An Empirical Analysis of Tax Ratios and Tax Efforts for Kenya and Malawi

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Abstract
The study intended to analyse the trends in tax ratio and tax effort differentials between Kenya and Malawi using secondary annual data for the period 1980 to 2015. The data were obtained from both the International Monetary Fund and World Bank data bases. The study was carried out to analyse tax ratios for Kenya and Malawi, estimate the tax effort for each, and identify the factors that accounted for the differences in the tax ratios and tax effort indices in the two countries. The regression models for the two countries were estimated using the ordinary least squares (OLS) method. The results reveal that GDP per capita was explaining changes in tax revenue in Kenya both in the long run and the short run, share of agriculture to GDP, and the share of industry were influencing the tax revenue in Kenya, in the long run. However, the coefficient for the dummy variable for political reform in Kenya has been insignificant. In Malawi, GDP per capita, share of agriculture in GDP, share of industry in GDP, and the dummy variable for political reform were all explaining changes in tax revenue in the long run but not in the short run. In regards to the tax efforts, the study reviels that Malawi was undertaxing while Kenya was overtaxing given the structure of their respective economies. The study recommends the two countries have to work towards optimal level of taxation.

Keywords: Tax ratios, Tax Efforts, Kenya, Malawi, OLS

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1.0   Introduction

The need to raise additional tax revenue is fundamental for developing countries seeking to increase public expenditure, reduce reliance on foreign assistance, and limit recourse to borrowing, reflecting this, increasing the tax – to - GDP ratio is an explicit, central aim of policy in many developing countries – often underpinned by specific quantitative targets (IGC, 2016). While a tax ratio tells us how much tax revenue is available to a country's government taking into account the size and the structure of the economy, the tax effort refers to an index measure of how well a country is doing interms of tax collection, relative to what could be reasonably expected given its economic potetial (AfDB, OECD, UNDP, 2010).

According to (Di John, 2010) a high tax ratio is not necessarily a good measure of a country's tax capacity and does not necessarily mean that a country with high tax share is exerting more than one with a lower one. This is because a higher share may be the result of windfall gains or accounted for by favourable structural variables or tax handles other than a government's own efforts, with the consequence that acountry with a higher tax ratio may actually be collecting less tax than is warranted by the structural determinants.

Tax effort is calculated by dividing the actual tax share by an estimate of how much tax the country should be able to collect given the structural characteristics of its economy. Empitically these characteristcs are captured respectively by the per capita income, the ratio of trade to GDP and the share of agriculture to GDP. A high tax effort ratio above one indicates that the country is collecting more taxes than predicted by the structural characteristics of its economy while a low tax effort below one indicates that the country is collecting less tax than predicted. On the other hand a tax effort about one means a tax collection is as expected from the structural characteristics (AfDB, OECD, UNDP, 2010).

Tax ratios and tax efforts have been a subject of many studies following the need for finding more information of the variability and differences among countries. A number of scholars such as the works of (Bird et al., 2008; Davoodi & Grigorian, 2007; Drummond, Srivastava, Daal, & Oliveira, 2012; Eliud Moyi and Eric Ronge, 2006; Mutua, 2012; Wawire, 2011) have sought to unravel the veil behind the tax ratios and tax efforts. The tax problems especially in many african counties range between lack of political will to tax evasion, poor tax structures, thin tax bases, big size of the informal sector, rasing size of underground economy, weak tax administration as well as the tax laws.

As a result many economies fiscal deficits have kept on increasing despite the ability and the structures of the economies to raise sufficient tax revenues (ADB Group, 2016). On the other hand few countries are able to raise higher tax revenues by enforcing a higher tax efforts leading to a tax effort index of more than one while others hardly manage to raise even 50% of what their economies have the potential of raising (AfDB, OECD, UNDP, 2010).This has led to a question on why are other countires able to raise more than others despite having similar economic output.Taxation role of the government is mainly for stabilization of the economy, mobilization of resources to finance development programas as well as redistributive purposes.

Different studies have been conducted in other African countries regarding the tax ratios and the tax effort, however no study has been undertaken to compare any two counties in terms of tax collections and tax efforts. Muthui et al (2015) attempted to carry out a study by comparing tax efforts between Kenya and Nigeria for the period 1994 – 2012 but without

following right proceduce in caliculating the tax effort. This study has been intended to evaluate the trends in tax ratio and tax efforts indices of Kenya and Malawi and to establish those factors that account for the differences in the two countries.

The main objective of the study has been to determine the trends in tax ratios and tax efforts indices of Kenya and Malawi for the period 1980-2015 and to find out factors that explain the differences in the two countries. This study is carried specifically seeks to: analyse the trends for tax ratios of Kenya and Malawi, to estimate the tax effort for Kenya and Malawi, and, to identify the factors that have accounted for the differences in the tax ratios and tax effort indices in the two countries.

