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Estimating Tax Buoyancy and Stability in Ethiopia

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Abstract

This paper estimates tax buoyancy and stability in Ethiopia. There is a growing argument among fiscal policy analyst that in developing countries the revenue generation capacities of nations play a crucial role in shaping the future trends of the economy. In this study attempt has made to estimate tax buoyancy and stability in Ethiopia. Consequently, the major questions of taxation; does tax revenue increases as gross domestic product increases? Is analysed using panel data econometric approach (i.e., fixed effect and random effect models) to check the responsiveness of tax revenue for change in economic growth-buoyancy measures and stability measurement. The data is collected for twelve years from three regional states and one city administration. The result showed tax buoyancy is not responsive for total tax revenue, personal income tax and turn over tax. However, automatic change of revenue for economic growth is exhibited for business profit tax, rental business tax and value added tax. Moreover, the tax stability estimates confirm there is no tax component contributed for the stable revenue stream. Based on the findings, among others creating transparent, efficient and effective taxation system as well as strong policy formulation, monitoring and evaluation on other side should take place for the positive role tax revenue plays on economic growth.

Keywords: Buoyancy; Ethiopia; Tax buoyancy; Stability

Introduction

The public policy instruments, such as tax rate changes, have different implications in exogenous (neoclassical) and endogenous growth theories. The neoclassical theory predicts that permanent changes in government policies do not have permanent effect on the growth of output. This implies that changes in a country's tax structure should have only transitory impact on its long-run economic growth [1-4].

Economic growth increases the taxable capacity of a country and enables a larger share of the private sector's resources to be ceded to the government as taxes to provide public goods and services. Many countries, therefore, depend mainly on taxation as a means of generating the required resources to meet their expenditure requirements. As noted by Newman [5], these countries often find themselves in growing fiscal imbalance whenever their revenue productivity falls below their expenditures. The need for fiscal adjustment then becomes particularly necessary to restore balance in the government budget.

Thus, to assess the responsiveness of tax revenues to fiscal policy measures, it is necessary to determine its responsiveness to growth in the tax base. Taxes are levied on several bases which are dynamic and tend to move in tandem with the economic activity within a country. Numerous literatures has utilised a proxy base such as GDP[1] due to the complexity of the specific tax bases in an attempt to determine how revenues respond to changes in the base. Such an analysis is twofold as it becomes necessary to assess revenue growth with and without the discretionary measures[2]. Bilquees [6] define the concepts "elasticity as the automatic response of revenue to changes in income net of discretionary changes while buoyancy is the total response of tax revenue to changes in incomes and therefore includes any changes due to discretionary measures."

Thereof, in public finance, an important measure to assess the efficiency of any tax system in terms of its mobilization capacity becomes tax buoyancy-total response of tax revenue to changes in national income. A tax which is buoyant is one whose revenues increase by more than one percent for a one percent increase in national income or output. In measuring buoyancy, no attempt is made to control for discretionary changes in the tax system or administration. Consequently, buoyancy reflects both discretionary changes and automatic revenue growth.

Wagner's law[3] stipulates that public expenditure is a natural consequence of economic growth. Many developing countries including Ethiopia in an attempt to increase growth have increased public expenditure but not been able to match it with revenue mobilization through taxation and resulted in huge budget deficit. Economic theory posits that instability in an economy may arise out of deficit financing mainly through foreign borrowing[4]. The Ethiopian Government has been introducing tax policy reforms with a view of improving tax revenues collection. Getachew [7] echoed the fiscal deficit has necessitated tax reforms in the Tax and Custom Administrations since 1992. He pointed out, the country faced severe macroeconomic imbalances such as falling export earnings, worsening balance of payments, and mounting debts and declining economic growth, the country undertook various policy measures following a major economic shift from centrally planned to market oriented system.

[1]Gross domestic product.

[2]This refers to the concepts of elasticity and buoyancy.

