



Assessing the Effects of Tax Elasticity on Government Spending

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ABSTRACT

This paper assesses the effects of Tax elasticity on Government Spending state wise from 2001-2010 for five major states in terms of population. OLS Regression model is used where the relationships are assumed to be linear. The variables used in the regression model are: G_t = the government spending at the state level, the dependent variable Y_t = the Gross Domestic Product (GDP) of the state C_t = the central assistance to the state, E_t = the elasticity variable, The subscript 't' refers to the corresponding year of analysis and $b_0, b_1, b_2, b_3, b_4, b_5$ are regression coefficients. In most of the cases, elasticity bore a positive and significant relation to the level of government spending except in the case of Bihar, where the coefficient was negative and insignificant.

Keywords-- Tax elasticity, Tax revenue, Govt. expenditure, OLS regression, GDP, Central assistance

measure this for the case of US during the years 1970-1975. The authors used OLS estimation to test the hypothesis and conclude that there is significant relation between tax elasticity and government spending levels i.e., states with significantly higher tax elasticities tend to spend more than the states with correspondingly lower tax elasticities.

Fauzia Mukarram in the paper '*Elasticity And Buoyancy Of Major Taxes In Pakistan*' [2] (2001) tries to estimate the elasticity and buoyancy for the four major tax revenue sources of Pakistan – direct tax, sales tax, customs duties and excise duties – for the period 1981-2001 using the Chain Indexing Technique. Elasticity is calculated by first removing the effects of discretionary changes on the tax revenues and then a two-step regression analysis which gives the responsiveness of the tax base to the GDP and tax revenue to tax base. The paper finds that the elasticity of direct and sales taxes have a relatively higher elasticity as compared to customs and excise duties, which appear to be very rigid. Also, it was found that the discretionary measures were found to have a positive effect on the tax structure, improving the elasticities of all the taxes.

Ankita Gupta in her paper '*The Trends and Responsiveness of Personal Income Tax in India*' [3] (2009) presented in the Fourth Annual International Conference on Public Policy and Management, analyses the responsiveness of personal income tax revenue to changes in income and tax reforms. Tax elasticity and buoyancy have been used to measure this response. To study the data the hypothesis used is : Buoyancy of Personal income tax in pre and post liberalization period has remained same. The hypothesis is tested using time series data and OLS method. The paper concludes by rejecting the null hypothesis and implying that there has been a significant change in the buoyancy between the pre and post liberalization period which can be attributed to the tax reforms in the later period.

I. INTRODUCTION

Tax elasticity is defined as the changes in tax revenue generated in response to changes in tax payer's income, without a change in statutory tax rates. In this report we try to analyze the effects of tax elasticity on government spending of various Indian states. The common notion is that the greater the elasticity in tax structures, the greater is the level of government spending. This is because of the concept of 'fiscal illusion'^[*].

II. LITERATURE REVIEW

Eleanor D. Craig and A. James Heins in their paper '*The effect of tax elasticity on government spending*' [1] (1980) explore the effects of tax elasticity structures on the amount of spending by state governments. The authors define tax elasticity as tax revenue generating capability of a tax structure in response to increases in tax payer's income without a change in statutory tax rates. The authors

The authors Brima Ibrahim Baimba Kargbo and Festus O. Egwaikhide in their paper 'Tax Elasticity in Sierra Leone : A Time Series Approach' [4] published in the International Journal of Economics and Financial Issues in 2012 study the impact of the tax reforms on the tax revenues. The impact is studied by calculating the tax buoyancy and the tax elasticity for different types of taxes. To adjust the tax data for discretionary changes, Singer's dummy variable method was used. This analysis was empirically applied to data for Sierra Leone for the period from 1977 to 2009. The paper concludes by accepting the importance of discretionary measures of the government in maintain the tax revenues during the period.

'Short- and long-run tax elasticities: The case of the Netherlands'. [5] This paper provides estimates for the base elasticities of Dutch taxes, paying particular attention to differences between short-and long-term elasticities, and allowing for asymmetric adjustment. Estimates are presented for five tax categories for the period 1970-2005, after making appropriate corrections for effects of discretionary tax measures. The empirical results indicate that short- term elasticities often are lower than long-term ones, notably when taxes are subdued. Consequently, shocks to tax revenues tend to be aggravated by the dynamics of short-term elasticities. Ignoring differences between short- and long-term elasticities contributes to revenue 'surprises' and an incorrect assessment of the fiscal stance.

III. OBJECTIVE

To test the effects of Tax elasticity on Government Spending at state level.

IV. METHODOLOGY^[**]

We test the hypothesis using the following regression model. The relationships are all assumed to be linear and are estimated by Ordinary Least Squares method.

