ESTIMATION OF TAX BUOYANCY RATES IN ORISSA

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Abstract: This paper studies tax buoyancy for the state of Orissa for the period of 1981-2010. Tax buoyancy explains the relationship between the changes in government's tax revenue growth and the changes in GDP. It refers to the responsiveness of tax revenue growth to changes in GDP. More specifically, the present analysis looks at the sign and size of the coefficient of tax buoyancy in Orissa by fitting a doublelog regression model. Our findings show that taxes are buoyant in the case of Orissa. So, if Orissa's government Tax Revenues will increase will the growth in its GSDP

IndexTerms : Tax Buoyancy, Orissa, GSDP, Tax revenues, tax rates.

I. INTRODUCTION

Orissa is one of the fastest growing state economies in India with a growth rate of 8.48% in 2014-2015. This makes it interesting to study whether the growth of its Gross State Domestic Product (GSDP) is leading to any incresase in the States's Tax Revenues or not, that is whether the taxes are buoyant in Orissa or not.

Tax buoyancy explains the relationship between the changes in government's tax revenue growth and the changes in GDP. It refers to the responsiveness of tax revenue growth to changes in GDP. When a tax is buoyant, its revenue increases without increasing the tax rate. Or a **tax** is said to be **buoyant** if the **tax** revenues increase more than proportionately in response to a rise in national income or output.

With a view to provide an empirical content to the tax buoyancy of 1981-2010 period in the Orissa Tax System, an attempt has been made in the present exercise using the data available for a period of 30 years. More specifically the present analysis looks at the sign and size of the coefficient of tax buoyancy in Orissa by fitting a doublelog regression model.

II. LITERATURE REVIEW

The literature suggests that economic development is expected to bring about both an increased demand for public expenditure (Tanzi, 1987) and a larger capacity to meet these demands (Musgrave, 1969). Effectiveness of measures for increasing tax revenue must be estimated in order to identify their success. Analysis of buoyancy rate is a means for evaluating the effectiveness of policies for improvement in tax revenue. Since gross investment is one of the components of aggregate demand therefore tax buoyancy with respect to investment should also be estimated.

There is a consensus in the literature on the use of per capita income as a proxy for the overall level of development. A higher per capita income reflecting a higher level of development is held to indicate a higher capacity to pay taxes as well as a greater capacity to levy and collect tax revenue (Chelliah, 1971).

With this backdrop, tax buoyancy rates in Orissa are estimated in this analysis.

III. DATA AND METHODOLGY

The data on Gross State Domestic Product(GSDP) is extracted from the Economic Survey of Orissa and Tax Revenue from Ministry of Statistics and Programme Implementation, GoI. Since the purpose of this analysis is to find out the tax buoyancy rates, both GSDP and Tax Revenue data is taken at current market prices, for the year 1980-81 to 2009-10.

In order to calculate the tax buoyancy rates over period of 30 years, log linear model has been used as its slope coefficient measures the proportional change in the value of the dependent variable for a given proportional change in the value of the independent variable, which technically is the tax buoyancy rate.

Tax Buoyancy = % change in Tax revuenue/ % change in Tax Base

The following linear regression equation has been estimated to calculate buoyancy rates.

$$\mathbf{Ln(TR_t) = \alpha + \beta\, Ln(GSDP_t) + \varepsilon_t}$$

Where, TR = Tax Revenue at current market prices (in Rs. Crores) at time t
GSDP = Gross State Domestic Product at current market prices (in Rs. Crores) at time t
α = intercept
β = tax buoyancy rate
ε_t = error term at time t
α andβare the parameters to be estimated and ε is the stochastic disturbance term.

IV. RESULTS AND FINDINGS

The following results were carried out in STATA software :

Table 1

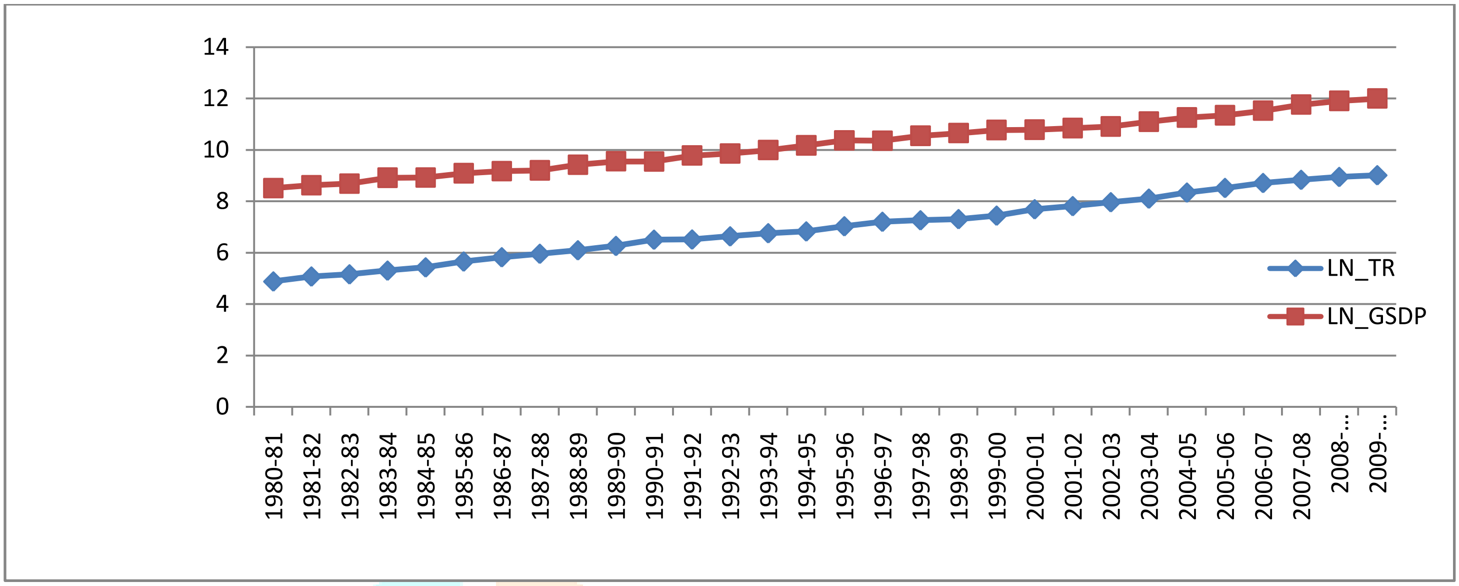
Source	SS	df	MS	
				Number of obs = 30
				F(1, 28) = 2953.94
Model	44.689038	1	44.689038	Prob > F = 0.0000
Residual	.423601711	28	.015128633	R-squared = 0.9906
				Adj R-squared = 0.9903
Total	45.1126397	29	1.55560827	Root MSE = .123