[3]Known as the law of increasing state spending, is a principle named after the German economist Adolph Wagner (1885-1917). The theory holds that for any country, that public expenditure rises constantly as income growth expands.

[4]Which 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.

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Hitherto, the fiscal deficit problem the country experiencing to date is a persistent challenge[5]. After 1992, the coming into power of the Ethiopian People Revolutionary Democratic Front (EPRDF), the regime engaged in liberalization of the economy. General liberalization extended, among other things, to reform in taxation and tax administration. The government has enacted a number of proclamations aimed at reforming the income tax, taxes on goods and services, and tax on international trade. In line with the liberalization drive, the government not only reduced the average level of tax and tariffs but also made the move to focus more on the value-added. Cited by Geda and Shimeles [8], this was augmented by an effort to introduce information technology to increase the efficiency of tax administration.

In the Ethiopian context a small number of studies conducted in the area of tax responsiveness to change in economic conditions, even majority of the papers focused on elasticity rather than buoyancy. Tofu [9], examined the productivity of tax system in Ethiopia from 1961-2005. The analysis shows that tax revenue tends to be inelastic with respect to changes in tax base. It is estimated that the tax-to-base elasticity is relatively lower than the base-to-income elasticity. The relatively low tax-to-base elasticity[6] may be explained by inefficient and poor tax administration and the existence of exemptions. A result of economic regression also indicates that the major tax categories together with the overall tax system possess a buoyancy coefficient that exceeds their respective elasticity coefficients.

On other studies, Tadele [10], analyzed tax buoyancy and its determinant in Ethiopia using time series data, and revealed tax revenues are non-buoyant in Ethiopia, and point out the need for enhancing the efficiency of revenue administration in bringing new customers in to the tax net. Apparently, this study neither show the difference in tax bases within the constituent of federal government nor their tax collection capacity to draw sound policy implication.

The subsequent review of literature raises the question to what extent higher economic growth can help bring down fiscal deficits? This research will address the main question in the fiscal policy frontier that; as GDP rises, do tax revenues rise at the same pace? and/or, by how much will faster economic growth boost government revenue?

This study differs from the previous ones in terms of the fact that it uses major constituent supplier of tax revenue to the national government and it was treated using panel data from three regional states and one city administration[7]. Panel data approach is favored, because of limitation in accessing reliable long period data, existence of heterogeneity in tax generation capacity across regions, city administration, and significant type of taxes were not found at national database, so that devising a policy instrument that can work for federal and regional states would not be ideal. Consequently, the study examined tax buoyancy using panel data approach[8]. It produces empirical evidence about the tax performance of Ethiopia through dynamic measures of taxation-buoyancy. Besides, the study estimates stability[9] that helps to devise a reasonably accurate estimation of Ethiopia's sustainable revenue generation capacity. The estimate also paves the way for designing appropriate expenditure pattern to alleviate fiscal deficit.

The study helps fiscal policy decision making through knowledge of the magnitude of the percentage change of tax revenues with its base (buoyancy), which not knowing will undermine or over exaggerate the expectation of policy makers about the capacity of the economy to generate revenue, and results in fiscal imbalance.

Materials and Methods

Conceptual model and research design

The need to measure tax responsiveness in relation to its revenue-generating competences can be seen in light of monitoring the progress of tax collections and tax revenue forecasting. The underlying assumptions become as GDP rises, do tax revenues rise at the same pace? The concept of buoyancy which measures the response of tax revenue to changes in income has been formulated.

Tax (or revenue) buoyancy is defined as;

$$\text{Tax buoyancy} = \%\Delta\text{Revenue} \div \%\text{base}. \quad (1)$$

Using numbers for the revenue and base actually observed. The concept was mentioned by Haughton [11], he treated; the base to be GDP[10]. In this study the base is captured by real GDP. On the other hand, the revenue refers to total tax revenue, or the revenue from any given tax item collected by regional states. The increases are measured in real terms, after adjusting for inflation. If the increases were measured in nominal values, then the estimate of tax buoyancy would be biased[11]. Subsequently, all variables in this study are converted in real terms.