The variables used in the regression model are:

G_t = the government spending at the state level, the dependent variable

Y_t = the Gross Domestic Product (GDP) of the state

C_t = the central assistance to the state

E_t = the elasticity variable

The subscript 't' refers to the corresponding year of analysis

And $b_0, b_1, b_2, b_3, b_4, b_5$ are regression coefficients.

The regression equation:

$$G_t = b_0 + b_1 Y_t + b_2 C_t + b_3 E_t + u_t$$

Findings:

The analysis has been done for 5 states viz., Andhra Pradesh, Maharashtra, Uttar Pradesh, Bihar and Punjab.

Table 1 OLS regressions: Government spending as the dependent variable: b coefficients and (t-ratios) for Maharashtra

Dependent variable	Y_t	C_t	E_t	R-Squared
Government spending (G_t)	-11.74 (-0.29)	3186.92 (1.9)	4792531.79 (8.2)	0.90

We would expect the coefficients of Central assistance and GDP variables to be large and significant as they are the major determinants of government spending. But from the results, it can be observed that the coefficients of GDP variables is negative (although very small) and almost insignificant. On the other hand, the

coefficient of central assistance is very large and highly significant as one would expect. We also notice that the elasticity coefficient is also very large and significant and thus one can conclude that in this particular case, the elasticity of tax has a significant effect on the government spending in Maharashtra.

Table 2 OLS regressions: Government spending as the dependent variable: b coefficients and (t-ratios) for Bihar

Dependent variable	Y_t	C_t	E_t	R-Squared
Government spending (G_t)	26.46 (0.19)	-6.63 (-0.0047)	-385998.68 (-0.71)	0.28

We would expect the coefficients of Central assistance and GDP variables to be large and significant as they are the major determinants of government spending. But on observing the results, we can see that the coefficient of central assistance is negative (although small) and also the coefficient of GDP variable is also very small and almost insignificant. It can also be seen that the

elasticity coefficient is negative and highly insignificant. But as it is evident from the value of R-square which is only 0.28 here, we can say that there are other variables which significantly affect the level of government spending other than the ones included here and hence we can't come to any conclusion from here.

Table 3 OLS regressions: Government spending as the dependent variable: b coefficients and (t-ratios) for Andhra Pradesh

Dependent variable	Y_t	C_t	E_t	R-Squared
Government spending (G_t)	58.21 (3.176)	-1110.44 (-1.84)	917097.70 (9.805)	0.88

We would expect the coefficients of Central assistance and GDP variables to be large and significant as they are the major determinants of government spending. And from the table, although the coefficient of GDP is positive and significant, the one of central assistance to states is negative and insignificant. And the elasticity

coefficient is large, positive and highly significant implying a positive impact on the level of government spending in Andhra Pradesh. Thus in the case of Andhra Pradesh, it can be said that elasticity of tax definitely has a positive impact on the level of govt. spending.

Table 4 OLS regressions: Government spending as the dependent variable: b coefficients and (t-ratios) for Punjab

Dependent variable	Y_t	C_t	E_t	R-Squared
Government spending (G_t)	2.78 (0.065)	4724.14 (2.96)	2290037.82 (6.375)	0.83

We would expect the coefficients of Central assistance and GDP variables to be large and significant as they are the major determinants of government spending. And accordingly, the coefficients of both central assistance to states and elasticity variables are highly positive and also very significant. It can also be seen that GDP although

small, has a positive impact on the level of government spending. Hence, we can say that, in this case, elasticity definitely has a very high positive impact on the value of government spending in the case of Punjab, thus validating our hypothesis.

Table 5 OLS regressions: Government spending as the dependent variable: b coefficients and (t-ratios) for Uttar Pradesh

Dependent variable	Y_t	C_t	E_t	R-Squared
Government spending (G_t)	609.11 (1.79)	-10996.81 (-1.44)	2249467.54 (8.51)	0.79

We would expect the coefficients of Central assistance and GDP variables to be large and significant as they are the major determinants of government spending. In this case, it can be observed that the coefficient of GDP variable is positive and slightly significant. But the coefficient of central assistance is highly negative and insignificant implying a negative relation. Most importantly, the coefficient of Elasticity variable shows a very high positive value and is highly significant thus validating out hypothesis about the effect of elasticity on government spending.

V. CONCLUSION

In this report, we analyzed the effects of elasticity on the levels of Government spending in 5 major states of India. From the analysis we can conclude that in most of the cases, elasticity bore a positive and significant relation to the level of government spending except in the case of Bihar, where the coefficient was negative and insignificant. It's interesting to note that the value of R-squared of Bihar was 0.28 indicating that the change in the level of government spending is not fully explained by the

variables used. This means that there are other variables which influenced the movement of the dependent variables.

But as we have observed in majority of the cases, the tax elasticity variables had a positive and significant impact on the levels of government spending thus validating our hypothesis. Thus, from the context of the present study, we conclude that tax elasticity definitely has a positive effect on the government spending of that particular state. Thus a state which is tax elastic, can afford to increase its expenditure even without a change in its statutory tax rates (to increase its revenue).