ln_tr	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
ln_gsdp	1.190501	.0219043	54.35	0.000	1.145632	1.235369
_cons	-5.163591	.2243373	-23.02	0.000	-5.623125	-4.704057

OR

$$\mathbf{Ln(TR_t) = -5.163591 + \mathit{1.190501}\ Ln(GSDP_t) + \varepsilon_t}$$

As it can be seen from the results, a proportionate change in GSDP leads to a 1.19 proportionated xhange in Tax Revuenues. Therefore, taxes are buoyant in the case of Orissa. When a tax is buoyant, its revenue increases without increasing the tax rate. So, if Orissa's government Tax Revenues will increase will the growth in its GSDP.



Also, as it can be seen from the time series graph plotted, the growth rates of GSDP and Tax Revenues move in similar fashion for the period of 30 years. Therefore, we can conclude that Tax Revenues of Orissa government increases with the income levels of households in the state, without the need to raise the tax rates.

Checking for autocorrelation

Since the data we took for GSDP and tax revenue is time series, there is a possibility of autocorrelation in the data , that is, the error terms may be correlated over time for this model. To check for autocorrelation we carry out the following test :

Testing for Autocorrelation

Ho : No Autocorrelation

Regression model :

$$U_t = P\, U_{t-1} + V_t$$

U_t = error term at time period t
U_{t-1} = error term at time t-1
V_t = error term of the AR(1) model

Carrying out the above regression in STATA gives :

Table 2

regress r1 r0

```
      Source |       SS           df          MS             Number of obs =      29
-------------+------------------------------                F(  1,    27) =    9.40
       Model |  .107094116     1          .107094116           Prob > F      =  0.0049
    Residual |  .307456803    27          .011387289           R-squared     =  0.2583
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-------------+------------------------------           Adj R-squared =  0.2309
       Total |  .414550919    28        .01480539      Root MSE      =  .10671
```

Table 3

r1	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
r0	.5106825	.1665246	3.07	0.005	.1690023	.8523627
_cons	.0012544	.0198262	0.06	0.950	-.0394256	.0419344

Therefore, **P = .5106825 . Since DW statisctic, d = 2(1-P) =2(1- .5106825) = 0.97**

So, d = 0.97 and since $d < d_l < d_u$ ie .97< 1.352< 1.489, we reject our null hypothesis and conclude that **there is autocorrelation in the data.**

Also, carrying out **Durbin Watson test** in the STATA, we get the same results :

Ho: No positive autocorrelation
Ho*: No negative autocorrelation

Durbin-Watson d-statistic(2, 30) = .9704773

Correction for autocorrelation

Applying Cochane Orcutt regression in STATA we get corrected estimators for autocorrelation, which is

$$\mathbf{Ln(TR_t) = -4.678757 \quad + \mathit{1.144161} \quad Ln(GSDP_t) + \varepsilon_t}$$

Cochrane-Orcutt AR(1) regression -- iterated estimates

```
      Source |       SS           df       MS           Number of obs =      29
-------------+------------------------------            F(  1,    27) =  633.60
       Model |  6.98829177     1   6.98829177           Prob > F      =  0.0000
    Residual |  .297794474    27   .011029425           R-squared     =  0.9591
-------------+------------------------------            Adj R-squared =  0.9576
       Total |  7.28608624    28   .260217366           Root MSE      =  .10502


------------------------------------------------------------------------------
       ln_tr |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
     ln_gsdp |   1.144161   .0454546    25.17   0.000     1.050896    1.237426
       _cons |  -4.678757    .475502    -9.84   0.000    -5.654406   -3.703107
-------------+----------------------------------------------------------------
         rho |  .5769015
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Durbin-Watson statistic (original) 0.957950
Durbin-Watson statistic (transformed) 2.025265

Therefore, as it can be seen from the results, a proportionate change in GSDP leads to a 1.14 proportionate change in Tax Revenues. Therefore, taxes are buoyant in the case of Orissa. When a tax is buoyant, its revenue increases without increasing the tax rate. So, if Orissa's government Tax Revenues will increase will the growth in its GSDP.

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