The study covers the period 1980 to 2015. This period is long enough to enable the study establish the trends in tax ratios and tax efforts in both countries. In addition it coincides with the period that a lot of tax reforms were being undertaken in the sub-Saharan Africa. It also captures the period that the structural adjustments programmes were introduced, when some taxes were introduces and abolished such as the sales tax in early 1970s and abolished in 1990 for Kenya in addition to the tax administration efforts. The study is to anayse the differences in the trends of tax ratios and tax efforts for Kenya and Malawi and find out those factors that account for the differences in the ratios and efforts of the two countries.
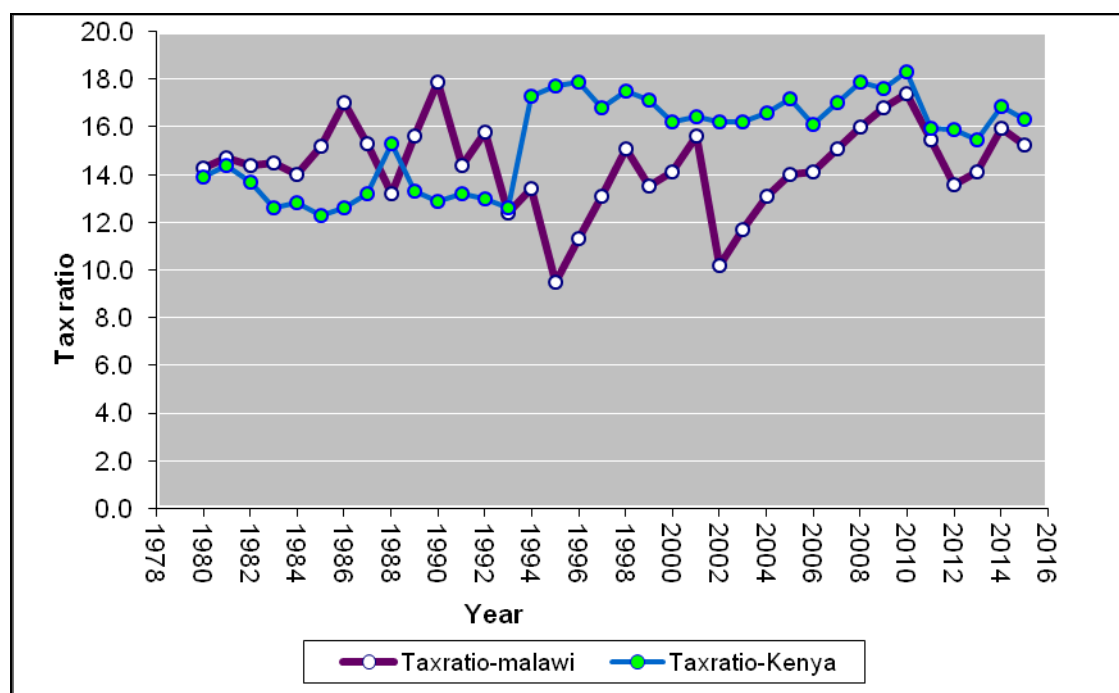

Fig. 1 Trends of tax artios for Kenya and Malawi

Trends in tax revenues reforms in Kenya

Kenya has witnessed an increase in its tax revenue from 66,187 million shillings in 1963 (Government of Kenya 13 April 1965) to 1,288, 870.13 trillion shillings in 2015 (KNBS, 2015). The government has been pursuing tax reforms in order to design a system that is viable and productive to finance and sustain government expenditures without recourse to deficit financing. With the devolved structure of governance spelt out in the country's constitution, there has been need for increased revenue collection to sustain the activities of both the devolved and central governments (Omondi, Wawire, Manyasa, & Thuku, 2014).

The increase in revenue is attributed to implementation of various tax reforms that took place from early 1970s to date. For instance, in 1973 there was shift of tax burden to consumer through the introduction of sales tax. This can explain the high tax levels observed in 1970's to early 1980's. The dip in the tax in early 1980's can be attributed to the time lag of the implementation of the sales tax leading to a high level in 1987. 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 (Muriithi & Moyi, 2003). Nevertheless, the reforms were aimed at increasing the tax revenues although as it can be seen from the trend indicated in the figure above the reforms did not seem to have achieved much. The decline that followed can be attributed to the high political temperatures following the frequent detention without trial and the opposition agitation for the introduction of the multiparty democracy coupled with the economic slowdown as a result of donor sanctions due to wide spread corruption.

The sales tax was later replaced with value added tax (VAT) in 1990. VAT was seen to be much effective than sales tax due to its wide coverage and flexibility. The other tax reforms that were implemented include the revision of tariffs and tax rates, expansion of tax base (Wawire, 2000). The governments tendency to carry out unpopular actions which were mainly of corruption and political reticence led to the non-implementation of many of the tax reforms put forward by the IFIs document after document released by the Kenyan government in the 1990s, the government was forced to reaffirm a commitment to tax reform to satisfy conditionality agreements with lenders in order to maintain a flow of funds. The significant rise in the revenue shares could be attributed to the introduction of the VAT in 1990 and also the many tax reforms and administration that were undertaken during the same period.

The sweeping reforms that were sustained saw a number of changes in tax administration. Key among them were the introduction and strengthening of tax institutions in order to define the revenue collection properly. According to (Cheeseman, 2005), establishment of KRA in 1995 also contributed to the increase in tax revenue as a result of improved tax administration and efficient implementation of organizational reforms. As it can be seen from the fifigure 1 above, there was a steady rise in the tax shares from early 1990's up to about 1994 then there was a slight decrease in 1995 followed by a steady rise in 1996. In the year 2000, the tax revenues were stagnant so was the economy. In 2002 there was a change in regime with the election of the new government which was supported and voted in by Kenyans of all walks of life. The voting in of the NARC government garnered 61.3% of all the votes cast being voted in by the highest margin in the country's history. This though brought a positive shock,there was a lag of about 2 years to have the full impact of this change be felt in the tax system. This is again followed by a steady decrease 2002 and stagnation through nearly to 2004 followed by a steady increase through to 2010. The stagnation in 2002 to 2004 can be due to the lag as the new government set in to set administration structures while the raise in 2004 through to 2010 can generally be attributed to the positive psychology of the tax payers showing a significant trust in their government though there was a slight decrease in 2008 which can be explained by the post election crisis that followed after the disputed 2007 eclection leading to the formation of a coalition government between the opposition and the rulling coalition. In return the government demonstrated its confidence by rolling out a number of significant public projects which touched on peoples lives positively.