To deal with data management issues [12] approach is employed; to estimate tax buoyancy. Other analogous theories and methods of estimating tax buoyancy are subject to certain weaknesses. The procedure involves are extremely bulky if it is applied to the full range of tax instruments that exists in Ethiopia. Also, the data requirements of these theories are necessarily very heavy[12] [13].

Data Collection and Description

Mentioned in the above section given the availability, nature and reliability of information on tax revenues, and tax bases in Ethiopia, the Mansfield [12][13] theory is used in this study. This theory has been used extensively by many researchers[14]. Fiscal policy in Ethiopia is confined

[5]The country never experiences fiscal surplus since 1974/75. See Biruk, (2016).

[6]Tax elasticity measures the extent to which a tax structure generates revenues in response to increases in taxpayer incomes without a change in statutory tax rates (Craig and Heins 1980).

[7]Oromiya, Amhara, SNNPRS and Addis Ababa are the major contributor of tax to the national economy.

[8]In statistics and econometrics, the term panel data refers to multi-dimensional data frequently involving measurements over time. Panel data contain observations of multiple phenomena obtained over multiple time periods for the same firms or individuals.

[9]A simple measure of the stability of tax revenue is the coefficient of variation (CV), which is defined as the standard deviation of tax revenue (as a fraction of GDP usually) divided by its mean. Revenue stability is desirable, at least from the government's perspective, in that it makes it easier to put together plausible spending and borrowing plans for the year ahead.

[10]Although other bases are possible, such as consumption as the base for sales taxes, or imports as the base for tariffs.

[11]The first step is to deflate the values. If we had not deflated the growth rates, the measure of tax buoyancy measure would understate the responsiveness of revenue to a change in real GDP.

[12]The theory developed by Anderson (1973) for instance requires information on the distribution of tax bases by rate categories, which are not readily available in Ethiopia. As a consequence, this theory is rarely used for analytical purposes.

[13]Mansfield (1972) assumes a system of n taxes to show that the tax revenue to income elasticity is the sum of the individual tax elasticities.

[14]See Muraya, 2013; Omondi et al., 2014; Isaac and Samwel, 2015.

to the federal level but tax legislation can be enacted at both federal and state levels.

The data is obtained from three regional states and one city administration Revenue and Custom Authorities, Finance and Economic Development Bureaus, and National Bank of Ethiopia. In this study both direct[15] taxes and indirect[16] taxes were used. All variables are converted in real terms using CPI. Moreover, to ease buoyancy analysis log transformation of variables has been made.

Data analysis

Panel data unit root test: Panel unit root properties of data were examined by the most conventional panel unit root test procedures[17].

Estimating tax buoyancy: The basic estimation procedure for tax buoyancy can be specified using the Cobb-Douglas function of the form;

$$T=e^{\alpha}Y^{\beta}e^{\mu}. \quad (2)$$

Where,

T=tax revenue, Y=income, α=constant term, e=natural number,

β=buoyancy coefficient, and μ=error term

Buoyancy of taxes with respect to their bases (i.e., real GDP) is derived from logarithmic regressions of unadjusted revenue data on these bases. To convert the model to a linear form we take the logarithms of eqn. (2) which yield the buoyancy coefficient of β_k and end up with the following form;

$$\ln T_k=a_k+\beta_k \ln Y+\mu_k \quad (3)$$

Where,

T_k=revenue from the k^{th} tax, a_k=constant term,

β_k=buoyancy coefficient, μ_k=error term

Estimating stability: To calculate tax stability, the revenue from different taxes varies from year to year. Taxes whose revenue is relatively stable, or whose revenue is negatively correlated with the revenue from other taxes, are likely to be particularly helpful in giving stability to the overall stream of revenue. A simple measure of the stability of tax revenue is the coefficient of variation (CV), which is defined as the standard deviation of tax revenue (as a fraction of GDP usually) divided by its mean:

$$\text{Coefficient of variation}=\text{Standard deviation} \div \text{Mean} \quad (4)$$

In this study the CV is calculated for tax revenue as a whole and for individual sources of revenue. It will provide convenient insight for comparisons among tax particulars.

