



## **DETERMINANTS OF TAX REVENUE IN ETHIOPIA (JOHANSEN CO-INTEGRATION APPROACH)**

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### **ABSTRACT**

*Tax revenue in Ethiopia has been low throughout the study period (1974 to 2013). Tax revenue in Ethiopia was below the average of sub Saharan African countries. The main objective of this study is to empirically examine the major determinants of tax revenue in Ethiopia for the period ranging from 1975-2013, using Johansen maximum likelihood co-integration approach. The result revealed that in the long run real GDP per capita income, foreign aid and industrial value added share of GDP positively and significantly affect tax revenue. However, inflation exerted a negative and significant influence. Whereas, in the short run Real GDP per capita income and inflation have negative effect, whereas industrial Value added share of GDP has positive effect on tax revenue in Ethiopia. The sign of real gross domestic product per capita income is contrary to the priori expectation. Moreover, the coefficients of the lagged error correction term (ECM (-1)) is significant and negative as expected, which imply the existence of economic or government forces that restore the long run equilibrium from short run shocks. Finally, the study recommends measures such as a boost in per capita income growth, structural transformations, introduction of new tax bases and efficient utilization of foreign aid inflow have to be considered by the concerned bodies so as to bring efficient tax administration and enhance revenue growth. Moreover, the government shall give a due recognition to the development of the industrial sector.*

**Keywords:** Tax revenue, Johansen co-integration approach, Error correction term, Long run, Ethiopia.

### **Contribution/ Originality**

This study is one of very few studies which have investigated the relationship between sectoral and macroeconomic variables with tax revenue in Ethiopia. It contributes to the existing literature in the study of tax revenue in Ethiopia. It identifies important determinants of tax revenue using econometric analysis.

### **1. INTRODUCTION**

Economic development is one macroeconomic goal of each country in the world. Especially, in most developing economies the issue of economic development is still to be answered. While most developing countries are resource blessed, they face a problem of fiscal deficit, which make them to depend on foreign assistance to finance its development program. Therefore, better mobilization of internal resources could help to reduce the fiscal deficit, and to better control the process of economic development and reduce poverty. In least developed countries, efficient utilization of resources remains poor so far and governments in these economies play greater role in stabilization of the economy through various policy measures such as fiscal policy.

Availability of economic resources to society is limited. So, an increase in government expenditure normally means a fall in private spending. Hence, implementation of fiscal policy, i.e. raising tax revenue is one means of transferring resources from the private to the public sector. Governments often use different methods of raising resources like, borrowing, receipt of aid, printing of money and taxation. But, taxation is undoubtedly the most important source of government revenue (Chaudhry and Munir, 2010).

Most governments in developing countries are aiming at stimulating and guiding their economic and social development. To this end, the implementation of an effective tax policy is an important tool by which resources are better mobilized (Wawire, 2011). Whereas, a progressively falling level of Official Development Assistance (ODA), for most aid dependent countries necessitates an efficient internal resource mobilization system. For that matter, over the last few decades, many developing countries had taken various reform programs like the introduction of value added tax (VAT) to increase the tax revenue of the countries. While the amount of tax revenue measure the capacity of the economy to finance government expenditure, in most developing countries the level of taxation is still remain poor (Haque, 2009).

Tax revenue instability might result in public spending instability which is of deep concern for Sub-Saharan African (SSA) countries, as it detriment growth and welfare (Fatás and Mihov, 2003). This instability along with global economic crisis has raised the need to mobilize domestic revenue. For most African countries, this crisis has brought into a sharp focus on the importance of immediately addressing the structural factors that weigh down economic and social development (Fatás and Mihov, 2003).

Aggrey (2013) stated that

Being able to rely on domestic sources of funding in the form of taxes will allow African states to reduce their dependency on official development assistance to fund development. It will give African states the room to determine their own development priorities and fund them accordingly without having to mollify donors who attach conditions to development aid that often reflects the interests of the donor rather than the recipient (P.5) (emphasis added).

According to Wilford and Wilford (1978a) to enhance economic growth, developing countries ought to increasingly mobilize their own internal resources which can be achieved through tax revenue generation. Fiscal imbalance remains the problem of most developing countries for the past several decades. The reason is attributed to rapid expansion of government expenditure and low revenue collection (Ansari, 1982). While trying to improve efforts to boost their fiscal revenue by establishing an efficient tax system, developing countries, especially SSA countries are greatly challenged by factors like; economic structure, institutional capacity, political setup, low economic development level (Dioda, 2012).

Low tax to GDP ratio is a common feature of most SSA countries. Despite much effort, many countries fail to raise sufficient revenues to finance the government deficit and to support the development needs of the country. According to United Nation Development Program (2013) and half of SSA countries rose 16.8% of GDP from tax revenue which is below the UN standard, 20%, to achieve the millennium development goal (MDGs). Ethiopia's tax to GDP ratio in 2010 was 12.2%. It was the lowest of its neighboring countries such as Kenya (17.7%) and Rwanda (14.1%) (Tilahun, 2014). This is to mean that tax revenue has different characteristics of an economy across nations. This difference is attributed to determinants that are unique to different countries due to socio-economic and political situations. In addition, most African economies, including Ethiopia are characterized by large hard-to-tax sectors, such as small enterprises, small farms and a high level of informal sectors (Dioda, 2012).

The underground economy is also common in every country, in which Ethiopia is not the exception. It consists of various activities ranging from unreported economic activities by paid domestic workers to registered business men

who underestimate their production (Emerta, 2010). In Ethiopia, 36% of the economy is not reported and captured by the official statistics. At the same time, the amount of tax evasion reached 10% of the economy. For the period from 2006/07 – 2011/12, the average growth rate of tax revenue has risen by 36%; nevertheless, the growth rate of tax revenue has been fluctuating between 10.1% in 2006/07 to 8.6% in 2008/09, and 11.5% in 2010/11 fiscal year (Ministry of Finance and Economic Development, 2011).

