

Tax Buoyancy And Tax Elasticity In India: A Log Regression Model

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Abstract: *The paper examined the tax elasticity and tax buoyancy of Center, State and Combine government during 1990-91 to 2015-16. The study has used log regression model with the help of E-views software to calculate the coefficient value. Even the study found that discriminatory changes and increase in GDP both have been proved tax productive. Even the study compares the value of tax elasticity and tax buoyancy for different period of time. The study revealed that compare to Centre government, the State Governments are more tax productive.*

Keyword: *Tax, Direct tax, Indirect tax JEL CLASSIFICATION: H21, H24, H25*

I. Introduction

A sound public finance is a precondition for the development of any nation and tax policy is an integral part of it. It is often said that history of country (Shumpeter, 1954) is determined by its fiscal history. In the post-independence years, with the gradual abatement of political and economic uncertainty, stimulating and accelerating growth was one of the primary objectives of fiscal policy. Thus, India embarked on a planning process since 1950-51 which assigned a large role to the public sector and taxation was made the mainstay of public finances. Fiscal policy (Singh N. , 2013) focused on achieving greater equity and social justice during the 1970s and both taxation and expenditure policies were employed towards fulfilling this objective. The external payments crisis of 1991, which led to the initiation of economic reforms (Rani, 2014) in India, was the result of deteriorating fiscal situation during the latter half of 1980s. The economic reforms have two phases known as internal reforms and external reforms and tax reform was part of internal reforms. The tax reforms have been carried out in both direct and indirect taxes.

In seventies of twentieth century it was found the effective marginal tax rate was abnormally high (97.75%), whereas the Wanchoo committee indicated that high tax rate in India is main reason for tax evasion. In 1984-85, Finance minister Pranab Mukharjee initiated rationalization of tax rates. In eighties Finance minister V. P. Singh extended tax rationalization and covered wealth tax and indirect taxes also. In nineties Finance minister Manmohan Singh initiated economics reforms which has brought structural changes in tax policy through reduction in tax rates, minimizing tax slabs, introduction of service tax and several other measures.

1.1 : Major Components of Taxation policy:

Taxes are classified in two broad categories as Direct tax and Indirect tax. Direct tax includes income tax, corporate tax, and wealth tax whereas indirect taxes include Excise duty, Custom duty, Sales tax, Service tax etc.

Taxation: Tax is a (Singh & Kumar, 2008) compulsory contribution imposed by the government on its citizen to meet its general expenses incurred for the common goods without any corresponding benefits to the tax payers.

Direct tax: J S Mills defined direct tax (Mithani, 1997) as, "one which is demanded from the very person who, it is intended or desired, should pay it."

Indirect tax: Charges levied by the state on consumption, expenditure, privilege, or right but not on income or property.

Income tax: The personal income tax is deemed to be the most measure of the ability of a person's economic standing.

Capital Gain Tax: The tax on the gain from the sale, exchange or transfer of capital assets is known as

capital gain tax.

Corporate tax: Corporation tax is income tax levied on the annual profit of the joint stock companies.

Wealth Tax: Wealth tax which is distinct from income tax, takes three forms, viz., (i) annual tax on net wealth, (ii) Capital levy and (iii) Death duty.

Custom Duty: Custom duties (Ghodke, 2000) or tariff duties are taxes on goods crossing the border of the country.

Excise Duty: Excise duty or excise tax is a tax levied on the production of goods within the country and collected at the factory itself from the manufacturer.

Service Tax: The tax levied on services considered as service tax. The service sector includes health care, education, social securities, leasing, entertainment, telecommunication, banking, hotel, transportation, publicity, legal and financial services etc.

State Level Tax (VAT): To deal with the cascading effects of a traditional turnover tax, some expert have suggested a single point VAT (Rani V. , 2014) at the central level to replace both excise duty and sales tax.

Goods and Service tax (GST): The GST is a part of recent indirect tax reforms to evolve an efficient and harmonized consumption tax system in the country. GST is simplified tax structure (Sinha, 2016) applied on both goods and services. It is a value added tax levied at all points in the supply chain with credit allowed for any tax paid on input acquire for use in making the supply chain.

