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Tax Productivity in Post Reform Ethiopia

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I. Part One :- Introduction

One of the policy instrument of any government to influence the working environment of the economy in order to maximize social wellbeing is fiscal policy. Government spending, taxations, and public dept. operations are the major policy instruments of fiscal policy. In developed country fiscal policy is mainly used to maintain full employment and stabilize economic growth. Whereas in developing countries, it is used to enhance business environments, such as mobilization of resource for investment, increasing employment opportunities, price stability, and minimization of the inequalities of income and wealth for rapid and sustainable economic growth. One of fiscal policy instrument is taxation which is used to raise revenue to fund government operations, help to encourage or discourage certain activity through tax provisions, and assist in redistributions of resources (World Bank, 1990).

In developing countries the establishment of effective and efficient tax system basically faces three difficulties. The first difficulty is, the structure of their economy: it is characterized by a large share of agriculture both in terms of total output generation and employment opportunity creation, large informal sector activities and occupations, small establishments, and small wages in total national income. The other difficulty is lack of good tax administrations. This is basically due to low level of human capital development as indicated by low literacy rate and it makes difficult to combine the entire ingredients that help for good tax administration. Therefore, many developing countries end up with too many small tax sources, too heavy reliance on foreign trade taxes, and a relatively insufficient use of personal income taxes. Finally, as compared to the developed nation the political set up was less responsive to rational tax policy than developed countries. This is basically doe to political power is concentrated in the top few hands in which richer tax payers are able to prevent tax reforms that would affect them negatively (Tanzi and Zee, 2000).

By direction, a policy instrument of any economic system should have to meet public expenditure from domestic economy through taxations. To argue with this idea, the tax system of developing countries should be stable and buoyant enough so as to enable the countries meet their increasing fiscal commitment. When the tax system is stable and buoyant, there is a higher probability that its public expenditure need will be met adequately overtime. As a result, some public economists argue that this aspect of tax system may be even important than other aspects such as tax collection efficiency and neutrality. Of course assessing tax productivity is important not only because it allows us to examine the responsiveness of the tax system, but also it affects the system's equity and efficiency at the same time (Kotur and Menjo, 2012).

II. Part Two :- Literature Review

In Ethiopia, after the beginning of modern taxation in 1940s different tax reform were initiated to increases government revenue which includes: the 1942 to 1944, 1947 to 1952, and in the early 1960s during the imperial regime. Basically, those reforms are discretionary changes which includes: amendment of property tax including land and cattle in the first two phases, broaden tax bases on goods and services were introduced in the mid-1950s, the changes in rate and structure of tax on income in the early 1960s. In the post 1974 to 1991 major changes in all types of taxation were made in terms of rate and structure. This includes: widening land tax base, introductions of capital and surplus transfer from nationalized firms, different arrangements on other types of taxation were done (Wogene, 1994).

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Since 1992 different reform actions are under taken with the objectives of: a shift from reliance on high taxes rate to broaden tax bases, a shift from the taxations of productions to taxations of consumptions, a shift from the taxations of international trade to taxations of domestic transactions, a shift in the burden of taxations from the poor to the rich, to restructuring of investment objectives, and to conduct rigorous tax administrations reform. Due to those reforms a significant growth in the revenue were registered, on average 25.6% between 2001/02 to 2011/12. Total tax revenue from both federal and regional governments reaches ETB86 billion from ETB7.8 billion in 2001/02 of early reform period. Even if the share of tax revenue to gross domestic product show improvement it remain 12% of GDP in 2012 which is lower than the sub Saharan average of 15% to 16% (MoFED, 2014).

Revenue structure is designed to be flexible enough to guarantee increased revenue during economic growth without necessarily resulting to discretionary policy. To realize such argument every individual tax yield is must responsive to national income change and predominant tax in the revenue must be those with highly elastic with respect to national income change. Flexible taxation attains economic stabilization via reducing danger of inflation during boom period by using discretionary measures to guarantee a higher rise in tax revenue relative to growth in national income. During recession tax base and tax rate adjusted in order to make the fall in revenue faster than the fall in national income this mitigates deflationary situation (Moses and Eliud, 2003).

The possibility of developing country like Ethiopia to financing their budget deficit externally without causing too much distortion in macroeconomic environment is very low. The other way in which countries make additional revenue is by making discretionary tax changes. Every country must decide how best to increase its internal tax revenue. The best outcome from such changes is that the tax system will automatically yield corresponding tax revenue as income or GDP grows on sustainable basis. The response of tax revenue to the change in GDP is measured by tax elasticity and tax buoyancy. These concepts help to analyze the overall tax structure and serve as valuable analytical tools for designing tax policy (Daniel et. al, 2008).