## 2. STATEMENT OF THE PROBLEM

Global economic crisis coupled with uncertainty and instability of aid flows has given due attention for governments to look for stable and sustainable modes of development finance (Bhushan and Samy, 2012). In addition, excessive reliance on foreign financing may in the long run lead to problems of debt sustainability, which together insist on LDCs to rely substantially on domestic revenue mobilization (Gupta, 2007). One way of mobilizing domestic resource is achieved through raising of revenue from taxation.

In Ethiopia, the total tax revenue as percentage of GDP is very low compared to its tax capacity. According to International Monetary Fund (2013) over the period 1999/2000 - 2011/12 the average tax revenue was 4.8% of GDP, derived from international transactions. The same report posited that income tax were 3.7% of GDP and SSA's average were 4.79% of GDP. Whereas, domestic tax on goods and services stood at 2.4% of GDP, and SSA's average were 7.2%. This is lower even to its neighbors like Kenya (8.5%), Uganda (6.89%), and Tanzania (6.23%) of GDP. This shows that the percentage share of tax revenue to GDP of Ethiopia is still lower both to its revenue capacity and Sub-Saharan standard.

In Ethiopia various efforts aimed at obtaining optimal fiscal policies with emphasis on the role of taxation as an instrument of economic development has been implemented (Alemayehu and Abebe, 2005). Despite such effort, the country's economy rely substantially on loans and grants (24 % of GDP) to finance its investment requirement. Furthermore, for the period 2001 to 2010, the average share of tax revenue, and total revenue and grants in GDP were 11.2 and 19.6 percent, respectively (Tadele, 2013). This implies that the tax revenue of the country is at low level.

The role of tax revenue is imperative in bringing economic development, where its working or efficiency is determined by different socio economic and political factors. Furthermore, the ability to generate adequate fiscal revenue is determined by different socio economic and political factors, which may have different effects on tax revenue either negatively or positively. Therefore, examining the effects of tax revenue on economic performance, depends on identifying the factors affecting tax revenue. Therefore, understanding the rationale for low level of tax revenue pose remedial mechanisms to correct prevailing problems of tax revenue.

It is infrequent to find country-specific time series studies on the issue as most empirical studies performed to investigate the determinants of tax revenue rely largely on cross-sectional and panel data set (Leothold, 1991; Gupta, 2007; Mahdavi, 2008; Ghani, 2012). In panel data set, it is not easy to distinguish country-specific behavior of tax revenue determinants, and hence country-level time series analysis is more appealing. Moreover, the above studies pointed that, factors affecting tax revenue vary across countries which necessitate the need for country level analysis of tax revenue. To the knowledge of the researcher, a study on the determinants tax revenue in Ethiopia is scant. Only a little has been dealt with the issue of tax revenue performance in Ethiopia. Few studies in the literature like, studies by Alemayehu and Abebe (2005) attempted to investigate the tax performance of Ethiopia. However, Alemayehu and Abebe studied only the tax performance of Ethiopia across regimes, they did not try to show what specific factors contribute to the tax revenue generation of Ethiopia. On the other hand, Tadele (2013) investigated the determinants of tax buoyancy (the ratio of percentage change of tax revenue to percentage change of GDP), he did not attempted to search for determinants that would impact tax revenue generation in Ethiopia. The study also did not incorporate

policy variables like, inflation and sectoral variables like, agriculture value added share of GDP and industrial share of GDP. Therefore, it is invaluable to investigate the determinants of tax revenue in Ethiopia with a special emphasis on the effect of sectoral share of the economy.

### 3. OBJECTIVE OF THE STUDY

The major objective of this study is to identify the macroeconomic determinants of tax revenue in Ethiopia. Specifically, the study aims to:

- Show trends and performances of Tax revenue in Ethiopia
- Examine the long run and the short run effect of the determinants of tax revenue in Ethiopia.

### 4. HYPOTHESIS OF THE STUDY

- Industry value added share of GDP, real gross domestic product per capita income, and education have positive effect on tax revenue both in the long run and in the short run.
- In addition, inflation and agriculture value added share of GDP are hypothesized to have negative effect on tax revenue.
- With regard to the effect of the external variable i.e. foreign aid, various empirical studies have been undertaken on its effect on tax revenue in developing countries. Of those, [Teera \(2003\)](#) and [Gupta \(2007\)](#) found positive impact, whereas, [Mahdavi \(2008\)](#) and [Chaudhry and Munir \(2010\)](#) come across with negative impact. Studies by [Abeba \(2002\)](#) suggested that foreign aid has no effect on tax revenue. However, dependence on foreign aid for developing countries; where Ethiopia is a number, requires the fulfillment of conditionality's and let them feel relax rather than providing an incentive to increase tax revenue. Therefore, in this study the researcher hypothesized negative effect of foreign aid on tax revenue in Ethiopia.

## 5. DATA SOURCE, MODEL SPECIFICATION AND METHODOLOGY

### 5.1. Data Source

In this study a time series data ranging from 1975 - 2013 were used to analyze the determinants of tax revenue in Ethiopia. The choice of time were dictated by data availability. All data's were secondary and gathered from different local and international organizations like; Ministry of Finance and Economic Development (MoFED), National Bank of Ethiopia (NBE), and the Ethiopian Economic Association (EEA) database, and World Bank (World Development indicators (WDI)).