Trends in tax revenues reforms in Malawi

The tax system in Malawi has seen several tax policy reforms in the last five decades. The reforms had different objectives including Revenue generation, increased investment level, Improving equity and efficiency, increasing international trade competitiveness. According to (Chipeta, 1998) tax reform has been carried out as an instrument for raising tax yield or productivity. At independence Malawi inherited the U.K tax system that heavily relied on direct than indirect taxes a pattern which was more reminiscent of developed countries. Personal taxes were collected from individuals working in public sector large firms and had four taxes: minimum taxes (head tax) levied on income less than graduated tax and all males above 18 years were required to pay, graduated tax was levied on income above specified amount and had five brackets, assessed tax for self-employed in farming and petty trading, and PAYE

The main tax policy and administration reforms in Malawi can be categorized into four time periods; 1964 -1977, 1979 -1984, 1985 - 1999 and 2000 - 2010 reforms. These can help in explaining the trends noticed in the tax revenues over the years. During the period 1964-1977 there was a number of tax reforms. After the incentives of 1969 there was an extension of tax to clubs, societies and associations whose operations were not solely for social welfare in 1969, company tax was extended to non-residents who partly or wholly produced, mines and similar others within Malawi and exports before sale in 1971. In 1975, government raised corporate tax rate to 45 from 40 percent. On personal tax main reforms included allowances on contribution to pension or provident fund in 1969. Indirect taxes reforms included: introduction of Surtax (tax levied upon a tax, or a tax levied upon income) at 5 percent rate in 1970, raising surtax rates in 1971 and 1977 to 10 and 15 percent respectively, introducing 1.2 uplift factor on imported goods for surtax, introduction of 8.5 percent surcharge on imports. This can mainly explain the tax levels seen in 1978.

During the period 1978-1984 Tax Policy Reforms; indirect taxes main tax reforms included: raising rates for surtax in 1979, 1980 and 1984 to 17 percent, 20 percent and 25 percent respectively for domestic output and 20 percent, 25 percent and 30 percent for imports; also extending import duty and surtax to capital and intermediate goods in addition to introduction of import levy on CIF value of all imported merchandize goods in 1981 and the rate increased to 5 percent in 1984. There was also an introduction of accommodation and refreshment tax in 1982. These reforms can explain the steady increase in the tax revenues witnessed in 1983 to 1984 while the sharp decrease can be explained by the taxes imposed taking toll on revenues. In the early 1980s, the flow of external funds dropped precipitously. This decline coincided with the loss of Malawi's primary foreign trade artery (80-90 percent of exports and imports) due to the closure of rail lines in neighboring Mozambique. These shocks resulted in a sharp increase in the servicing of Malawi's external debt and defense spending, thereby creating a pressing need for more revenues. At first the Government raised the rates on those tax bases that were administratively the easiest to tax, such as trade. By 1985, the tax to GDP ratio had increased by almost 50 percent. However, it was increasingly apparent that the ad hoc, temporary measures were inconsistent with the creation of a more liberal economic environment in the long run. This led to a reexamination of the tax system as a whole (Shalizi & Thirsk, 1991).

There was not so many major Changes on the tax system in the Malawian economy from the early 1970's. However many of the changes occurred in the relative importance of different taxes. Import duties, which were one of the largest source of revenue in the 1970/1980s lost

that position in the 1990/2000s following a relative shift in the composition of imports from consumer goods, which were taxed more, to intermediate and capital goods, which were taxed less, and to the large increase in revenue from other taxes. Surtax shifted its position from third in 1970/1971 to first in 1979/1980 and remained so till 2010 (Simwaka& Chiumia, 2012).

In 1985 the country witnessed a sharp decline in tax revenues all through to 1994 only to observe a slight increase in 1995 through 2000 where there was a significant decrease again. This can be explained by reforms undertaken by the International Monetary Fund (IMF) and World Bank on the whole tax system. On the indirect tax, the reforms centred on shifting the taxes from a production and trade based to a consumption based, to introduction of a crediting system instead the ring (suspension) system in surtax. Additionally, abolishment of uplifting factor on import surtax, harmonizing surtax rate on same domestic and imported goods, non-protective aspects of import duty and import levy into import surtax in addition to the introduction of ad valorem excise tax rates. There was also a reduction of customs duty tariffs to maximum of 30 percent. On personal and company taxes there was an introduction of withholding tax system in1985 and the tax extended to income from agricultural produce, royalties, rent and in transport sector, bank interest, introduction of fridge benefit tax in 1991, the concept of taxing income on accrual basis was introduced in 1992, introduction of non-resident extended taxation of income to dividends and capital gain income and introduction of a zero rate bracket in 1991. These reforms seem not to have worked well as their results impacted on the tax revenues negatively.