Of course the purpose of taxation is go beyond expenditure financing and it used for production efficiency, discourage or encouraging consumption of commodities yielding negative or positive externalities, to stabilize national income, and to redistribute income and wealth in the economy. To achieve those objectives the tax system of any country should be productive which measured in terms of tax buoyancy and elasticity.

Tax buoyancy is useful to measure the performance of both tax policy and tax administration overtime. It measures the total response of tax revenue to total national income. Total response takes into account both increase in income and discretionary changes made by the tax authorities in the tax system. These discretionary changes may be on the tax rate or tax base. Thus, tax buoyancy measures the soundness of the tax base and the effectiveness of the tax rate change in terms of revenue generation (Tanz, 1988).

On the other hand, tax elasticity, measures the pure response of tax revenue to the change in the national income. It reflects only the extent in responsiveness of the tax revenue to changes in the national income. Tax elasticity calculation excludes the impact of change in tax rates and tax bases. It considers only the effects due to changes in income. The tax elasticity coefficient gives an indication to policy makers whether tax revenue will rise at the same rate as the national income rise or not. It is the ratio of the percentage change in the tax revenue to the percentage change in GDP assuming no discretionary changes has been made in the tax base or tax rate (Cashin, 1995).

Empirical results on the responsiveness of tax revenue to change in national income, and total response of tax revenue to total national income shows different outcome. Fauzia (2001) finds Elasticity and Buoyance varies within category of revenue and overall tax elasticity is also low in Pakistan. And Buoyance's are higher than their corresponding elasticity for all tax category. And he concludes an increments in revenue in Pakistan is due to enhanced tax rates and broadened tax bases rather than economic growth. Moses and Eliud (2003) finds tax reform in Kenya have a positive impact on individual tax handling and on overall tax structures. Even if VAT was a predominant tax source the reform doesn't show responsiveness of it to change in the economy.

Kotut and Menjo (2012) finds tax system in Kenya was less buoyant and inelastic which means a decreasing proportion of incremental income transferred to the government in terms of tax revenue. Later on Ochieng et al. (2014) finds even if the reforms have positive impact on tax buoyance and elasticity this was not sufficient to generate ever increasing government expenditure in Kenya. In Zimbabwe Desmond (2013) had stated the same issue and finds in the tax system except customs duty individually and generally are not buoyant. The buoyance coefficients are greater than the elasticity one this show to generate additional tax government expect to intervene via discretionary tax measures.

In case of Ethiopia, Alemayehu and Abebe (2005) had studied tax and tax reform in Ethiopia from 1990 – 2003. Their analysis is based on the distributional impact of tax incidence using the concept of concentration curve, on the bases of 1999/2000 central statistical authority's household income and consumption surveyed. Finally the distributional impact

indicates some commodities subject to some kind of tax turned out to be progressive where as some of they tend to be regressive. And their examination of freely provided service like education suggested that non-poor benefited disproportionately from free secondary educations whereas in case of primary education more or less uniformly distributed.

The other related study in Ethiopia is conducted by Delesa and D.K. Mishra (2014) on compositions of Ethiopian domestic revenue and tax buoyancies over the period 1974/75 to 2012/13. Their finding indicates the share of each tax category to GDP remains low the tax revenue is dominated by indirect tax generally and foreign trade particularly.

The interest of the current study is to extend the implication of tax productivity with economic growth in post reform from 1991/92 to 2013/14 in term of its buoyance and elasticity. And the outputs of the finding will have greater policy implication that can stabilizes the economy with sustainable taxation over time. In analyzing tax productivity in post reform Ethiopia of 1991/92 to 2013/14, this study examine the existence of long run relationship between tax revenue and economic growth, estimates Tax productivity in terms of Tax Buoyance and Tax elasticity in post reform Ethiopia.

III. Part Three: - Method and Procedure

a) Model specification

To examine the issues of tax productivity in post reform Ethiopia the study bases itself on the following specified model. The specification of the model measures tax productivity which is response of tax revenue to change in GDP in terms of tax buoyance and elasticity.

Both tax elasticity and tax buoyance is calculated in the following formula.

$$TE \text{ or } TB = \% \Delta \text{ Revenue} / \% \Delta \text{ Base} \ldots\ldots \quad 1$$

Were; TE is tax elasticity for total or individual taxes, TB is tax buoyance for total or individual taxes, Δ (represent changes), Revenue is total or individual tax revenue, Base is total income (GDP).There is crucial difference between the tax elasticity and tax buoyance estimations. In case of estimating elasticity revenue is calculated with assumptions of no change in tax low including tax rate, tax base and tax administration reform. Elasticity show as what tax revenue would have been collected if last year's laws continued to apply this years and which taxes will yield more revenue as GDP rise with constant tax low. It is unit free and calculating it is desirable because it reduces thinking about tax system every years. Buoyance can be calculated using actual figures of tax revenue and actual base that considers tax law changes in terms of tax rate, tax base and tax administrative reform (Johnatan, 1998).