### 5.2. Model Specification

The assessment of actual and potential tax performance of any country is a matter of judgment that should be based on a consideration of the stage of development and structure of the economy and should also take account of national traditions and relevant special circumstances ([Chelliah, 1971](#)). Therefore, to analyze statistically the determinants of tax revenue in Ethiopia, an estimate of a model will help to see the functional relation of tax revenue to economic development and structure of the economy.

Various studies included different variables while analyzing the determinants of tax revenue across the world. For instance, [Teera \(2003\)](#) tried to estimate the tax share of Uganda, by incorporating import share of GDP, gross domestic product per capita, foreign aid (%GDP), Manufacturing value added (%GDP), agriculture value added (%GDP) and population density as tax correlates. Whereas, [Chaudhry and Munir \(2010\)](#) included the following

variables in estimating tax revenue in Pakistan: Tax base (agriculture value added (%GDP), manufacturing value added (%GDP), service value added (%GDP), per capita income, and openness), economic policy variables (exchange rate, inflation and monetization or M2), foreign aid, political stability, remittance and social variables (urbanization, literacy rate). Karagöz (2013) extends the model, including total stock of debt, agriculture value added (%GDP), industry value added (%GDP), money supply (M<sub>2</sub> %GDP), urbanization rate and openness. Sinbo and Muibi (2013) studied the macroeconomic determinants of tax revenue in Nigeria by incorporating; real GDP, openness, exchange rate, inflation and external debt.

However, in developing the tax model including all variables is impossible due to unavailability of data and small sample size problem. Therefore, following empirical literatures, this study attempts to empirically investigate the effect of policy variable (inflation), tax base (agriculture value added share of GDP, industrial value added share of GDP and real GDP per capita income), education and foreign aid on tax revenue percentage of GDP. Therefore, in this study the model is specified as:  $TR_t = f(AGRI_t, CPI_t, INDU_t, RGDPPC_t, ODA_t, EDU_t)$ ; Where, TR is tax revenue as percentage of GDP at period t.

Specifically, the log transformation of the model is as follows:

$$LTR_t = \alpha + \beta_1 LAGRI_t + \beta_2 LCPI_t + \beta_3 LINDU_t + \beta_4 LRGDPPC_t + \beta_5 LODA_t + \beta_6 LEDU_t + \varepsilon_t \dots \dots \dots (1)$$

Where,  $\alpha$  is intercept term and  $\beta_1, \beta_2, \dots, \beta_6$  are long run coefficients.

$LTR_t$  = Natural logarithm of tax revenue (%GDP) at time t

$LRGDPPC_t$  = Natural logarithm of gross domestic product per capita at time t

$LEDU_t$  = Natural logarithm of government expenditure on education (%GDP) at time t

$LCPI_t$  = Natural logarithm of consumer price index at time t

$LODA_t$  = Natural logarithm of net official development assistance at time t

$LINDU_t$  = Natural logarithm of industrial value added (%GDP) at time t

$LAGRI_t$  = Natural logarithm of agriculture value added (%GDP) at time t

Service value added as percentage of GDP, urbanization, foreign debt and import share GDP could also be included in the model. However, due to multicollinearity problem this specification has not been applied.

All variables in the model are transformed into logarithm form and hence log linear form of the model is used for tax revenue model as opposed to linear model. This is because log linear model is preferred to the linear model in that log linear model helps to control the size of data and results in consistent and reliable estimates (Worku, 2010). Furthermore, log linear model produces better results than linear form of the model; i.e., logs are used in economics because the estimated coefficients in log regressions have a good interpretation. Economists often think in terms of elasticity's, and log regressions have coefficients that estimate elasticity's. It helps to interpret as percentage change instead of as a marginal effect (Benoit, 2011).

Table-1. Description of explanatory variables

Independent Variables	Variable Descriptions
LRGDPC	Real GDP Per capita income is expected to be positively correlated with tax share as it is expected to be a good indicator of the overall level of economic development and sophistication of the economic structure. This is because as a country develops, tax bases will be wider and grow more than the growth in income. A higher per capita income reflects a higher level of development which imply a higher capacity to pay taxes as well as a greater capacity to levy and collect taxes (Chelliah, 1971). It is measured as the ratio of RGDP to total population.
LAGRI	Certain sectors of the economy are easier to tax than others; i.e., the agriculture sector may be hard to tax, especially in developing countries where the lion's share of the economy is dominated by this