The period 2000-2010 corresponded to the time government embarked on IMF's poverty reduction and growth facility (PRGF). The reforms as can be seen from the trends in Figure1 above saw an increase in the tax revenue every year with a slight reduction in 2011 followed by a steady rise. During this period there was a reduction of marginal rate of company tax to 30 percent from 38 percent, introduction of 100 percent allowance in mining sector in first year of assessment, increase of export allowance rate to 15 percent from 12 percent, introducing 10 percent final withholding tax rate on dividends, reducing the personal income tax brackets number to 3, and reducing withholding tax rates for fees and rents to 10 percent from 20 percent. On indirect tax there was an exemption of fuel products (petrol, diesel and paraffin) from surtax, zero-rating milk, capital goods and machinery, salt and exercise books from surtax, introduction of VAT in 2005, petrol goods carrying vehicles, gaming/betting including lotteries, pharmaceuticals and rail locomotives, aircrafts, aircraft engine and related spare parts were zero rated. Indirect taxes saw the introduction of excise tax on petrol, diesel, paraffin, airtime, ordinary bulbs and some food products, introduction of tax stamps and specific excise rates on cigarettes depending on the lid of the packet, additional excise tax on motor vehicles depending on year of make were introduced, introduction of three tariff bands of 0, 15 and 25 percent for raw materials, intermediate goods and finished products respectively under COMESA. Reduction of import tariffs for goods originating from SADC trade bloc to almost zero rates except for South Africa.There was also administrative reforms such as the introduction of Malawian Revenue Authority (MRA) in 2000. The Established Large Taxpayer Office (LTO) in 2007, establishment of Domestic Taxes Division to handle all domestic taxes by one office, introduction of a self-assessment scheme and payment through banks, introduction of the use of Tax Clearance Certificates issuing of and renewing business licenses and permits for professionals, establishment of Revenue Policy Division in Ministry of Finance in 2006 by MRA saw a significant improvement in the collection from these taxpayers groups.

According to (Simwaka & Chiumia, 2012) VAT became more significant than PAYE, which between 2000 and 2010 contributed 24.0% to tax revenue compared to 37.0% from VAT. Within the income tax category, PAYE surpassed the contribution of corporate tax in the 1990s and remained a major source of income tax revenue till 2010. Also over the period 2005 to 2011,(USAID, 2013) Malawi increased tax revenue by 3.8% of GDP. Improvements in revenue were largely due to increases in personal income tax and VAT collections due to strong economic performance. Following strong economic growth in the four years ending in 2011, Malawi's economy experienced a slowdown in fiscal year 2012 with a respective decline in revenues by -1.4% of GDP, but with a projected recovery in 2013.This can be seen in the table 1 below.

Table 1. Government budget current revenue (% GDP)

	2005	2006	2007	2008	2009	2011	2012	2013 Proj
Total Tax Revenue	15.3%	14.8%	16.3%	17.5%	17.5%	19.1%	17.7%	18.8%
Personal Income Tax	3.9%		2.0%	4.1%	4.2%	5.2%	4.8%	4.8%
Corporate Income Tax	2.0%		0.8%	2.1%	2.5%	2.5%	2.8%	2.8%
Value Added Tax					5.9%	6.4%	6.1%	6.1%
Excise Tax					2.9%	3.0%	2.2%	2.5%
Taxes on International Trade	2.1%	1.8%	2.0%	2.0%	2.0%	2.0%	1.8%	2.6%

Source: IMF

The remainder of this study is organized as follows. Section reviews the literature. Section three spells out the methodology of the study. While section four presents and discusses the estimated results, section five offers conclusion and policy implications

2.0 Literature review

A number of studies have been carried out to arcetain the various country's tax efforts. However, most of them produce conflicting results. In addition, there are few studies that have compared tax efforts of two countries in the Sub Saharan Africa. This study reviews a few of these works;

Stotsky & Woldemariam (1997) analyse tax effort in Sub-Saharan Africa. Using panel data on 43 SSA countries during 1990-95, the study measures the determinants of tax share in GDP and construct measure of tax effort. The analysis suggests that the countries with a relatively high tax share tends to have a relatively high tax index of tax effort although these results were not uniform across countries. The results therefore, provides guidance on the fiscal policy mix in the event of budgetary imbalance.

Chipeta (1998) analysed tax reform and tax yield in Malawi. The study estimated two sets of regression equations where tax revenue was regressed on GDP and tax revenue was regressed on GDP and dummy variable that capture discretionary tax changes respectively. The results show that few taxes were buoyant. In addition the tax system as a whole was not, hence relying on increasing tax rate, extending existing taxes to new activities and introducing new taxes were not sufficient for raising bouyance on the tax system. Only PAYE was income tax elastic while the whole system was not. To improve tax elasticity study suggest that the tax base must grow relative to GDP. Davoodi & Grigorian (2007) analysed tax potential against tax effect which was a cross country analysis of Armenia's stubbornnly low tax collection. The study found that, the persistence of Armenia's low tax to GDP ratio could be traced to persistence of week institutions and large shadow economy. Also, the gap between potential and actual tax collection could be as high as 6.5 percent of GDP implying that if adopted it can boost revenue buoyancy.

