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Empirical Analysis of Tax Buoyancy in India

Dr. Aruna M[1], Prof. Padmavathi V.[2]
[1]*Associate Professor ICFAI Business School*
[2]*Ph.D., FIII, PGD, Convener-Center for Women Development, D 005, Department of Economics, IBS Hyderabad- A constituent of IFHE - Deemed to be University*

Abstract **- Tax incomes of the government contribute the country's administration and resources required for its economic progress. India with 29 states and seven union territories, heterogeneous in terms of per capita GDP, population, urban development, culture and very large untaxed informal sector. India's largest modern tax amendment was Goods and Service Tax (GST) which was introduced with the Finance Bill, 2017. Owing to the contemporary relevance an attempt is made in this paper to estimate and establish relationship between tax revenue and gross domestic product at market prices for the period 2000-01 to 2013-14. So as to understand short run and long run tax buoyancy during the study period by employing Nerolvian Partial Adjustment mechanism. The estimated results of the long run tax buoyancy is positive and more than unity , indicating that the growth rate of tax revenue will be relatively higher than the growth rate of the income in the study period.**

INTRODUCTION

Though the tax system in India traces its origin to the prehistoric texts such as Arthashastra, Manusmriti, post-independence Indian Government used the tax system to propel the economic development of the country. Tax incomes of the government contribute the country's administration and resources required for its economic progress. India with 29 states and seven union territories, heterogeneous in terms of per capita GDP, population, urban development, culture and very large untaxed informal sector. Article 256 of the constitution states that "No tax shall be levied or collected except by the authority of law".

INDIA'S TAX STRUCTURE

The tax system in India for long was a complex one which included direct tax, indirect tax, and customs duty with a three – tier federal structure. The central government collect Income tax, customs duties, central excise duty, state governments collect agricultural income, professional tax, value added tax, state excise duty and stamp duty and local municipal bodies collect property tax, water tax, other taxes on drainage and small services until 1 July 2017 when the Goods and Service Tax was implemented.

REASONS FOR TAX AMENDMENT

Beginning of every financial year, Ministry of Finance presents finance budget which covers aspects such as how the previous year has gone and what are the proposals for the next financial year in terms of revenue allocation to various sectors, changes relating to tax law provisions etc., once these proposals are accepted by both houses of parliament it becomes an enacted law. Such tax law changes are termed as 'amendments. India's largest modern tax amendment was Goods and Service Tax (GST) which was introduced with the Finance Bill, 2017.

GST is a value-added Tax (VAT) replaced most of India's indirect taxes levied on Goods and Services by the Central and State governments. Some of the taxes GST replaced include Sales Tax, Central Excise Duty, entertainment tax, octroi, service tax and purchase tax. Proponents of the GST expected that the tax will boost economic growth by up to 2 percent due to greater tax compliance, reduction in cost, and simplification of the tax system.

RELATIONSHIP BETWEEN TAX REVENUE AND NATIONAL INCOME

The tax system may affect the growth of the national income through its effect on consumption or investment (Carl Shoup, 1940).

There are possibilities of increasing consumption by changes in the tax system

- Taxes that do not vary directly with volume of consumption
- Taxes that vary inversely with the amount of consumption
- Tax elements yielding no revenue

Similarly, there are possibilities of increasing investment by changes in the tax system

- Taxes that vary positively with the amount of investment
- Taxes that vary positively with the results of the investment
  - Effect on willingness to invest
  - Effect on ability to invest.
- Tax elements yielding no revenue

The relationship between tax revenue and national income can further be studied

- Taxes having no direct connection with the amount of investment
- Tax elements affecting the mechanism of the market for investment funds.
- Effect of change in consumption on national income
- Effect of change in investment on national income
- Effect on national income through increasing investment
- Net effect of changes in consumption and investment

Objectives of the study include : to estimate average tax buoyancy and to calculate short run and long run tax buoyancy

Sources of data: In order to examine the above states objectives and to test the empirical strength of the hypothesis, the required time series data on Gross Tax revenue and Gross Domestic Product at Market prices for the period between 2000-01-2013-14 has been collected from Handbook of Statistics on Indian economy and Public Finance Statistics.

METHODOLOGY

The specification of linear regression model pertaining to Tax revenue function is :

$Y_t = b0 = b1X1 = Ut$ 1

Where b0 is the Trend Value of tax revenue in the absence of income, known as intercept. The sign of b0 will be positive b1 is the value of the rate of change in gross tax revenue per unit change in income, which is known as slope

The first derivative of Yt with respect to Xt = (dYt/dXt) = b1, it is the rate of change in tax revenue which will remain constant

Ut is the random variable with the usual standard assumptions.

The values of b0 and b1 are estimated by Ordinary Least Squares method.

The responsiveness of gross tax revenue to the changes in gross income is estimated from linear regression model . The specification of the model is :

eYtt.Xt =dYt/dXt . Xt/Yt = b1.Xt/Yt

b1 is the component of tax buoyancy. According to theory, tax buoyancy is directly related to increase in income and inversely related toincrease in tax revenue. In empirical analysis the numerical value of tax buoyancy is calculated at the mean values of tax revenue and national inome. The specification is :

e Yt .Xt = dY?dXt . mean of Xt/ mean of Yt = b1 . mean of Xt ? mean of Yt

Thus the estimate is then referred to as an average tax buoyancy. The probable value of tax buoyancy can be evaluated on the basis of sign of the intercept b0 in the simple linear regression model.