	sector; it is not politically feasible to tax this sector. Many countries are unwilling to tax this sector since it is subsistent (Stotsky and WoldeMariam, 1997). Also, this sector is highly informal and costly to assess. In addition, the tax rate is lower on the sector and taxable items do not generate surplus production. As a result, negative relationship is anticipated between agricultural share and tax revenue.
LINDU	This variable helps to show the effects of industrialization on revenue generation, particularly it is intended to capture the effect of industrial growth on the tax revenue generation of Ethiopia. Increase in the growth of industrial sector will increase direct tax through corporate income tax, indirect taxes through sales tax, and excise duty on domestic products. Moreover, this sector is largely owned by businessmen that use better recording activities, which give the taxing authority better taxing capacity. As a result, the researcher expected positive sign of this variable. It is measured as the ratio of industrial value added to GDP.
LCPI	Inflation is a sustained rise in the general price level of goods and services in an economy. It is the proxy for macroeconomic stability of a country. The most commonly used measure of inflation is consumer price index <sup>1</sup> , it reduces the purchasing power of a society and erodes the taxpaying capacity of tax payers. Crane and Nourzad (1986) stated inflation as non-legislated tax increase which enhance government revenue. Unlikely; taxpayers on average, respond to the inflation-induced tax increase by instituting their own non legislated tax cut through evasion (i.e. The increased level and proportion of income underreported). Taxpayers will engage in an informal or underground economic activity. As a result, inflation is expected to affect tax revenue negatively.
LODA	Foreign aid is used to capture the effect of dependence on foreign assistance on domestic revenue mobilization (i.e. through tax). Chaudhry and Munir (2010) pointed out that a country, which depends on revenue from natural resources, foreign aid or other income that does not come through the political effort of persuading their citizens to pay taxes, may be less likely to develop effective and democratic institutions. According to Gupta <i>et al.</i> (2003) if aid weaken 'tax effort' it may also undermine public expenditure accountability, resulting in the possibility of reckless expenditure by governments, which will further weaken incentives to raise domestic revenues. So, as the increase in foreign aid inflow make government of developing countries to relax their effort towards mobilizing internal sources, the effect of foreign aid on tax revenue is expected to be negative. It is measured as official development assistance (ODA) share of GDP. This is because ODA is the most popular measure of foreign aid (Teera, 2003).
LEDU <sup>2</sup>	Education is by far the most important element for successful collection of tax revenue. Because, the documentation of the economy is essential for an effective tax system. Documentation comes from a literate tax base. Literacy is more than being able to keep records on books. It includes knowledge and usage of information technology. Taxes yield less revenue in less literate economies (Chaudhry and Munir, 2010). The fact that more educated peoples are expected to have the knowledge of tax, education is expected to have positive effect on tax revenue.

Source: Own Computation

## 6. RESULTS AND DISCUSSIONS

### 6.1. Results of Unit Root Test

Test for stationary is a prerequisite for consistent and valid inference of time series models and co-integration analysis. Unit root implies that the time series data are non-stationary while absence of a unit root shows that the stochastic process is stationary. The results of using non-stationary time series may be spurious. It may imply as if a relationship is existed among variables, when no relationship is actually existed.

<sup>1</sup> In this study inflation is measured in consumer price index, in order to transform the data in logarithm form to better interpret the result as elasticity, which is impossible while using inflation rate as it might be negative.

<sup>2</sup> According to Pessino and Fenochietto (2010). Education can be measured by literacy rate, labor force with secondary education as (percentage of total), and secondary education enrolment ratio. However, when data on none of those measurement is available, it is possible to use total government expenditure on education as percentage of GDP as a proxy for education. Similarly, Wondwosen (2011). used expenditure on education as a proxy for education. Hence, for the same argument in this study the researcher used expenditure on education (%GDP) as a proxy for education.

Table-2. Stationarity test Results ADF Unit-Root Test Results

Variable	ADF Statistic	Critical Value	Order of Integration
LTR	-5.782758	-3.621023	I(1)***
LRGDPPC	-6.859824	-4.226815	I(1)***
LCPI	-3.278229	-3.202445	I(1)*
LINDU	-3.367500	-2.945842	I(1)**
LAGRI	-6.149679	-4.243644	I(1)***
LODA	-6.646673	-3.626784	I(1)***
LEDU	-3.372545	-3.200320	I(1)*

Source: Own estimation using Eviews version 6 \*, \*\*, and \*\*\* shows 10%, 5% and 1% level of significance respectively; the null hypothesis is that there is a unit root.

Therefore, so as to get consistent and reliable estimates of the model, a non-stationary data must be converted into stationary by differencing. In this study, the Augmented Dickey Fuller (ADF) test is employed to test the Stationarity of the variables and the test result is given in table 2.

The test has shown that all variables are stationary at first difference; i.e., I (1). Therefore, Johansen maximum likelihood approach can be applied to test the presence of co-integrating relationship among variables.

### 6.2. Optimal Lag Selection Results

The need for optimal lag is aroused because of the sensitivity of Johansen co-integration analysis to the number of lags included in the model. It appears that, in general, too few lags in the model results in rejection of the null hypotheses too easily, while too many lags in the model decrease the power of the test (Verbeek, 2004). This indicates that there is some optimal lag length. Therefore, selection of optimal lag length helps to avoid loss of initial values. As shown in the table 3 the selected optimal lag length is one. This is because all lag selection criteria's (i.e., LR, FPE, AIC, SIC and HQ) suggest an optimal lag of one at 5% level of significance.

Table-3. Optimal Lag Order Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	112.1403	NA	8.03e-12	-5.683258	-5.378490	-5.575813
1	308.0720	307.1362*	2.99e-15*	-13.62551*	-11.18737*	-12.76595*
2	355.6611	56.59252	4.35e-15	-13.54925	-8.977727	-11.93757

Source: Own estimation using Eviews version 6 \* indicates lag order selected by the criterion

However, one cannot conclude as the optimal lag is one only looking the selection criteria. Hence, to further confirm the relevance of the chosen optimal lag length for all variables, a test of lag exclusion [Wald lag exclusion test] is conducted. It shows that the inclusion of a single lag length for each variable individually and for all the system jointly is significant for all variables at 1% level of significance.

Table-4. VAR Lag Exclusion Wald Tests

Vari-ables	LTR	LRGDP PC	LCPI	LINDU	LAGRI	LEDU	LODA	Joint
Lag	1	1	1	1	1	1	1	1
Df	7	7	7	7	7	7	7	49
Chi^2	93.73898	2002.716	2292.786	151.8770	24.89091	4225.293	731.9760	10639.46
Prob>Chi^2	0.000***	0.000***	0.000***	0.000***	0.001***	0.000***	0.000***	0.000***

Source: Own estimation using Eviews version 6 \*\*\* implies indicates lag order failed to be excluded at 1% level of significance

**6.3. Johansen Co-Integration Analysis**

The Johansen method is used for the test of co-integration as it is superior over the Engle-Granger method in allowing for the test of more than one co-integrating vectors (Verbeek, 2004). Theories state that econometric analysis with non-stationary variables makes no sense. The only exception is if a regression of one non-stationary variable over another non-stationary variable yield a stationary series and if so, it is known as co-integrating regression.