Bird& Martines (2008) examines the tax effort in developing countries and high income countries: The impact of corruption, voice and accountability. The variables of the model were domestic output, GDP per capita, population growth rate, ratio of export plus import to GDP, non agriculture share of GDP, accountability and corruption depicted by govanance using dummy variable of regions based on the time series data 1990 to 1999. They found out that the demand side determinants were highly relevant in explaining tax performance in high income countries. Both variables control of corruption and accountability were statistically significant showing high better coefficient and the wald test report that the null hypothesis could not be rejected. Accountability had a strong impact on tax performance than corruption. The policy implication for the study is that while at first glance giving such advice to poor countries seeking to increase their tax ratios may not seem more helpful than telling them to find oil it is presumably more feasible for people to improve their governing institutions than to re arrange nature's bounty.

Le et al (2012) did a study on tax capacity and tax effort which was an extended cross country analysis from 1994 to 2008 using panel data. The study regress tax ratio on constant

GDP per capita, demographic variable, trade openness, agriculture value added as a percentage of GDP, regional and time dummies, and governance quality. The study used pooled OLS panel estimation method. The coefficient of GDP per capita, population growth, trade openness, agriculture, governance variable were significant. The study establishes that countries with low tax collections were having low tax effort while countries with high tax collections were having high tax efforts. The study recommended that the design of tax revenue reforms must be country specific and constructed after comprehensive analysis of the country's taxable capacity, revenue performance, and its top leadership's political commitment. Muthui et al. (2015) did a study on the tax effort differentials between Kenya and Nigeria 2002 – 2012. In their study they calculated the tax effort as the ratio of the actual tax revenue to GDP. Given the understanding in the literature about how a tax effort being the ratio of the actual tax ratio to predicted tax ratio (Pessino and Fenochietto, 2010), the study failed to follow the appropriate method in calculating the tax effort for the two countries.

3.0 The methodology of the study
This section detail the procedure followed in carrying out the study. The section details the research design, model specification and estimation and diagnostic tests.

3.1 Research design
The study is intended to establish a comparative analysis of the trends of the tax ratios between Kenya and Malawi. In addition the comparative levels of the tax efforts in the two countries were analysed. In working out the tax effort for each of the two countries, a model was built and estimated inorder to establish the predicted tax ratio. There after, a tax effort was obtained by dividing the actual tax ratio by the predicted tax ratio hence adopting a causal research design. According to Cooper and Schindler (2006), causal analysis is concerned with how one variable affects changes in another variable. After obtaining the tax effort for the years covered in the study for each of the two countries, an average tax effort was worked out for Kenya and Malawi. The average tax effort for each of the two countries was obtained by dividing the sum of the tax efforts over the sample size.

3.2 Model specification
The following model was estimated to get the predicted tax ratios for the two countries.
Model for Kenya

$$taxratio_t = c + \beta_1 GDPPC_t + \beta_2 SAGRIC_t + \beta_3 SInd_t + \varepsilon_t$$

Model for Malawi

$$taxratio_t = c + \beta_1 GDPPC_t + \beta_2 SAGRIC_t + \beta_3 SInd_t + \beta_4 DPR_t + \varepsilon_t$$

Where; Taxratio = tax to GDP ratio; GDPPC = GDP per capita ; SAGRIC = share of agriculture to GDP; Sind = share of industry to GDP, C= constant ; DPR = dummy of political reform; ε is error term and t represent time series dimension in the data.

3.3 Technique of data analysis
To achieve the objectives of the study the following methodology was used. The trends for tax ratios were graphed for Kenya and Malawi. The study highlight the trends of tax ratios and detail the reasons for the trend to achieve the first objective.

In this study the data were analysed using the ordinary least squares (OLS). After estimating the model for each of the two countries, to avoid spurious regression the variables were subjected to a unit root test both in levels and in first difference using Argumented Dickey fuller (ADF) test.

After confirming the nonstationarity of all the variables in each of the models, a cointergration test was conducted using Angle-Granger two stage procedure to arcetain whether there is long run relationship between regressors and regressand. Having confirmed the existence of cointergration in the models of the two countries, an error correction model (ECM) was estimated to capture the short run dynamics in each of the models.

Results from long run model was used determine estimated (predicted) tax ratios for the two countries which were used to calculate tax efforts. The tax effort for each of the two countries was obtained by dividing the actual tax ratio by the estimated or predicted tax ratio.

3.4 Diagnostic tests
To ensure the reliability of the models and the validity of results in both the long run and short run models, diagnostic tests were conducted. The tests conducted comprised; Autocorrelation test, normality test, heteroscedasticity test, and Stability test

4.0 Results and interpretation
In this section, different results are presented comprising the results of the stationarity (unit root) tests on the different variables in the models for Kenya and Malawi respectively. The results of the regressions, and thereby followed by the results of the diagnostic tests are presented equally in this section.

4.1. The results of the stationarity tests
4.1.1 Results of the unit root tests (Model for Kenya)
Table 2 Results of stationarity tests (Kenya)

Test of stationarity when variables are in levels			Test of stationarity when variables are in first differences		
Variable	ADF statistic	Order of integration	Variable	ADF statistic	Order of integration
TAXRATIO_KENYA	-2.644249	I(1)	Δ TAXRATIO_KENYA	-6.649817	I(0)
GDPPC	-0.013647	I(1)	Δ GDPPC	-2.982654	I(0)
SAGRIC	-1.763219	I(1)	Δ SAGRIC	-3.764679	I(0)
SIND	-2.140170	I(1)	Δ SIND	-5.827102	I(0)

Table 2 above contains the results of the unit root tests for the variables both in levels and first differences in the regression model for Kenya using the Augmented Dickey-Fuller (ADF) method. In levels all the variables have nonstatinary, meaning the variables are integrated of order 1. However, in the first differences, all the variables turned out to be stationary: that is, they are integrated of order zero.