They are different practical ways of eliminating the effects of discretionary taxes change from actual taxes including proportional adjustment methods, dummy variable methods, constant rate structure methods, and division index method. In Proportionate Adjustment Method a series of adjusted tax revenue is first obtained by subtracting from the actual tax revenue in each year. This is to separate budget estimate of the revenue impact of discretionary changes in that year. The series is further adjusted by excluding the continuing impact of each discretionary change on future year's tax revenue. The method adjusts a historical revenue series according to a particular year's tax structure on the assumption that this particular tax structure is maintained throughout the period under consideration. Even if the method helps to estimating tax elasticity by eliminating the discretionary impact from actual taxes revenue it is not free from limitations. The common shortcomings are absence of data on revenue receipts directly and strictly attributable to discretionary changes in tax policy, the method assumes that the discretionary changes are as progressive as the underlying tax structure, and generally this approach is highly aggregative as compared to other methods (Ochieng et al., 2014).

For practical estimation our study uses proportional adjustment method following Kutut and Menjo (2012). Elasticity can be decomposed in to tax to income, tax to base and base to income. From policy point of view tax to base ratio is within the control of the government and base to income lies outside the control of the government. In our case we consider total tax to income elasticity.

$$T_t = e^{\alpha} Y_t^{\beta} e^{\varepsilon t} \ldots\ldots\ldots \quad 2$$

Where T_t is total tax revenue, Y_t is current real income (GDP), α is a constant term, β is an estimable parameter, e is a natural number and ε is a stochastic error term with constant variance and mean zero. Using logarithmic linear the general estimation for the buoyance of tax system becomes:

$$\ln T_t = \alpha + \beta \ln Y_t + \varepsilon_t \ldots\ldots\ldots \quad 3$$

Where T_t is total tax revenue, Y_t is current real income (GDP), α is a constant term, β is an estimable parameter, and ε is a stochastic error term with constant variance and mean zero. Considering one years to capture implementation lag of policy on tax revenue equation 3 becomes:

$$\ln T_t = \alpha + \beta_1 \ln Y_t + \beta_2 \ln Y_{t-1} + \varepsilon_t \ldots\ldots\ldots\ldots \quad 4$$

Where T_t is total tax revenue, α is a constant term, Y_t and Y_{t-1} are current and previous years real income respectively, β_1 and β_2 are buoyance coefficient for current and previous years incomes respectively, ε is a stochastic error term with constant variance and mean zero.

In the case of estimating elasticity proportional adjustment method is used as follow to eliminate discretionary changes in tax revenue. Following Kutut and Menjo (2012) discretionary impact from actual taxes revenue can be eliminated as follow.

First it needs computations of $T_{tt} = T_t - D_t$…… 5

Where: T_{tt} is the actual collection of the T_t year adjusted to the structure of that year, T_t is the actual tax yield in the t^{th} year and D_t is the budget estimate of the discretionary change in the t^{th} years. To generate a revenue yield based on the structure of the reference year the revenue yield for each year in the sample period is adjusted as follow.

$$(T^*)_1 = T_{1,1} \ldots\ldots\ldots\ldots \quad 6$$

$$(T^*)_2 = ((T^*)_1/T_1) * T_{2,2} \ldots\ldots \quad 7$$

$$(T^*)_t = ((T^*)_{t-1}/T_{t-1}) * T_{t-t} \ldots\ldots\ldots \quad 8$$

After eliminating discretionary change from the actual tax, equation 4 re-specified as follow to estimate elasticity.

$$\ln T_t = \alpha + \beta_1 \ln Y_t + \beta_2 \ln Y_{t-1} + \varepsilon_t \ldots\ldots \quad 9$$

Where T_t is adjusted total tax revenue, α is a constant term, Y_t and Y_{t-1} are current and previous years real income respectively, β_1 and β_2 are elasticity coefficient for current and previous years incomes respectively, ε is a stochastic error term with constant variance and mean zero.

b) Data Analysis Technique

The estimation technique is based on secondary data analysis of bounds test of ARDL (Autoregressive Distributed Lag) co-integration analysis approach. While the bounds test for co-integration does not depend on pre-testing the order of integration, the variables need to either be I (0) or I (1) or mutually integrated and but not I (2) (Gloria, 2008). This approach allows us to work with the smaller sample sizes as compared to the Johansen co-integration technique. Final, the bound test model regression's by assuming some of the variables as endogenous or exogenous provides unbiased long run estimates and valid t-statics. The analysis technique basically includes lag length selection test, unit root test, co-integration test and finally estimations of tax buoyance and elasticity. All the analysis in the study were conducted using E-views 7 version software.