The trace test tests the null hypothesis of r co-integrating vectors against the alternative hypothesis of k co-integrating vectors, where k is the number of endogenous variables, for r=0,1,2,...,k-1. Whereas, the maximum Eigenvalue, tests the null hypothesis of r co-integrating vectors against the alternative hypothesis of r+1 co-integrating vectors. Accordingly, in this study both trace test and maximum Eigen value test indicate the presence of one co-integrating vectors at 5% critical value. This is because both tests failed to reject the null of at most one co integrating equations. Hence, there is a unique co-integrating vector in the system. The result is shown in table 5.

**Table-5.** Johansen Co-Integration Test Result

Hyp.No. of Co-int. Eqn(S)	Trace Statistic	0.05 Critical Value	P-Value	Max Eigen Statistic	0.05 Critical Value	P-Value
None	148.3487**	125.6154	0.0010	59.32463**	46.23142	0.0012
At most 1	89.02407	95.75366	0.1328	34.20122	40.07757	0.1978
At most 2	54.82284	69.81889	0.4264	23.14285	33.87687	0.5196
At most 3	31.67999	47.85613	0.6297	13.65295	27.58434	0.8458
At most 4	18.02704	29.79707	0.5641	9.924806	21.13162	0.7517
At most 5	8.102236	15.49471	0.4545	7.998960	14.26460	0.3788
At most 6	0.103276	3.841466	0.7479	0.103276	3.841466	0.7479

Source: Own estimation using Eviews version 6 Note: \*\* implies rejection of null hypothesis at 5% level of significance

One co-integrating equation is justified based on Johansen co-integrating coefficients, hence only the first column of alpha ( $\alpha$ ) coefficients in table 6 and first row of beta ( $\beta$ ) coefficients in table 7 are important. When the variables are out of long-run equilibrium, there are economic forces, captured by the adjustment coefficients that push the model back to long-run equilibrium. The speed of adjustment toward equilibrium is determined by the magnitude of  $\alpha$  coefficients. While the negative  $\alpha$  coefficients show convergence, a positive coefficient implies deviation from long run equilibrium. As reported in table 6, the adjustment coefficients of LTR, LCPI, and LINDU are negative, which indicate the speed of adjustment towards their long run equilibrium. This implies that 79.8, 16.35, and 7.4 percent of the disequilibrium error for the above variables is corrected in one time period, respectively.

**Table-6.** Estimated Alpha Coefficients

	<b>-0.797863</b>	<b>-0.285627</b>	<b>-0.488168</b>	<b>0.38447</b>	<b>0.299907</b>	<b>-0.024739</b>	<b>-0.000281</b>
LTR							
LAGRI	0.196721	-1.141098	0.082638	0.25991	-0.052984	-1.408361	-0.0002
LCPI	-0.163494	0.157544	-0.074488	-0.00465	0.051357	0.048455	-0.002849
LINDU	-0.074390	-0.072489	0.042135	-0.027048	0.025832	-0.621354	0.000482
LRGDPPC	0.014130	0.083574	-0.094332	0.235099	-0.17562	-0.362986	0.000304
LODA	0.067761	-0.177012	0.122091	-0.0126	-0.090576	-1.092681	-0.001479
LEDU	0.025577	0.073506	0.05182	-0.057764	0.020556	0.010574	-0.002724

Source: Own estimation using Eviews version 6



Table-7. Estimated Standardized Beta Coefficients

LTR	LAGRI	LCPI	LINDU	LRGDPPC	LODA	LEDU
1.0000	-0.106873	0.679111	-0.420426	-0.3813622	-0.973846	-0.121710
0.002326	1.0000	-0.087763	-0.206067	0.053716	2.177225	-0.290098
1.470530	1.441747	1.0000	-1.024018	-0.038641	-5.873188	0.553376
-0.103169	0.527193	1.362444	1.0000	-1.181775	-7.115412	1.666142
0.402192	-2.846593	1.658942	-5.172703	1.0000	3.748489	-2.149773
-1.421780	1.070602	1.169572	0.791593	-0.68981	1.0000	-0.460803
0.140430	-0.535732	-1.371660	-3.963600	-0.688594	2.439959	1.0000

Source: Own estimation using Eviews version six

Once we check the existence of one co-integrating relationship between the variables in the tax revenue model, the presence of weak exogeneity can be tested. Weak exogeneity helps to identify the endogenous and exogenous variables entering into the model. Rejection of weak exogeneity implies that the variables under investigation are endogenous (Maddala, 2001). This requires imposing zero restriction on the first column of  $\alpha$  coefficients. The results, using the likelihood ratio (LR) test as shown in table 8 confirm that only the dependent variable rejects weak exogeneity at 1% level of significance; i.e., all variables other than the dependent variable (LTR) are exogenous at any conventional level of significance. Therefore, the long run relationship can be formulated by taking LTR as endogenous and all other variables as exogenous variable.

Table-8. Test of Weak Exogeneity /Zero Restriction on Adjustment Coefficients

Variables	Adjustment coefficient	LR- test	P-Value
LTR	-0.797863	18.49955	0.000017***
LRGDPPC	0.014130	0.007102	0.932839
LCPI	-0.163494	1.632786	0.201318
LINDU	-0.074390	0.667057	0.414080
LAGRI	0.196721	0.477043	0.489765
LODA	0.067761	0.586736	0.443684
LEDU	0.025577	0.027858	0.867442

Source: Own estimation using Eviews version 6 \*\*\* indicate rejection of weak exogeneity at 1% level of significance

Once the long run relationship is defined, the next task is to formulate test of significance on the long run parameters. This test requires imposing restriction on  $\beta$  coefficients, which is known as exclusion test. It helps to determine variables which are statistically significant in the co-integrating vector. The result of the test alongside their respective probability values are reported on table 9.