Result and Discussion

Unit root test results

A variety of procedures for the analysis of unit roots in a panel context have been developed. The emphasis in this development is the attempt to combine information from the time-series dimension with that obtained from the cross-sectional dimension, with the hope that inference about the existence of unit roots and cointegration can be made more straightforward and precise by taking account of the latter.

Unit root test revealed that except $\ln T_o T_r$ all variables are not stationary at level i.e., we cannot reject the null hypothesis (variables have unit root). But, when we first differenced all variables become stationary, meaning we overwhelmingly reject the null hypothesis (Table 1).

Buoyancy for aggregate tax revenue

The buoyancy coefficient for the total tax revenue is obtained by converting the Cobb-Douglas tax function to the logarithmic form. However, before estimating the buoyancy coefficient we determined fixed effect model is appropriate for our data i.e., using Fixed/Random Effects tests-the Hausman Test[18].

The fixed-effects model controls for all time-invariant differences between the individuals, so the estimated coefficients of the fixed-effects models cannot be biased because of omitted time-invariant characteristics-regions in this case. When using fixed effect we assume that something within the individual may impact or bias the predictor

Variables	Tests	At level	At 1st Difference
lnPITr	Levin, Lin & Chu	0.8662	0.0000*
	Im, Pesaran	0.9998	0.0000*
	ADF-Fisher	1	0.0001*
	PP-Fisher	1	0.0001*
lnBPTr	Levin, Lin & Chu	0.853	0.0000*
	Im, Pesaran	0.9846	0.0000*
	ADF-Fisher	0.9962	0.0001*
	PP-Fisher	0.9941	0.0000*
lnRBTr	Levin, Lin & Chu	0.8852	0.0000*
	Im, Pesaran	0.9925	0.0000*
	ADF-Fisher	0.9987	0.0000*
	PP-Fisher	0.9997	0.0000*
lnToTr	Levin, Lin & Chu	0	0.0000*
	Im, Pesaran	0	0.0000*
	ADF-Fisher	0	0.0000*
	PP-Fisher	0	0.0000*
lnVATr	Levin, Lin & Chu	0.0022	0.0000*
	Im, Pesaran	0.065	0.0000*
	ADF-Fisher	0.0253	0.0000*
	PP-Fisher	0.0015	0.0000*
lnTRr	Levin, Lin & Chu	0.9593	0.0000*
	Im, Pesaran	0.9999	0.0000*
	ADF-Fisher	1	0.0002*
	PP-Fisher	1	0.0001*
lnRGDP	Levin, Lin & Chu	0.7066	0.1
	Im, Pesaran	0.9976	0.6766
	ADF-Fisher	0.9983	0.0701**
	PP-Fisher	0.9986	0.0414*

Source: Generated from EViews Version 8 using Region's and City Administration Data.
* and **indicates level of significance at 5% and 10% respectively.

Table 1: Panel unit root test.

[15]Direct tax used in this study includes tax on income from employment/personal income tax (PIT), business profit tax (BPT), tax on income from rental of buildings (RBT).

[16]Indirect tax used in this study includes turn over tax (ToT) and value added tax (VAT).

[17]See the Levin, Lin and Chu (2002), Im, Pesaran and Shin (2003), Fisher type test using ADF and PP Test (Maddala and WU (1999) and Choi (2001). Testing procedures assumes individual unit root process.