Lag length selection test:- In selecting the minimum lags it needed to be considered the lag selections criteria's of AIC and SBIC. In situations where all tests do not agree on lag– length AIC always selects the largest order, SBIC always selects the smallest and HQIC is somewhere in between (Lutkepohl, 2005). According to Pesaran and Smith (1998) SBIC were best criteria special in the specifications of best model with small sample data.

Unit root test:- Now we need to confirm if none of the variable is I (2) for this we need to do the Augmented Dickey Fuller (ADF) test and see the Z (t) statistic on the top if the first test statistic is smaller than all others in magnitude if they have same sign then it means that variable is I (1) when we are checking at level. Similarly you have to prove it I (0) at first difference. In the practical test of the unit root property of the variables, the paper employed Augmented Dickey Fuller test (ADF).The Augmented Dickey-Fuller (ADF) regression model has a form (Pantula, 1989):

$$\Delta y_t = \alpha + \beta t + \delta y t - 1 + \sum_{i=1}^{p} \gamma i \Delta y t - i + \varepsilon t, \text{ intercept and time trend item} \ldots\ldots\ldots\ldots \quad 10$$

$$\Delta y_t = \alpha + \delta y t - 1 + \sum_{i=1}^{p} \gamma i \Delta y t - i + \varepsilon t, \text{ intercept and no time trend item} \ldots\ldots\ldots\ldots\ldots \quad 11$$

$$\Delta y_t = \delta y t - 1 + \sum_{i=1}^{p} \gamma i \Delta y t - i + \varepsilon t, \text{ no intercept and no time trend items} \ldots\ldots\ldots\ldots\ldots \quad 12$$

Where t is the time index, α is an intercept constant, β is the coefficient on a time trend, δ is the coefficient presenting process root, ε is an independently, identically distributed residual term, yt is the variable of interest. The aim of test is to see whether the coefficient δ equals zero, which would imply that process is non-stationary, thus for the equation 10 the null hypothesis is H0: $\delta = 0$ $\beta \neq 0$, yt is non-stationary, against the alternative HA: $\delta < 0$ $\beta \neq 0$, yt is trend stationary, represents a least restricted ADF model i.e. including trend. For equation 11 excludes trends H0: $\delta = 0$ $\alpha \neq 0$, yt is non-stationary, against the alternative HA: $\delta < 0$ $\alpha \neq 0$, yt is level stationary and For equation 12 H0: $\delta = 0$ yt is non-stationary, against the alternative HA: $\delta < 0$, yt is stationary and excludes both trend and constant (Ibid).

ARDL Co-integration test: The use of the bounds technique is based on three validations. First, Pesaran *et al*. (2001) advocated the use of the ARDL model for the estimation of level relationships because the model suggests that once the order of the ARDL has been recognised, the relationship can be estimated by OLS. Second, the bounds test allows a mixture of I (1) and I (0) variables as regressors, that is, the order of integration of appropriate variables may not necessarily be the same. Therefore, the ARDL technique has the advantage of not requiring a specific identification of the order of the underlying data. Third, this technique is suitable for small or finite sample size (Pesaran *et al*., 2001).Following Pesaran *et al*. (2001), we assemble the vector auto regression (VAR) of order *p,* denoted VAR (*p*), for the following growth function:

$$Z_t = \mu + \sum_{i=1}^{p} \beta_i z_{t-i} + \varepsilon_t \ldots\ldots\ldots\ldots \quad 13$$

Where z_t is the vector of both x_t and y_t, where y_t is the dependent variable defined as total taxations (TT), x_t is the vector matrix which represents a set of explanatory variables i.e., economic growth (REG). According to Pesaran *et al*. (2001), y_t must be I (1) variable, but the regressor x_t can be either I (0) or I (1). We further developed a vector error correction model (VECM) as follows:

$$\Delta z_t = \mu + \alpha t + \lambda z_{t-1} + \sum_{i=1}^{p-i} \gamma_t \Delta y_{t-i} + \sum_{i=1}^{p-1} \gamma_t \Delta x_{t-i} + \varepsilon_t \quad 14$$

In the above equation Δ is the first-difference operator. The long-run multiplier matrix is defined as:

$$\lambda = \begin{bmatrix} \lambda_{YY} \lambda_{YX} \\ \lambda_{XY} \lambda_{XX} \end{bmatrix} \ldots\ldots\ldots\ldots \quad 15$$

The diagonal elements of the matrix are unrestricted, so the selected series can be either I (0) or I (1). If $\lambda_{YY} = 0$, then *Y* is I (1). In contrast, if $\lambda_{YY} < 0$, then *Y* is I (0).