As can be seen in table 9, four variables (real GDP per capita income, inflation, industrial value added share of GDP and official development assistance) have significant on effect on tax revenue percentage of GDP in the long run. Whereas, agricultural value added share of GDP and Education are not significant determinants of tax revenue in the long run.

Table-9. The Test of Significance / Zero restriction on  $\beta$ -coefficient

Variables	$\beta$ - Coefficient	LR test	P- Value
LRGDPPC	0.381362	22.41037	0.000002***
LCPI	-0.679111	22.99737	0.000002***
LINDU	0.420426	7.580412	0.005901***
LAGRI	0.106873	0.209172	0.647417
LODA	0.973846	2.361164	0.024389**
LEDU	0.121710	1.461981	0.2269155

Source: Own estimation using Eviews version 6 \*\*, \*\*\* indicates significance at 5%, and 1% level of significance.

The long run relationship derived from the co-integrating vector normalized with respect to LTR can be represented as:  $LTR = 1.56 + 0.11 LAGRI + 0.38 LRGDPPC - 0.68 LCPI + 0.42 LINDU + 0.97 LODA + 0.12 LEDU$

(0.647)      (0.000\*\*\*)      (0.000\*\*\*)      (0.006\*\*\*)      (0.024\*\*)      (0.227)

The long run equation reported that real GDP per capita income, industrial value added share of GDP and official development assistance have a significant and positive long run effect on tax revenue percentage of GDP. On the other hand, inflation has a negative and significant effect on tax revenue in the long run. On the other hand, agriculture value added share of GDP and education have insignificant effect on tax revenue percentage of GDP in the long run.

- The long run model shows that tax revenue is positively and significantly influenced by gross domestic product per capita income in the long run. The result is interpreted as a 1% increase in real GDP per capita income results in a raise in tax revenue percentage of GDP by 0.38 percent, *ceteris paribus*; i.e., tax revenue as percentage of GDP does not increase as much as the raise in real GDP per capita, which might be due to tax evasion. Tax revenue is also inelastic to the change in income, because income tax rate is constant for incomes greater than 5000 birr. It is not progressive for incomes of above 5000 birr. The result of this study is in line with the findings of studies conducted in many least developed countries, where economic development helps to increase taxpayer's ability to pay tax and improve efficiency of tax authorities in tax collection in the long run. It is consistent with priori expectations and the findings of [Chelliah \(1971\)](#); [Gupta \(2007\)](#) and [Karagöz \(2013\)](#). Moreover, the empirical result is also in agreement with the descriptive analysis. The result lends support to argue that with economic development especially at the initial stages of development, the demand for public services will increase and as a result, tax revenue increase to finance the raising demand for expenditure.
- Inflation measured by consumer price index (CPI) and taken as measure of macroeconomic instability is found to have long run significant effect on tax revenue in Ethiopia. The result is also in line with the descriptive result and to the hypothesized sign. A percentage increase in inflation, results in 0.68 percent of reduction in tax revenue, which is strong effect that could put the government under stress, if inflationary pressure is hiking. This is attributed to the increase in cost of living associated with the loss of purchasing power of money, which could ultimately reduce real value of tax collected. According to [Tanzi \(1989\)](#) there exists a sizable time lag between the actual tax collection and the transaction to be taxed, in developing countries in which tax at time of payment is small in real value as tax obligations become lower (i.e. *Olivera -Tanzi effect* holds true). Furthermore, with skyrocketing price, tax evasion will increase and informal economy might be expanded, and consumers may switch to spend on items which are less likely to be taxed. The result of this study is congruent with the findings of [Ghura \(1998\)](#) and [Agbeyegbe et al. \(2004\)](#).
- Industrial value added share of GDP also has positive and significant long run effect on tax revenue, in the study period. The result is as expected and has the coefficient of 0.420426, which can be interpreted as a one percent increase in the share of industry to GDP will boost tax revenue approximately by 0.42 percent, other things kept constant. Industrial sector is positively related with tax revenue as predicted in theory that manufacturing enterprises are producing items that are easier to tax meanwhile, business owners typically keep better and organized records of their activities. The result lend support to argue that increase in the industrial sector would contribute more to tax revenue through increasing corporate income tax. Moreover, if production is efficient the sector can contribute a large taxable surplus. The finding is consistent with the results of [Teera \(2003\)](#) for Ugandan economy and [Basirat et al. \(2014\)](#) for Iran economy.
- Reliance on the external sector of the economy also matter in domestic revenue mobilization. Official development assistance is found to exert a statistically significant effect on tax revenue of Ethiopia in the long

run, at 5% significance level. The sign of ODA coefficient is positive contrary to priori expectations. The result revealed that a 1% increase or decrease in the net official development assistance, results in 0.97% increase or decrease in tax revenue in the long run. The result support the hypothesis that official development assistance has stimulating effect on domestic revenue mobilization (i.e., increase tax effort). Gupta *et al.* (2003) stated that if foreign aid is primarily in the form of loans, then the tax burden of future loan repayment will be higher so that this will give incentive to enhance domestic revenue mobilization (increase domestic tax effort). The result shows that foreign aid is a stimulating factor for tax revenue, rather than serving as a substitute as tax revenue to finance fiscal deficit. The result of this study is consistent with Teera (2003) of Uganda, and Gupta (2007).