4.1.2. Results of the unit root tests (Model for Malawi)

Table 3 Results of stationarity tests (Malawi)

Test of stationarity when variables are in levels			Test of stationarity when variables are in levels		
Variable	ADF statistic	Order of integration	Variable	ADF statistic	Order of integration
TAXRATIO-Malawi	-3.46752	I(1)	Δ TAXRATIO-Malawi	-7.602419	I(0)
GDPPC	-2.646694	I(1)	Δ GDPPC	-5.999255	I(0)
SAGRIC	-3.744797	I(1)	Δ SAGRIC	-9.248979	I(0)
SIND	-2.249005	I(1)	Δ SIND	-7.124028	I(0)

As it was the case with the variables in regression model for Kenya, using ADF, the variables in the model for Malawi shown in table 3 above have been nonstationary in levels. When tested for unit roots in first differences, all the variables became stationary. Having confirmed the nostationarity of all the variables in the two models, a conintegration test for the two models using the Angle-Granger two stage procedure was conducted. The results revealed that the variables in each of the two models were cointegrated. Economically, there exists a long run relationship between the dependent and the independent variables in each of the two models.

4.2 Regression results

4.2.1 Regression results and interpretation (Model for Kenya)

The regression results for the estimated long run model for Kenya are presented in the table 4 below.

Table 4 Regression results for the long run model for Kenya

Variable	Coefficient	t-Statistic	Prob.
C	37.56626	4.045491	0.0003***
GDPPC	0.003099	2.107427	0.0433**
SAGRIC	-0.323612	-1.804015	0.0810*
SIND	-0.748629	-2.982287	0.0055***
DPR	0.346378	0.276470	0.7840
Adjusted R-squared	0.486067		
F-statistic	7.329779		
Prob(F-statistic)	0.000282		

*Note: *** 1% level of significance, ** means 5% level of significance, & * is 10% level of significance*

As can be seen in the tables 3 above, all the variables except the dummy for the political reform (DPR) have significant coefficients. This means apart from the dummy for political reform, all the other variables have the power to explain for the changes in tax ratio for Kenya in the long run. Individually, the coefficient of GDP per capita (GDPPC) has been significant and positive meaning any increase in the level of GDP per capita by once US dollar, increases the tax ratio by 0.003099. This result is consistent with the findings of Davoodi and Grigorian (2006) when carrying a cross-country analysis in Armenia. Unlike the other variables, the coefficient GDPPC is equally significant in the short run (as shown in table 4 of the short run model below.

To the contrary, any increase in the share of agriculture in GDP (SAGRIC) and share of industry (SIND) by 1 per cent, reduces the tax ratio by 0.323612 and 0.748629, respectively. The negative sign of the coefficient of the share of agriculture to GDP concurs with the the results of a study by Martins & Resende (2001) and the same study established a coefficient of the share of the industry of GDP to have a positive sign which contradicts the finding of the study in hand. The F-statistic of 7.329779 with the probability of 0.000282, which is the measure of the overall joint explanatory power of the independent variables in the model, shows that the regressors have high explanatory power of 99% variations in tax ratio in Kenya in the long run.

Table 5 Regression results for the Short run model for Kenya

Variable	Coefficient	t-Statistic	Prob.
C	0.096272	0.412455	0.6831
Δ GDPPC	0.007417	1.909312	0.0665*
Δ SAGRIC	0.073822	0.550791	0.5861
Δ SIND	-0.077653	-0.326913	0.7462
Δ DPR	-0.478529	-1.032860	0.3105
ER(-1)	-0.451229	-3.487680	0.0016**
Adjusted R-squared	0.249303		
F-statistic	3.191834		
Prob(F-statistic)	0.020997		

*Note: ** means 5% level of significance, & * is 10% level of significance*

As noted earlier, as the other variables in the model failed to explain any changes in the tax ratio (i.e. their coefficients are insignificant) in the short run, GDP per capita uniquely has the explanatory power for changes in tax ratio in the short run. That means any increase in the level of the per capita GDP by one dollar in short run increases the tax ration by 0.007417. The ECM term in the model is significant with a negative coefficient of -0.451229. The fact that the coefficient of the ECM term is negative, indicates that the model has been out and above the equilibrium and has been adjusting towards the equilibrium with the speed of adjustment equal to 0.451229. Since the coefficient is less that 0.5, it means the model adjusts slowly to its equilibrium when it is temporarily out of the equilibrium in the short run. Although individually in the short run SAGRIC, SIND, DPR have insignificant coefficients, with only GDPPC and ECM term having significant coefficients, the overall joint effect of the independent variables on the tax ratio in Kenya was influential given the value of F-statistic of 3.191834 with the probability of 0.020997. That means the regressors in the model have a joint explanatory power on the dependent variable (tax ratio) at 5% level of significance. Putting it differently, GDPPPC, SAGRIC, SIND, DPR, are able jointly to explain 95% variations in the tax ratio in Kenya.