The VECM procedures described above are imperative in the testing of at most one co-integrating vector between dependent variable y_t and a set of regressor x_t. To derive model, we followed the postulations made by Pesaran *et al*. (2001) in Case III, that is, unrestricted intercepts and no trends.

$$\Delta(T) = \beta_0 + \beta_1(TT)_{t-1} + \beta_2(REG)_{t-1} + \sum_{i=1}^{p} \beta 3\Delta(TT)t - 1 + \sum_{i=1}^{p} \beta 4\Delta(REG)t - 1 + u_t \ldots\ldots\ldots \quad 16$$

In the equation (16) Δ, REG, TT and u_t are the first-difference operator, economic growth, taxation and a white-noise disturbance terms respectively (Bardsen, 1989). After regression of Equation (16), the Wald test (*F*-statistic) was computed to differentiate the long-run relationship between the concerned variables. The Wald test can be carry out by imposing restrictions on the estimated long-run coefficients of economic growth, tax revenues. The null and alternative hypotheses are as follows:

$$H_0 = \beta_1 = \beta_2 = \beta_3 = 0 \text{ (No long-run relationship...} \quad 17$$

Against the alternative hypothesis

$$H_0 \neq \beta_1 \neq \beta_2 \neq \beta_3 \neq 0 \text{ (A long-run relationship exists)} \ldots\ldots\ldots\ldots \quad 18$$

The computed *F*-statistic value will be evaluated with the critical values tabulated in Table CI (iii) of Pesaran *et al.* (2001). According to these authors, the lower bound critical values assumed that the explanatory variables x_t are integrated of order zero, or I(0), while the upper bound critical values assumed that x_t are integrated of order one, or I(1). Therefore, if the computed *F*-statistic is smaller than the lower bound value, then the null hypothesis is not rejected and we conclude that there is no long-run relationship between taxation and economic growth. Conversely, if the computed *F*-statistic is greater than the upper bound value, then taxation and economic growth share a long-run level relationship. On the other hand, if the computed *F*-statistic falls between the lower and upper bound values, then the results are inconclusive.

c) Variables Definitions and Proxy

Tax revenue is the summations of all individual taxes of income tax and profit, tax on goods and services, and tax on international trade measured in Ethiopian Birr. Economic growth represent by real gross domestic product is a base proxy for economic growth. All the data used in this study were time series data which are collected from MoFED, and National Bank of Ethiopia varies year report. In the process of adjusting discretionary data was generated for the period 1991 to 2005. And, since 2006 it was calculated from National Bank annual report.

IV. Part Four:- Result and Discussions

In this part the study discuss the result following the stated methodology to attain the objectives of tax productivity in the post reform Ethiopia from 1991/92 to 2013/14. The base proxy for total tax (LTT)

and adjusted total tax (LATT), is real gross domestic product in Birr (LREG).

a) Lag Length Selections

Table 1.1 : Lag length selection criteria

Lag	AIC	SBIC
0	7.562145	7.660316
1	2.695277	2.991493
2	2.702221	3.198149
3	1.729337	2.425685
4	1.807764	2.703923

Source: Eviews 7

As shown on the table 1.1 lag length selection criteria of both AIC and SBIS strongly advise us the inclusion of three lag in the analysis. The decision role is that the lower the values of the selection criteria the better the model we can concludes.

b) Unit Root Test

As indicated below in the table 4.2.A. the unit root test at level (ADF) of our variables are non-stationary. Whereas, they became stationary after taking their first differences as presented below in the table 4.2. B. unit root test at first difference (ADF).

Table 4.2.A : Unit Root Test at Level (ADF)

Based on Akaike Information Criteria									
	Intercept			Trend &intercept			None		
Variable	Test statistics	5% critical value	10% critical value	Test statistics	5% critical value	10% critical value	Test statistics	5% critical value	10% critical value
LREG	2.12	-2.99	-2.63	-0.34	-3.63	-3.25	4.27	-1.95	-1.60
LTT	0.042	-2.99	-2.6	-1.07	-3.62	-3.2	1.17	-1.95	-1.60
LATT	1.61	-2.99	-2.63	-1.01	-3.62	-3.24	5.32	-1.95	-1.60

Source: Eviews 7

Table 4.2.B : Unit root Test at First Difference (ADF)