Elasticity and Buoyancy of Tax: "Tax elasticity (Mukul, 1977) may be defined as the ratio of a percentage change in adjusted tax revenue to a percentage change in income. On the other hand, tax buoyancy refers to changes in actual tax revenues due to the changes in income as well as due to the changes in discretionary measures such as tax rates and tax bases"

II. Review Of Literature

A study in Pakistan that was having object of removing distortion in Pakistan's tax system (Fauzia, 2001) during 1981 to 2001 was carried with the help of econometrics model. The study has used given model for calculation of tax elasticity or tax buoyancy,

$$\text{Log (TR)} = \alpha + \beta_1 \cdot \text{Log (TB)} + \epsilon$$

Where, TR = Tax Revenue, TB = Tax Base and β_1 = tax elasticity/buoyancy

The study finds values of tax elasticity and tax buoyancy for Direct tax 1.13 and 1.61, for custom duty 0.32 and 0.55, for Excise duty 0.47 and 0.76, for sales tax 0.99 and 1.55 and for total tax 0.64 and 1. The study indicated the value of tax elasticity and tax buoyancy has increased in Pakistan compare to previous years.

According to findings of M. Govinda Rao (Rao M. G., 2005) on the basis of trends of Tax-GDP ratio from 1950-51 to 2003-04, and the result showed that the tax reform has enhanced the tax-GDP ratio. There was study increase in tax-GDP ratio from 6.3% in 1950-51 to 16.1% in 1987-88 and further 15.8 % in 1992-93. There was little decline in the ratio in 1997-98 where it was 13.4 % but again increased above one point and came to 15.2% in 2003-04.

An empirical analysis which has assess the Individual Income tax reforms (Dasgupta, 2005) with the help of secondary data for 1966 to 2005, proved that the reduction in tax rates have decreased tax burden on individuals and buoyant revenue which is major success for policy initiatives.

An analysis in Kenya has assessed responsiveness of tax revenue (Peter, 2011) to change in national income, during 1986 to 2009. The study finds that major taxes in Kenya are found to be tax inelastic. The study has used log regression model as, $\text{Log (T)} = \alpha + \beta_1 \cdot \text{Log (B)} + \epsilon$

Where, T = Tax Revenue, B = Tax Base and β_1 = tax elasticity/buoyancy

A time series analysis of tax elasticity and buoyancy (Timsina, 2008) reveals that tax structure in Nepal is quite inelastic for the period 1975-2005. The reason for low tax elasticity in Nepalese tax system is due to various factors like exemptions, tax incentives, duty waivers, low compliance and the large sectors of the economy which are not subject to taxation.

A paper which has examined the elasticity and buoyancy of tax components (Samwe & Isaac, 2012) and tax system in Kenya, using time series data during 1985 to 2009 found that Kenya's tax system is neither income elastic nor buoyant. It was found that the elasticity value of whole Kenyan tax system is 0.509, it indicates with the 1% growth in Kenyan GDP the tax revenue grew by 0.5%.

A study which has used Singer method of dummy variable to trace the effect of discretionary tax measures (Kargbo & Festus, 2012), to examine the base elasticity of the tax system in Sierra Leone during 1977 and 2009. The study found that the discretionary tax measures proved effective to generate more revenue and at the same time period the tax system was quite inelastic. It is observed that except in case of personal income tax, in case of other taxes like total tax system, import duty, domestic transaction tax and corporate tax the tax buoyancy value is higher than tax elasticity value.

An article which measures productivity of Nigerian Tax System (Eugene & Chineze, 2015) during 1994 to 2013 through log regression model with the help of Minitab statistical software revealed that there is positive relationship between tax policy and tax base, and weak relationship between tax revenue and economic growth. An empirical investigation that has examined tax buoyancy in Kenyan tax system (Mawia & Nzomoi, 2013) used log regression model for the measurement of tax buoyancy has taken GDP

at current factor cost as a base for Income tax, Private consumption for VAT, Private consumption for Excise duty, Import of Goods and services for import duty and GDP at current market price for total tax revenue. Tax buoyancy (Jenkins, Kuo, & Shukla, 2000) measures total response of tax revenue to change in national income, the total response includes both increase in income and discretionary changes like change in tax base, change in tax rate etc. The responsiveness of tax revenue to the discretionary change in the tax rate and tax base in relation to GDP is termed as buoyancy of tax. The tax revenue purely measures response of tax revenue to the change in national income.

An article (Bhalla, 2004) indicated from the study of Indian tax revenue data from 1988 to 2004, that the tax cuts were resulted in increase in revenue. So the tax reform initiatives, including both reduction of tax rates and removal of exemptions, would lead to a significant increase in direct tax revenues.