**6.4. Vector Error Correction Model (VECM)**

The short run dynamics of the long run model is estimated using vector error correction model. Variables entering in the short run model are in difference and the coefficient of differenced variables presented in table 10, represent short run dynamics. The coefficient of lagged error correction term ECM (-1) captures the speed of adjustment of the dependent variable towards its long run steady state. The short run model is obtained through the general to a specific model selection method where variables with insignificant coefficients are eliminated from the model till parsimonious model is obtained. Parsimonious model maximizes the goodness of fit of the model with minimum number of statistically significant parameters. Accordingly in this study, due to its insignificance official development assistance and agriculture value added share of GDP are excluded in the short run model. Using this specification the parsimonious short run equation is obtained as indicated in table 10.

Table 10 shows that real GDP per capita income and industry value added share of GDP at their difference have a statistically significant effect on tax revenue in the short run, at 5% level of significance. Inflation is significant at 1% level of significance. The coefficients of variables in the model are jointly different from zero, as the overall significance (i.e. F statistic) is significant at 1% critical value. The model is also free from serial correlation; i.e., Durbin statistics is 1.82. The model is also well fitted model, the explanatory power of the model as measured by R<sup>2</sup> is 0.602165, which implies that 60.22% of the variation in tax revenue is explained by the variation in the variables included in the model.

Table-10. Results of Short Run Model

Variables	Coefficient	Std. Error	T-Statistic	Prob.
DLRGDPPC(-1) (-1))	-0.321906	0.143153	-2.248683	0.0318**
DLCPI(-1)	-0.390906	0.140478	-2.782682	0.0091***
DLINDU(-1)	0.626956	0.242785	2.582353	0.0148**
DLEDU (-1)	-0.242996	0.157595	-1.64637013	0.1061
ECM(-1)	-0.777952	0.132760	-5.859837	0.0000***
C	0.103174	0.025408	4.060685	0.0003***
R-squared	0.602165	Mean dependent var		0.020144
Adjusted R-squared	0.537998	S.D. dependent var		0.126702
S.E. of regression	0.086120	Akaike info criterion		-1.918756
Sum squared residual	0.229916	Schwarz criterion		-1.657526
Log likelihood	41.49699	Hannan-Quinn criterion.		-1.826660
F-statistic	9.384353	Durbin-Watson stat		1.815843
Prob(F-statistic)	0.000016***			

Source: Eviews version 6 output \*\*\*, \*\*, \*, implies significance at 1%, 5% and 10% level of significance, respectively.

The vector error correction term has important implications in linking the short-run periods to the long run period. It represents a deviation from the long run equilibrium which is corrected gradually through a series of short

run partial adjustments. Its coefficient is negative as expected and less than one in absolute value, which is statistically significant at 1% critical value. The sign and magnitude of the coefficient of the error correction term indicates the direction and speed of adjustment of the dependent variable towards its long run steady state path. Thus, the statistically significant and negative sign of ECM (-1) implies the existence of co-integration among variables and hence, the presence of stable long-run relationship. A stable co-integrating relationship adjusts the short-run deviations by the extent of the error correction term. The result in table 4.11 shows that 77.8% of dis-equilibrium in tax revenue is corrected in the first year.

- Similar to the relationship existed in the long run model, LNCPI have a negative short run effect on tax revenue. It shows that 1% increase in inflation results in a 0.39% reduction in tax revenue percentage of GDP, which implies that increasing inflationary pressure discourage tax revenue that will aggravate budget deficit as low level of tax revenue is associated with low level of government revenue. `
- Unlike to the long run effect, RGDPPC has negative and significant short run effect on tax revenue percentage of GDP at 5% significance level. A unit percentage increase in real gross domestic product per capita income leads tax revenue (%GDP) to decrease by 0.32 percent. The result manifested that boost in the real GDP per capita will aggravate the fiscal imbalance in Ethiopia, i.e. at least increase the fiscal gap that would influence the government's ability to finance from within, without resorting to other financing mechanisms. As a result, the government may look for external financing which may ultimately increase the country's dependence on the rest of the world. This fails to conform to economic theory. The negative sign might be because theory suggests that an increase in income has a different impact on different categories of taxes. For instance, in developing countries direct tax ratios are lower than indirect taxes and there exists sizable tax evasion (Chaudhry and Munir, 2010).
- Moreover, in the short run weak institutional capacity, rent seeking, and corruption might be higher. According to [Tanzi and Davoodi \(2000\)](#) institutional quality and governance, are important factors for poor tax collection in developing countries in which Ethiopia is not the exception. This is through its contribution to tax evasion, improper tax exemptions and weak administration. Corrupt tax and custom officials allocate a proportion of their working hours to collect bribes in exchange for alleviating tax burdens of taxpayers offering these bribes; and complicating procedures for taxpayers who refuse to participate in the bribery scheme, thus forcing them out of business or into the informal sector. These activities lower tax revenue for the public treasury.
- Similar to the long run model, the short run estimation has shown that industrial value added has a positive and significant effect on tax revenue as percentage of GDP in Ethiopia. Moreover, the result of this study shows that a one percent increase in industrial value added share of GDP boost up tax revenue by 0.62 percent. It has strong positive impact, which implies that the country should strive for the development and distribution of the sector.

### 6.5. Diagnostic Tests and Model Stability

After estimation of the short run dynamic model, diagnostic tests like, serial correlation, heteroskedasticity, RESET test are made and the result of these tests confirmed the model is free of the problem of serial correlation, homoscedastic, correctly specified and it is stable Hence, the model is adequate.