Variable	Intercept			Trend &intercept			None		
	Test statistics	5% critical value	10% critical value	Test statistics	5% critical value	10% critical value	Test statistics	5% critical value	10% critical value
DLREG	-4.56	-3.00*	-2.64**	-4.46	-3.63*	-3.25**	-0.99	-1.95	-1.60
DLTT	-4.65	-3.00*	-2.64**	-5.06	-3.63*	-3.25**	-4.46	-1.95*	-1.60**
DLATT	-5.30	-3.00*	-2.64**	-5.32	-3.63*	-3.25**	-0.74	-1.95	-1.60

*Source: Eviews 7. * And ** indicates the rejection of the null hypothesis at 5% and 10%.*

In general the unit root test result indicates us our variables are combinations of the same orders I (1). The variables are I (1), meaning they become stationary after taking their first differences.

c) ARDL Co-integration Test

In this part we examines the existence of or absence of long run relationship between tax revenue and economic growth in Ethiopia using the bounds co-integration test.

Table 4.3 : Result of ARDL Co - integration Test

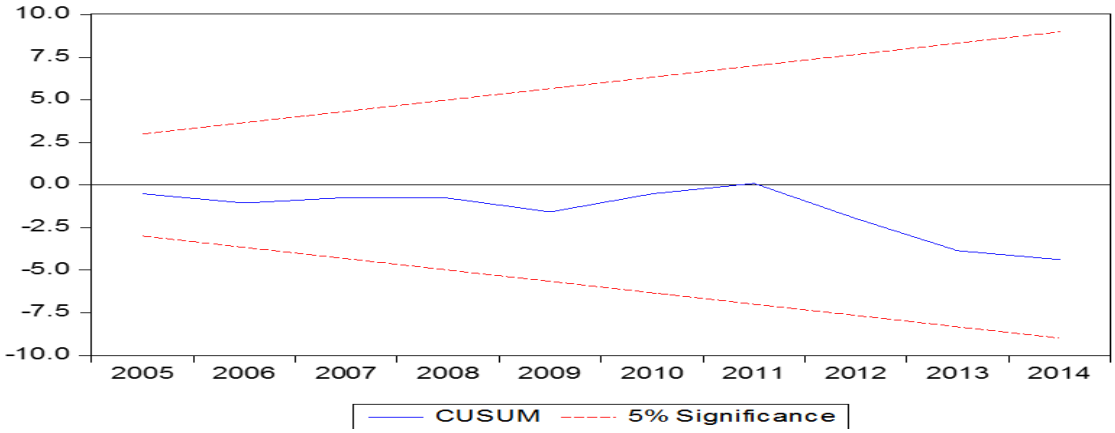
Critical value	Lower Bound Value	Upper Bound Value
1%	3.41	4.68
5%	2.62	3.79
10%	2.26	3.35

Source: Pesaran et al. (2001), Table CI (iii), Case 111: with unrestricted intercept and no trend.

The above table 4.3. Shows the Critical Values of Pesaran et al. (2001), Table CI (iii), Case 111: with unrestricted intercept and no trend at 1%, 5% and 10%. The Computed F-statistic of 417.3584 is greater than the critical values at 1%, 5% and 10% respectively. It implies that there is long run relationship between economic growth and tax revenues in Ethiopia.

Diagnostic Test LM Test; F-statistic 0.164342 Prob. F (3, 7) 0.9170

The Breusch-Godfrey Serial Correlation test of Serial Correlation Breusch-Godfrey 0.164342 (0.9170) indicates acceptance of the null hypothesis and conclusions of Error terms are serially uncorrelated. Stability Test of the model: The cusum square test for model stability test indicates that our model is stable. According to this criteria we concludes that the residual is stable when the estimated model falls between the upper and lower red lines.



Source: - Eviews-7

i. *Estimations of Tax Buoyance in the ARDL long run model*

The diagnostic test concludes that the model is stable and there is no problems of serial correlation problems in our model. So the long run coefficient of the model is estimated as follow. **ARDL of (1, 2,) the dependent variable is LTT**

Regressor	Coefficient	Standard Error	T-Ratio	P - Value
C	-7.865302	2.996775	-2.624588	0.0222
D(LREG(-1))	-0.971929	0.392511	-2.476180	0.0292
D(LREG(-2))	-0.965584	0.391572	-2.465915	0.0297
D(LTT(-1))	0.592894	0.273736	2.165931	0.0512
LREG(-1)	0.953366	0.395671	2.409493	0.0329
LTT(-1)	0.704064	0.161324	4.364283	0.0009
ECT(-1)	-0.720955	0.385827	-1.868596	0.0863