4.2.2 Regression results and interpretation (Model for Malawi)
Table 6 Regression results for the long run model for Malawi

Variable	Coefficient	t-Statistic	Prob.
C	9.795811	3.313877	0.0023
GDPPC	0.010085	2.737110	0.0102***
SAGRIC	-0.023279	-0.356583	0.7238
SIND	0.199660	2.004822	0.0538**
DPR	-1.374773	-1.759180	0.0884*
Adjusted R-squared	0.147320		
F-statistic	2.511768		
Prob(F-statistic)	0.061791		

*Note: *** 1% level of significance, ** means 5% level of significance, & * is 10% level of significance*

Table 6 above depicts the results of the long run model for Malawi. In this model, all the coefficients of the regressors are all significant with the exception of share of agriculture in GDP which has insignificant coefficient and negative. This can be explained among other things by the fact that importation of fertilizers, pesticides, herbicides, ploughs harrows, scribers, cultivators, weeders, manure spreaders and fertilizer distributors and milking machinery, are Duty Free and VAT free (MRA, n.d).

The coefficient of GDP per caipta in the model for Malawi has been significant and positive as it was the case in the model for Kenya, although the coefficient turns out to be insignificant for Malawi in the short run model. This means that any increase in GDP per capita by $1 increases the tax ratio in Malawi by 0.010085 and an increase in share of industry in GDP by 1 percent increases the tax ratio by 0.19966. The share of agriculture to GDP is inversely related to tax ratio: increase in the share of agriculture to GDP reduces the value of the tax ratio by 0.023279. The dummy variable for political reform in Malawi has been significant and negative. It means that the years after the one party rule in the country has caused a declined in the tax ratio either because the tax revenues were dwindling while GDP remains relatively constant or there has been an increase in the level of the GDP while the tax revenues remain relatively constant. Chipeta (1998) stated that the tax revenue collections of Malawi were less than the other countries in the Sub-Saharan region which seems to concur with the current study undertaken in which the tax effort for Malawi is less on average (average tax effort of 0.9) to that of Kenya which stands at 0.1 on average. The overall fitness of the model given the F-statistic of 2.511768 with Probability of 0.061791 is at 10% level of significance. That means, up to 90% of the variations in tax ratio in Malawi are explained by GDPPC, SAGRIC, SIND, and DPR in the model.

The short run model in the model for Malawi had all the independent variables (GDPPC, SAGRIC, SIND) in their first differences and the dummy variable DPR, having insignificant coefficients. In the same model, the ECM term was equally having insignificant coefficient indicating that the model was not out of the equilibrium. Given the insignificants of the coefficients of regressors including the ECM term in the model, then there was no need to report the results in a tabular form.

4.3 The results of diagnostic tests in models for Kenya and Malawi
Having obtained the results for both the long run and the short run models for Kenya, post estimation tests were conducted to ensure the reliability of the model and the validity of the

results. The same diagnostic tests were equally conducted for the model of Malawi and the results of these tests for the long run of Kenya and the long run model of Malawi are explained in turns below.

4.3.1 The results of the diagnostic test for the Model of Kenya

Table 6 below depicts the results of the various diagnostic tests for the model of Kenya. In the table, are the name of the test, value of the test statistic, the value of the probability of the test, and the decision taken whether to reject the null hypothesis or not, in every case.

Table 7 Results of the diagnostic tests (Model of Kenya)

Test	Statistic	Probability	Decision
Breusch-Godfrey Correlation LM test	10.17345	0.0014	Reject the null of no serial correlation
JB Normality test	0.801744	0.669736	Do not reject the null of residuals being normally distributed
Heteroskedasticity test: Breusch-Pagan-Godfrey	8.233313	0.0834	Reject the null of no hetroskedasticity
Ramsey RESET	0.008352	0.9655	Do not reject the null of no misspecification of the model

From the table 7 above, it can be witnessed that the tests were having insignificant test statistic except for serial correlation and heteroskedasticity. Having run the long run model, and with the serial correlation problem identified in the Long run model, the model was corrected for serial correlation using the HAC (Aetroskedasticity-Autocorrelation) using Newey-West method.

In the case of Malawi, the results of all the diagnostic tests failed to confirm any rejection of the null hypotheses tested. Considering the probabilities of all the test statistics in the table below, it is evidently clear that the model of Malawi has not suffered from any problems being diagnosed.

Table 8 Results of the diagnostic test for the Model of Malawi

Test	Statistic	Probability	Decision
Breusch-Godfrey Correlation LM test	2.431501	0.1189	Reject the null of no serial correlation
JB Normality test	0.409154	0.814992	Do not reject the null of residuals being normally distributed
Heteroskedasticity test: Breusch-Pagan-Godfrey	5.951990	0.2028	Reject the null of no hetroskedasticity
Ramsey RESET	0.042392	0.4649	Reject the null of no misspecification

4.4 Tax Efforts For Kenya and Malawi
Table 9 Tax efforts for Kenya and Malawi from 1980 – 2015

Year	Tax Effort-Malawi	Tax effort-Kenya
1980	0.9	1.1
1981	0.9	1.1
1982	0.9	1.1
1983	0.9	1.0
1984	0.9	1.0
1985	1.0	0.9
1986	1.1	0.9
1987	0.9	0.9
1988	0.9	1.1
1989	1.0	0.9
1990	1.1	0.9
1991	0.9	0.9
1992	1.0	0.8
1993	0.8	0.8
1994	1.0	1.2
1995	0.7	1.1
1996	0.8	1.2
1997	0.9	1.1
1998	1.1	1.1
1999	1.0	1.1
2000	1.0	1.0
2001	1.2	1.0
2002	0.7	1.0
2003	0.8	1.0
2004	0.9	1.0
2005	1.0	1.1
2006	0.9	1.0
2007	1.0	1.0
2008	1.0	1.1
2009	1.1	1.1
2010	1.1	1.1
2011	0.9	1.0
2012	0.9	1.0
2013	0.9	0.9
2014	1.1	1.0
2015	1.0	1.0
Average	**0.9**	**1.0**