## 7. CONCLUSION AND POLICY IMPLICATIONS

### 7.1. Conclusion

In countries like Ethiopia, where material and financial resources are in acute shortage so as to carry out various developmental goals, the need to enhance domestic revenue mobilization (i.e., increasing tax effort) is crucial. Hence, the study investigated the determinants of tax revenue in Ethiopia. The study explored the macroeconomic determinants of tax revenue in Ethiopia from 1975 to 2013. It applied Johansen co-integration approach and vector error correction model. The stationary behavior of variables included in the model is tested using ADF test, and the test result showed all variables were stationary at first difference. The long run and short run relationship established between tax revenue and its determinants implied various empirical findings.

The fact that industry value added share and real gross domestic product per capita income were significant, was sufficiently enough to claim that structural variables contribute much for tax revenue generation. However, contrary to economic theory but in line with previous studies per capita income put a detrimental impact on tax revenue in the short run. According to [Aggrey \(2013\)](#) in developing countries, more than half of the tax revenue collected cannot be traced by government treasuries due to corruption and tax evasion. In addition, the negative result might be because theory suggests that an increase in income has a different impact on a different category of taxes. For instance, in developing countries direct tax ratios are lower than indirect taxes and there exists sizable tax evasion ([Chaudhry and Munir, 2010](#)). The study has also revealed that the external sector; i.e., official development assistance was the dominant contributor of tax revenue growth in Ethiopia. Its contribution to tax revenue was almost proportional. This is associated with the role it played to the development of the economy.

One significant conclusion of this study come across was the existence of lower tax revenue performance in the country throughout the study period. This gave birth to the availability of fiscal gap (fiscal deficit) for a long period, though it was declining with the current fascinating economic growth and falling level of unanticipated spending. Therefore, there exists a space to significantly augment the tax performance, if better tax administration is maintained. The development of the industrial sector is also one important accelerator of tax revenue generation in Ethiopia. Despite this, a mere increase in industrial value added share of GDP may not be a guarantee for increasing tax revenue. This is because the study showed that tax revenue was inelastic to the change in industry value added, albeit its response was significant both in the long run and in the short run.

Equally important issue worth mentioning in tax revenue performance was price instability. Inflation remained significant determinants of tax revenue in Ethiopia. Ethiopia has not been a high inflation country before 1975. Coupled with policy changes and occurrence of natural calamities (worst drought) that has resulted in acute shortage of agricultural food production since recent years the country come to face higher inflation. This made tax payers to put their tax liability a side and began to worry about satisfaction of their daily consumption, owing to loss of purchasing power of money. Therefore, the effect of price instability has been holding back tax revenue collection in Ethiopia. This is exactly what was observed in this study.

To sum up, a number of variables affect tax revenue in Ethiopia as evidenced in the empirical findings presented in this study. This study examined a different relationship between tax revenue and its determinants, these relationships are indicative of the role of policies pursued by the country that have a strong influence on a tax revenue generation. Empirical findings of the study revealed that industrial development, macroeconomic condition and external sector are the main policy instruments for tax revenue in Ethiopia. The most noteworthy achievement of this study is that the result of sectoral composition of the economy is congruent with the broad and pro poor economic policy of Ethiopia. That means the industrial sector contributes a lot to tax revenue in the long run. Finally, the study concludes that tax revenue performance in Ethiopia is disappointing; i.e., although, it shows promising trend since a recent past, tax to

GDP ratio remained low wandering around 10 percent during the study period, in which raising tax revenue level shall be at the heart of policy makers.

## 7.2. Policy Implications

Based on the findings of this study the following policy implications were forwarded as an alternative to improve the performance of the private sector and of course to increase its level, having in mind the contributions it makes to the development of the economy in general and the tax system in particular.

- As evidenced from the result of this study, tax revenue has remained to be the largest contributor of the total government revenue in Ethiopia. However, the share of tax revenue to GDP is very low, which would imply that domestic resource mobilization is at an infant stage in Ethiopia. Therefore, improving the efficiency of tax administration, broadening tax bases like, boost in industrial sector shall be given due attention by policy makers. Strategies that will increase economic growth should be facilitated. Per capita GDP has been found to affect tax revenue negatively in the short run in Ethiopia. However, it has positive significant contribution in the long run. Therefore, along with extending the current fascinating economic growth, factors that would hold back the growth in tax revenue has to be checked. This requires policy makers to put good policies in place, which will ensure that tax collection increases as the economy grows.
- Moreover, due to the significant effect of industrial value added share of GDP on tax revenue in the long run, the country has to do with a paradigm shift from the agriculture to the development of the industrial sector, while maintaining the inter relationship between the two sectors. Likewise, the government has to take care of enacting policies that can promote industrial production and it has to strive forward to bring small industries into medium and large industries. The current economic growth performance is also has to be extended.
- Evidenced in this study, foreign aid inflow has positively contributed to domestic revenue mobilization. Therefore, the country has to recognize the role played by aid inflow to the enhance tax revenue growth in general and in meeting different socio-economic, political and social goals. Hence, the allocation of foreign aid inflow should be efficient and spend on items that the country can gain more tax revenue.
- Macroeconomic instability erodes the purchasing power of the people and reduce the value of revenue collected in real terms. Hence, individuals may not avail to pay tax; i.e., they attempted to evade from the tax authority and underreport their actual earning which will understate the amount that would otherwise be collected. Even the economy may exhibit large informal sector. Therefore, the government of Ethiopia shall regulate the macroeconomic situation of the country and find new tax items along with formalizing the underground economy.
- Moreover, policies which could encourage employment growth resulting in greater purchasing power on the part of the consumers who effectively have to pay tax. Particularly, this study recommends measures that boost per capita income growth, structural transformations, introduction of new tax bases have to be considered so as to bring efficient tax administration and enhance revenue growth.

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