty such as alcoholic beverages and cigarettes so as to increase the yield of this tax while curbing the consumption of such commodities. It will also be vital to strengthen the capacity of the revenue agencies to register more eligible tax payers. With regards to personal income tax, in a bid to broaden its base, there is the need to reduce not only fringe benefits but also allowances. The government should also come up with policies to improve coverage by capturing the

informal sector workers through effective monitoring of businesses particularly private ones and ensuring every worker is registered with the tax agencies. Finally, effective tax administration is needed to advance tax compliance, boost revenue collection and to avert tax evasion which is a huge issue in Kenya and South Africa.

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7. Appendices.

Appendix 1: Johansen Cointegration results for Kenya.

series	Hypothesized number of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Number of cointegrating equations
Total tax and GDP	None	0,2732	13.1934	12.3209	1
	At most one	0.0106	0.4268	4.1299	
Excise and GDP	None	0.2631	17.7674	12.3209	2
	At most one	0.1297	5.5559	4.1299	
VAT and GDP	None	0.2481	12.3482	12.3209	1
	At most one	0.0232	0.9416	4.1299	
Import and GDP	None	0.2652	20.3942	12.3209	2
	At most one	0.1826	8.0651	4.1299	
Income and GDP	None	0.2932	14.3563	12.3209	1
	At most one	0.0117	0.4739	4.1299	

Appendix 2: Johansen Cointegration results for South Africa.

series	Hypothesized number of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Number of cointegrating equations
Total tax and GDP	None	0.3694	16.5948	12.3209	1
	At most one	0.0409	1.3781	4.1299	
Excise and GDP	None	0.3466	20.8163	12.3209	1
	At most one	0.1880	6.8728	4.1299	
VAT and GDP	None	0.3041	13.3091	12.3209	1
	At most one	0.0400	1.34733	4.1299	
Import and GDP	None	0.3528	16.7134	12.3209	1
	At most one	0.0688	2.3541	4.1299	
Income and GDP	None	0.3985	21.7406	12.3209	2
	At most one	0.1397	4.9654	4.1299	