Source: - Eviews 7

The goodness of the fit of the model is supported by R-squared (0.997684) and Adjusted R-squared (0.996526) there result indicates that the model is specified very well respectively. It indicates that 99 percent of tax Revenue is explained by real economic growth which is theoretically acceptable. The result of S.E. of regression (0.065450), Sum squared residuals (0.051405), Log likelihood (29.20852), F-statistic (861.6363) and Prob (F-statistic) (0.000000) all supports that the model as a whole is significant as indicated in the appendix.

$$LTT = 7.865302 + 0.95LRE(-1)\ldots \quad 19$$

(2.996775) (0.395671)

(-2.624588) (2.409493)

(0.0222) (0.0329)

In the equation 19 the value in the parentheses are standard error, t- statistics ratio and p-values respectively, it shows that economic growth is significant in explaining tax revenue in terms of tax buoyance at 5%

significance level. The coefficients are positive which supports the theoretical meaning of tax and economic growth relationship. The buoyance coefficient of (0.95) is less than unit. It implies that for a one percentage increases in economic growth revenue from total tax system grows on average by 0.95 percent. The implication is that total tax is less buoyant with respect to discretionary tax policy and a decreasing proportion of incremental income was transferred to the government in terms of total tax revenue. The tax system is not proportional responsive with a given Economic change in Ethiopia and not generating enough revenue through discretionary tax measures.

The coefficient of the error correction term gives the speed of adjustment of tax buoyance toward its long run equilibrium value. In our estimated model we get the correctly signed ECT 0.720955 (0.0863) which is significant at 10%. The negative sign indicates adjustment toward equilibrium and the higher coefficient (0.720955) indicates fastest speed of adjustment in case of disequilibrium in the tax buoyance. It implies that 72 percent of the previous disequilibrium are corrected for in the current period.

ii. *Estimations of Tax elasticity ARDL of (2, 2,) the dependent variable is LATT*

The goodness of the fit of the model is supported by R-squared (0.78) and Adjusted R-squared (0.64) there result indicates that the model is specified very well respectively. It indicates that 64 percent of tax elasticity is explained by real economic growth which is theoretically acceptable. The result of S.E. of regression (0.089829), Sum squared residuals (0.088763), Log likelihood (24.01933), F-statistic (5.530559) and Prob (F-statistic) (0.006277) all supports that the model as a whole is significant as indicated in the appendix.

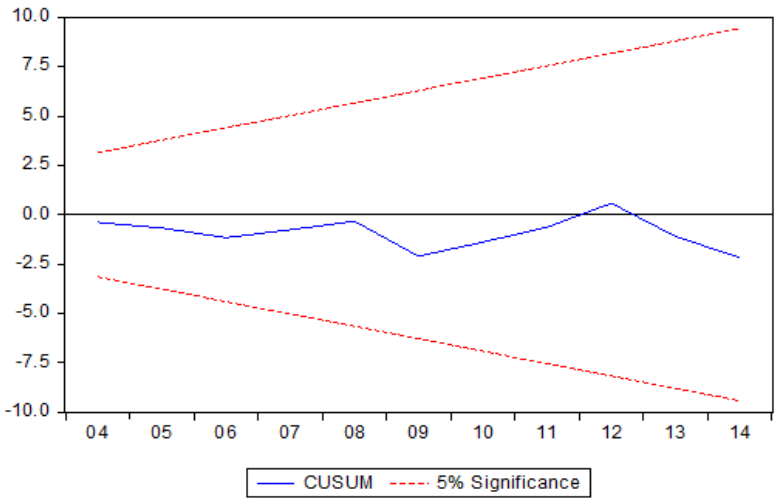
Regressor	Coefficient	Standard Error	T-Ratio	P - Value
C	-16.75709	4.044300	-4.143383	0.0016
D(LATT(-1))	0.511107	0.257158	1.987523	0.0723
D(LATT(-2))	0.363441	0.183385	1.981853	0.0730
D(LREG(-1))	-2.118662	0.531413	-3.986844	0.0021
D(LREG(-2))	-2.118770	0.531507	-3.986342	0.0021
LATT(-1)	-0.757709	0.225368	-3.362099	0.0063
LREG(-1)	2.117774	0.537585	3.939417	0.0023
ECT(-1)	-0.927056	0.359066	-2.581858	0.0255

Source: - Eviews 7

The goodness of the fit of the model is supported by R-squared (0.78) and Adjusted R-squared (0.64) there result indicates that the model is specified very well respectively. It indicates that 64 percent of tax elasticity is explained by real economic growth which is theoretically acceptable. The result of S.E. of regression (0.089829), Sum squared residuals (0.088763), Log likelihood (24.01933), F-statistic (5.530559) and Prob (F-statistic) (0.006277) all supports that the model as a whole is significant as indicated in the appendix.