From Table 9 and figure 2 Malawi has the lowest tax effort of 0.7 in 1995 and highest tax effort of 1.2 in 2001. The average tax effort for the country is 0.9 which implies that Malawi is under taxing. Looking at tax effort for all years out of 36 years, Malawi was over taxing in seven years, under taxing 19 years and had optimal tax in 10 years.
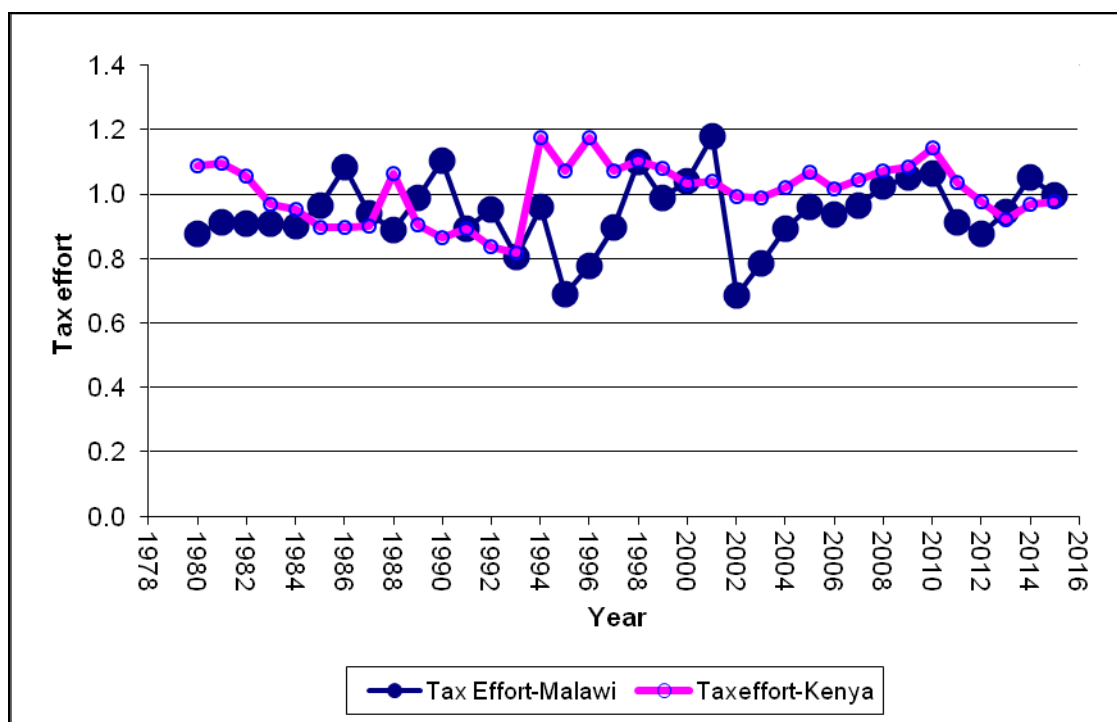
Figure 2 Comparisons of Tax Effort for Kenya and Malawi

For Kenya, despite the average tax effort of one, out of 36 years, Kenya had optimal tax only of 13 years. It undertaxed for nine years and overtaxed for 14 years. The highest tax effort of 1.2 was observed in 1994 and 1996 and lowest was 0.8 in 1992 and 1993, respectively.

5.0 Conclusion and policy implications
This section is specifically meant to present the conclusion and policy recommendations of the study undertaken.

5.1 Conclusion
In general, this study analyses the tax ratio and established tax effort indices for Kenya and Malawi over 1980-2015. The findings show that tax effort index is low for Malawi and high for Kenya implying that Malawi was undertaxing and Kenya is overtaxing for the period covered in the study. The tax effort has been greater than 1 in Kenya over the years with exception of 1990, 1992 and 2015 and few years when taxation was optimal. In Malawi it indicates over the years tax effort has been less than 1 with exception of few years mostly after the 1990s. Under taxing in Malawi can be attributed to the growing informal sectors which are largely untaxed, low tax compliance, many tax exemptions associated with foreign direct investment and the growing subsistence agricultural sector which largely untaxed.

5.2 Policy Implications
Given the results of the tax effort of Kenya for the period, it would be beneficial for Kenya to work toward optimal taxation as over taxation can lead to tax evasion, under declaration of taxes and also growth of underground economy. On the other hand, given the under taxation in Malawi, Malawian governemnt has an opportunity to increase tax revenue by working towards optimal taxation. This can be achieved by broadening the tax base, improving tax

administration and reducing types of taxes with excess burden. In Malawi Dummy for political reform, is inversely related to tax effort implying that there is need for political will in order to increase the tax effort.

To ensure sustainable optimal tax in both countries, various reforms can be enhanced. Some of these reform measures may include streamlining tax policy and tax administration procedures to reduce compliance costs; broadening tax base; increase efficiency of tax administration; curbing corruption; enhance ICT use; introduction of new taxes; abolition of taxes with excess burden; and changes in the tax mix. Tax authorities in the two countries have to minimize the loopholes of both evasion and avoidance; and also closing all the rent seeking opportunities available to tax collectors.

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