The equation for it is :

Yt = b0 + b1Xt

eYt.Xt = b1Xt/Yt

=b1X1 / b0 +b1X1

The long run tax buoyancy is estimated using Nerlovian partial adjustment mechanism

The specification of the model

$Yt^* = b_0 = b_1X_t$

Where

Y_t^* = Long run revenue collection

Since the Long run tax revenue collections cannot be calculated directly, the following partial adjustment mechanism is employed to calculate the short run tax revenue:

$Y_t - Y_{t-1} = Xt\ (Y_t^* - Y_{t-1})$

$Y_t - Y_{t-1}$ actual change in the tax revenue collection

$Y_t^* - Y_{t-1}$) is desired change in the collection of tax revenue

Xt = Coefficient of partial adjustment , whose value will be more than zero , less than 1 or equal to 1.

If the value is less than one, then the actual change in tax revenue will be smaller than the desired change in tax revenue. If the value is one, then the actual change will be equal to desired change in tax revenue .If the value is zero, it implies that there is no change in the between Yt and Yt-1.

By substituting equation (3) in equation (4) we get the following short run tax revenue function

Yt = Xt ln b0 + Xt b1 ln X t-1 - Xt Y t-1 + Y t-1 …..(3)

Yt = b0 * +b1 * Xt-1 = b* 2 X t-1 ……(4)

Where

b * 0 = Xt b0

b * 1 = Xt b1

b * 2 = 1- Xt

Xt = 1- b * 2

[1- Xt] = - b * 2

b * 1 is the constant Short run tax buoyancy

Long run tax buoyancy with respect to lagged tax revenue

Short Run tax buoyancy will be estimated at the mean values of Yt and Xt as;

= b*1 mean of Xt/mean of Yt

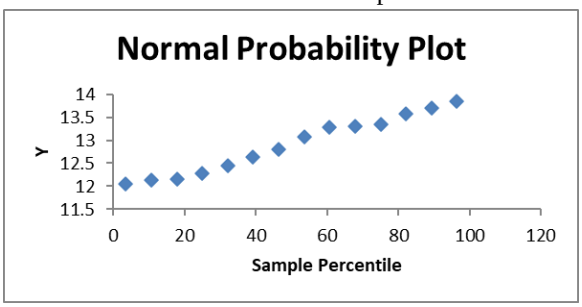
The Long Run tax buoyancy can be calculated by deflating the short run tax buoyancy with

Xt and not taking into considerationYt-1

Long run revenue function = b*1 mean of Xt/ mean of Y*t 1/ Xt

The analysis is carried out on the assumption that there is linear relationship between tax revenue and income

Visual Plot of the data series Gross Tax revenue and Gross Domestic Product at market prices



Empirical Results are presented in Table 1

Summary Output						
Regression Statistics						
Multiple R	0.99206					
R Square	0.984184					
Adjusted R Square	0.982866					
Standard Error	0.081905					
Observations	14					
ANOVA						
	df	SS	MS	F	Significance F	
Regression	1	5.009345	5.009345	746.7228	3.56E-12	
Residual	12	0.080501	0.006708			
Total	13	5.089846				
	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%
Intercept	0.990255	0.436542	2.268407	0.04256	0.039112	1.941397
X Variable 1	1.106868	0.040506	27.32623	3.56E-12	1.018614	1.195122

The regression results of log linear tax revenue function in table 1 indicate that the regression coefficient of log income i.e tax buoyancy is 0.12. Thus it can be inferred that a one percent increase in national income results in increasing the tax revenue by 0.12 percent annually. The size of tax buoyancy as reported in the results is less than unity evincing the fact that tax buoyancy in Indian economy is relatively inelastic during the study period.

The size of the tax buoyancy is evaluated in terms of the sign of intercept which can explained as : If the sign of b0 is positive , it means that the average tax buoyancy will be less than unity. If the sign of b0 is negative, then average tax buoyancy will be less than unity : If the sign of the b0 is zero, it implies that the average tax buoyancy will be unity.

Short run and long run Tax revenue function

The empirical results short run and long run tax revenue function is presented in Table 2

Table 2

Summary Output						
Regression Statistics						
Multiple R	0.99202					
R Square	0.984103					
Adjusted R Square	0.980924					
Standard Error	38912.11					
Observations	13					
ANOVA						
	df	SS	MS	F	Significance F	
Regression	2	9.37E+11	4.69E+11	309.5277	1.02E-09	
Residual	10	1.51E+10	1.51E+09			
Total	12	9.52E+11				
	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%
Intercept	-15692.4	24662.94	-0.63628	0.538886	-70644.9	39260.01
	0.466653	0.285008	1.637334	0.132602	-0.16838	1.101691
	5.5046	2.312533	2.380334	0.03859	0.351956	10.65724

The estimated short run elasticity of tax revenue function, the coefficient of the lagged prices is positive and significant indicating that a 1 percent increase in the income will increase the tax revenue by 0.628 percent, per year, other things remaining constant.

The coefficient value of partial adjustment reported in the results is 0.53 indicating that the actual change in tax revenue will be smaller than the desired change. Further the estimated results of the long run tax buoyancy is positive and more than unity 1.1, indicating that the growth rate of tax revenue will be relatively higher than the growth rate of the income in the study period.

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