Diagnostic Test:-LM Test; F-statistic 0.4083 Prob. F (2, 9) 0.6764

The Breusch-Godfrey Serial Correlation test of Serial Correlation Breusch-Godfrey 0.408381 (0.6764) indicates acceptance of the null hypothesis and conclusions of Error terms are serially uncorrelated. Stability Test of the model: The cusum square test for model stability test indicates that our model is stable. According to this criteria we concludes that the residual is stable when the estimated model falls between the upper and lower red lines.



$$LATT = 16.75 + 2.12LREG(-1) \ldots\ldots\ldots\ldots\ldots 20$$
$$(4.04) \quad (0.53)$$
$$(-4.14) \quad (3.93)$$
$$(0.00) \quad (0.0023)$$

In the equation 20 the value in the parentheses are standard error, t- statistics ratio and p-values respectively. It shows that the sign of the coefficient of economic growth is positive which supports the theoretical meaning of tax and economic growth relationship and is significant in explaining tax elasticity at 5% significance level. The elasticity coefficient of 2.12 is greater than unit. It implies that for a one percentage increases in automatic economic growth rather than any discretionary tax policy revenue from total tax system grows on average by 2.12 percent. The implication is that total tax is elastic with respect to economic growth and an increasing proportion of incremental automatic economic growth was transferred to the government in terms of total tax revenue. The tax system is more proportional responsive with a given change in automatic economic growth in Ethiopia.

The coefficient of the error correction term gives the speed of adjustment of tax elasticity toward its long run equilibrium value. In the estimated model we get the correctly signed ECT 0.927056 (0.0255) which is significant at 5%. The negative sign indicates adjustment toward equilibrium and the higher coefficient (0.927056) indicates fastest speed of adjustment in case of disequilibrium. It implies that 93 percent of the previous tax elasticity disequilibrium are corrected for in the current period.

V. Part Five: - Conclusions and Recommendations

This study was initiated to investigate tax productivity in post reform Ethiopia of 1991/92 to 2013/14 with the specific objectives of: assessing the existence of long run relationship between tax revenue and economic growth, to examine Tax productivity in terms of Tax Buoyance in post reform Ethiopia and to assess Tax productivity in terms of Tax elasticity in post reform Ethiopia.

The Autoregressive Distributed Lag co-integration analysis approach is used in estimation to arrive at the above stated objectives. The variables are becomes stationary after taking their first differences. All the variables used in the model were co-integrated, which implies the existence of long run relationship among the variables. Based on its objective the study found that there is long run relationship between economic growth and tax revenues in Ethiopia. And this long run relationship is supported with positive signs and significant relationship between economic growth and tax revenues in the country. The correct signed and significant error correction term in the model indicates that fast speeds of convergence to the equilibrium in case of tax disequilibrium. The fitness of the model is justified by diagnostic tests of normality and stability tests.

Concerning the examinations of tax productivity in terms of tax buoyance the study founds buoyance coefficient of 0.95 which is less than unit. It implies that for a one percentage increases in economic growth revenue from total tax system grows on average by 0.95 percent. The implication is that total tax is less buoyant and a decreasing proportion of incremental income was transferred to the government in terms of total tax revenue. In other words the tax system is not proportional responsive with a given change in economic growth in Ethiopia and not generating enough revenue through discretionary tax measures. The implications of less tax buoyance is incapability of collecting proportional tax revenue from the combinations of the change in discretionary tax policy and economic growth.

In the last objectives of the examinations of tax productivity in terms of tax elasticity the study founds elastic coefficient of 2.12 which is greater than unit. It implies that for a one percentage increases in automatic economic growth rather than any discretionary tax policy revenue from total tax system grows on average 2.12 percent. The implication is that total tax is elastic with respect to economic growth and an increasing proportion of incremental automatic economic growth was transferred to the government in terms of total tax revenue. The tax system is more proportional responsive with a given change in automatic economic growth in Ethiopia and is generating enough revenue through growth in automatic economic activity rather than the discretionary tax policy changes.

The possible reason for a more elastic tax revenue is a shift in tax payers to higher bracket with current raped economic growth in the country and adjustment actions taken by the government for salary. Based on the outcome of this study we can concludes that the tax system in Ethiopia in more productive in terms of automatic economic growth. In order to secure stable economic finance which could be generated from taxations the greater concern shall be given to economic policies that can sustains economic growth in the country. The less tax buoyance could be due to less soundness of discretionary tax policy in term of tax base and effectiveness of tax change in collecting tax. This could be explained by the tax system in taxing all transactions, minimizing tax compliance and in including all economic agents to the tax payer's network.

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