[*]The illusion being that if the legislature does not enact a statute raising tax rates, taxes have not increased. It follows that states with elastic tax structures experience greater increases in tax revenues without having to go through the hassles of a tax increase, and those states will spend more.

[**]The methodology has been adapted from ELEANOR D. CRAIG and A. JAMES HEINS's paper, 'The effect of tax elasticity on government spending'

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APPENDIX

Appendix Table 1: Maharashtra

Year	total exp	state Tax revenue	Central Assistance	state gdp	elasticity
2001-2	4,386,213	25,714.00	2,166.50	273,188	0.45
2002-3	4,957,103	26,441.60	3,004.50	299,479	0.29
2003-04	6,260,524	29,110.90	4,273.90	340,600	0.74
2004-05	18,862,782	41,607	5,242	415,480	1.95
2005-06	20,613,927	46,347	8,598	486,766	0.66
2006-07	17,088,124	46,122	8,555	584,498	0.02
2007-08	21,884,918	54,211	9,089	684,817	1.02
2008-09	26,369,412	58,103	14,306	753,969	0.71
2009-10	52,909,819	63,959	17,484	867,866	0.67

Data Source: Analysis of state Budgets (Various years), Reserve Bank of India website (www.rbi.org.in)

Appendix Table 2: Bihar

Year	state Tax revenue	total exp	Central Assistance	state gdp	elasticity
2001-2	8,610.40	1,486,929	1,247.20	57,657	1.57
2002-3	9,488.30	1,775,242	1,757.10	64,965	0.80
2003-04	10,894.70	1,913,369	2,184.70	66,174	7.96
2004-05	14,414	3,106,932	4,404	77,781	1.84
2005-06	17,049	3,815,900	5,369	82,490	3.02
2006-07	17,325	11,499,770	5,247	100,737	0.07
2007-08	21,091	3,848,045	7,048	113,680	1.69
2008-09	26,098	4,914,774	9,779	142,279	0.94
2009-10	26,295	5,352,963	10,606	164,547	0.05

Data Source: Analysis of state Budgets (Various years), Reserve Bank of India website (www.rbi.org.in)

Appendix Table 3: Andhra Pradesh

Year	state Tax revenue	Central Assistance	total exp	state gdp	elasticity
2001-2	15,706.30	3,484.90	3,130,622	156,711	1.23
2002-3	17,529.30	3,354.10	3,488,760	167,096	1.75
2003-04	19,205.50	4,096.60	4,365,441	190,017	0.70

2004-05	26,774	4,926	6,404,883	224,713	2.16
2005-06	33,611	6,025	7,634,287	255,941	1.84
2006-07	32,792	4,965	13,887,781	301,035	0.14
2007-08	41,900	7,355	10,052,167	364,813	1.31
2008-09	48,908	12,379	11,050,749	426,765	0.98
2009-10	52,773	11,526	12,741,737	476,835	0.67

Data Source: Analysis of state Budgets (Various years), Reserve Bank of India website (www.rbi.org.in)

Appendix Table 4: Punjab

Year	Central Assistance	state Tax revenue	total exp	state gdp	elasticity
2001-2	917.3	5,574.70	1,677,978	79,611	2.87
2002-3	1,622.10	6,473.50	1,873,922	82,249	4.87
2003-04	1,596.40	7,311.00	2,293,418	90,089	1.36
2004-05	3,462	9,842	8,633,610	96,839	4.62
2005-06	2,666	11,332	16,839,898	108,637	1.24
2006-07	2,240	10,583	17,054,224	127,123	0.39
2007-08	3,825	12,321	18,750,298	152,245	0.83

2008-09	2,223	13926	12,924,250	174,039	0.91
2009-10	2,794	16,384	12,938,181	197,500	1.31

Data Source: Analysis of state Budgets (Various years), Reserve Bank of India website (www.rbi.org.in)

Appendix Table 5: Uttar Pradesh

Year	state Tax revenue	Central Assistance	total exp	state gdp	elasticity
2001-2	21,691.50	4,378.40	4,279,180	158,260	0.38
2002-3	22,927.10	3,984.20	4,537,741	190,269	0.28
2003-04	26,303.00	4,690.70	7,350,308	206,855	1.69
2004-05	38,093	6,328	11,351,780	226,972	4.61
2005-06	46,262	8,358	12,149,987	260,841	1.44
2006-07	46,216	7,851	67,871,099	293,172	0.01
2007-08	57,882	11,908	29,343,510	336,317	1.72
2008-09	63,677	13,144	30,629,451	383,026	0.72
2009-10	66,967	15,952	34,393,021	444,685	0.32

Data Source: Analysis of state Budgets (Various years), Reserve Bank of India website (www.rbi.org.in)