[18]The Hausman test can be also used to differentiate between fixed effects model and random effects model in panel data. In this case, Random effect is preferred under the null hypothesis due to higher efficiency, while under the alternative fixed effects is at least as consistent and thus preferred.

or outcome variables and we need to control for this. This is the rationale behind the assumption of the correlation between entity's error term and predictor variables. Fixed effect removes the effect of those time-invariant characteristics so we can assess the net effect of the predictors on the outcome variable.

The key insight is that if the unobserved variable does not change over time, then any changes in the dependent variable must be due to influences other than these fixed characteristics [14]. Accordingly, the following model is estimated for buoyancy for the total tax component.

The estimated econometric model is $\ln TRR_k=\alpha_k+\beta_k \ln RGDP+\mu_k$

From Table 2, it is evident buoyancy for the aggregate tax revenue to real GDP is not buoyant. On average a 1% increase in real GDP in each regional states and city administration increases aggregate tax revenue by 0.78% and found to be statistically significant. Moreover, the model fulfils the assumptions of the classical linear regression model (i.e., came up with high r^2, coefficients are jointly significant and residuals are normally distributed).

The low level of buoyancy in each regional state among others may be attributed to poor tax collection, tax evasion, non-compliance and tax administration issues.

Buoyancy for components of tax revenue: In this section component of tax revenue has been estimated. The estimation technique is conducted by decomposing the aggregate tax revenue to particular tax items (Table 3).

The result revealed buoyancy coefficients for components of tax revenue; personal income tax (PIT) which includes any payments or gains in cash or in kind received from employment by an individual is not buoyant in Ethiopia. In this study other things remain constant, personal income tax is increased by less than 1% for a 1% increase in real GDP. In other words, a 1% increase in real GDP on average induces personal income tax to increase by 0.81%. In developing country, the pattern of tax revenues and economic growth across countries has become a significant concern in recent years. In most African countries, however, personal income tax and business profit tax are relatively responsive to changes in non-agricultural GDP. Therefore, given the agrarian economy in Ethiopia unresponsive PIT to Real GDP is expected.

Dependent Variable: LNTRR				
Method: Panel Least Squares				
Periods included: 12				
Cross-sections included: 4				
Total panel (balanced) observations: 48				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
C	-0.47213	0.721189	-0.654655	0.5162
LNRGDP	0.786977	0.071617	10.98865	0.0000*
Effects Specification				
Cross-section fixed (dummy variables)				
R-squared	0.907004	Mean dependent var		7.450501
Adjusted R-squared	0.898353	S.D. dependent var		0.374212
S.E. of regression	0.119307	Akaike info criterion		-1.315906
Sum squared resid	0.612066	Schwarz criterion		-1.120989
Log likelihood	36.58175	Hannan-Quinn criter.		-1.242247
F-statistic	104.8460	Durbin-Watson stat		0.682467
Prob(F-statistic)	0.000000			
Source: EViews Version 8 Using Regions and City Administration Data. *indicates level of significance at 5%.				

Table 2: Buoyancy estimates for total tax revenue.

Tax Components	Buoyancy Coefficients	P-value	r^2
lnPITr to lnRGDP	0.8191	0.0000*	0.8719
lnBPTr to lnRGDP	1.0949	0.0000*	0.8015
lnRBTr to lnRGDP	1.7869	0.0000*	0.888
lnToTr to lnRGDP	0.6091	0.0019*	0.1941
lnVATr to lnRGDP	2.1341	0.0000*	0.6428
Source: Generated from EViews Version 8 using Regional State's and City Administration data. *indicates level of significance at 5%.			

Table 3: Buoyancy for components of tax revenue.

The other tax particular analysed in this study was rental building tax (RBT), which is the tax imposed on the income from rental of buildings. Again this tax particular is also buoyant to real GDP. Other things remain constant, a 1% increase in real GDP increased rental of buildings tax by more than 1% which is 1.78%. The result is attributed to the expansion in construction sector and rapid expansion of small scale business.

When we look at the indirect tax particulars buoyancy, turn over tax (ToT) found to be not buoyant. Other things remain constant; a 1% increase in real GDP increased only 0.60% in turn over tax. In Ethiopia the turnover tax would be payable on goods sold and services rendered by persons not registered for Value Added Tax. In this tax, the low base to tax is an indication of inefficiency in tax collection and administration, low tax compliance, attitude of taxpayers, and tax evasion for this tax particular.

One of the major tax items in Ethiopia that is designed after 2003 is the value-added tax (VAT)[19]. This tax particular is very buoyant to economic growth. A 1% increase in real GDP increased value added tax by 2.13%. Many reasons can be mentioned for the extremely buoyant value added tax. Different literature asserts clearly that VAT can increase the potential for saving and investment [15]. It is, however, not clear whether the increase in investment would be in the public or the private sector. Some researchers consider VAT as an income-generating machine for the government; hence it is more likely that investment in the public sector would increase after VAT application. Consequently, the public sector would be larger than it already is. It is also well recognized in the literature that larger public sector crowds out private investments.

In nutshell among the three direct tax particulars in Ethiopia two tax components found to be buoyant (i.e., business profit tax and rental of buildings tax) whereas one tax particular (i.e., personal income tax) is not buoyant. From the indirect taxes while the turn over tax found to be not buoyant, value added tax becomes buoyant.

[19]After 2003 Value Added Tax (VAT) has been introduced as a replacement of conventional sales tax.

Computation	Tax Particular					
	PIT	BPT	RBT	ToT	VAT	TR
S.D	0.323009	0.515306	0.801391	1.015481	0.932489	0.374212
Mean	6.993034	6.520941	5.223277	6.685087	6.356204	7.450501
C.V	0.04619	0.079023	0.153426	0.151902	0.146705	0.050226
Source: Generated from EViews Version 8 using Regional State's and City Administration data.						

Table 4: Tax stability computation.

Tax stability: Obviously, taxes whose revenue is relatively stable, or whose revenue is negatively correlated with the revenue from other taxes, are likely to be particularly helpful in giving stability to the overall stream of revenue. Based on our data the following stability fashion is estimated (Table 4).

The result shows the revenue stream for components as well as total tax revenue. The implication of tax stability is that any tax particular that has higher coefficient of variation (CV) leads to greater revenue stability. Therefore, from the estimated result it is possible to conclude except personal income tax and business profit tax other tax particulars lead to greater revenue stability in Ethiopia over the period under investigation. The implication is that in order to generate higher revenue from the economy and stabilise the revenue stream with economic growth, giving due attention for RBT, ToT and VAT will have a relative overriding importance.

The total tax revenue stability from the result is very low. Even though revenue is growing from time to time it is not stable and doesn't guarantee in Ethiopia, stable revenue fashion prevailed. Lack of transparency in tax collection, poor system in determining the tax volume to business and good governance issue in the taxation sector impede the stability fashion not to be promising in financing the expenditure.

Based on the findings, the following policy advice is extracted for Regional and Federal Revenue and Custom Authority policy makers;

- Buoyancy for some tax components is not responsive to automatic change in national income. Hence, the tax authority needs to strengthen the capacity of revenue collection through promoting positive tax attitude to tax payers, building a transparent, efficient and effective tax system and institution building.
- Broadening the tax base through a careful analysis of tax payers and strong measures has to be taken to those tax payers who frauds in paying tax, and doesn't comply.
- Tax related policies which intended to boost the revenue the economy generates, needs to be carefully designed and a thoughtful follow up needs to undertake. Along with this when tax policy is introduced the net effect in revenue stabilization need to be estimated.
- The revenue stability stream is not confirmed for components as well as total tax revenue. Hence, every tax item needs to be carefully watched in a way to ensure stability in the tax revenue generation in an effort to finance own expenditure.
- There is other way to extend this research and look the effects of policy changes for a prolonged period of time and different tax items.

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