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According to findings of M. Govinda Rao (Rao M. G., 2005) on the basis of trends of Tax-GDP ratio from 1950-51 to 2003-04, and the result showed that the tax reform has enhanced the tax-GDP ratio. There was study increase in tax-GDP ratio from 6.3% in 1950-51 to 16.1% in 1987-88 and further 15.8 % in 1992-93. There was little decline in 1997-98 where it was 13.4

% but again increased above one point and came to 15.2% in 2003-04.

A research paper which has used double log regression model (M. & Upender, 2008) to find different coefficient of tax for India during 1950-51 to 2004-05, has assessed time series for stationary with ADF and PP test. During pre-reform era the tax buoyancy was just more than unity and in post-reforms era it is less than unity. A study examined progressivity of Indian tax system (Gupta, 2009), examines buoyancy of tax pre and post reforms era (1980-81 to 2006-07). It is found that before economic reforms the tax buoyancy was 0.85 and after economic reforms it was 2.42. The findings indicate reduction in top marginal tax rate, reduction in tax slabs, high economic growth and administrative reform has put favorable impact on productivity of tax. A time series analysis has assessed the elasticity of tax (Acharya, 2013) in India during 1991 to 2010, found that the tax elasticity for Direct tax is 1.63, for Indirect tax 0.90 and for gross tax revenue 1.2. During the same period tax buoyancy coefficient remained one for Direct tax, Indirect tax and Gross tax revenue. That proves the responsiveness of tax revenue is better to change in national income.

An IMF working paper which has examined and compared the tax buoyancy (Dudine & Jalles, 2017) for one hundred and seven countries includes advanced, emerging and low-income countries for the period of 1980 to 2014, found that long-run buoyancy of total revenue is not different from one in all country groups whereas short run buoyancy in advanced nation is less than one and in emerging and less developed nation it is more than one. Specifically for India, the long run tax buoyancy is 1.104 and the short run tax buoyancy is 1.668.

III. Research Methodology

This study compiles all policy initiatives as a part of tax reforms, its effect on revenue side. The policy initiatives include announcements regarding to direct taxes, indirect taxes and others. The trends are related to absolute and proportional revenue from various sources of direct and indirect taxes. The impacts talk about the effects of tax policies on productivity of particular tax. The study compares revenue sources of Center, State and Combine government.

1: Area of Study: The study has analyzed data of Indian Public Finance, specially related to tax revenue during 1990-91 to 2015-16. Tax revenue is composition of direct tax and indirect tax, whereas direct tax includes corporate tax, personal income tax (PIT), wealth tax etc., and indirect tax is composition of Sales tax, Service tax, Custom duty, Excise duty etc. Apart from this the study examines data of Gross Domestic Product (GDP).

2: Source of Data: The major sources of data are series of Indian Public Finance Statistics from 1990-91 to 2015-16 which is published by Indian Finance Ministry. The study has also uses Handbook of Statistics on Indian Economy for 2015-16 which is published by Reserve Bank of India.

3: Objective of Study: The study has following objectives;

- 1) To estimate the tax elasticity of various taxes during 1990-91 to 2015-16
- 2) To estimate the tax buoyancy of various taxes during 1990-91 to 2015-16
- 3) To compare the tax elasticity and tax buoyancy value for different period of time
- 4) To compare the tax elasticity and tax buoyancy value for Centre, State and Combine government during the 1990-91 to 2015-16

4: Model of Study: The Study has used log regression Model to measure elasticity and Buoyancy of various taxes through regression analysis.

$$\text{Log (TR)} = \alpha + \beta_1 \cdot \text{Log (TB)} + \epsilon$$

Where, TR = Tax Revenue, TB = Tax Base and β_1 = tax elasticity/buoyancy

Table 1: Base selected for Tax Elasticity and Tax Buoyancy of particular Tax

For particular tax	Base for Regression for (Tax Elasticity)	Base for Regression for (Tax buoyancy)
Total tax revenue	GDP	Non-Agriculture GDP

The model has used GDP as a base for measuring tax elasticity and Non-Agriculture GDP as a base for measuring tax elasticity.

5: Major Variables: Major variables of study are, (1) Center Governments Total Tax Revenue (CTTR), (2) State Governments Total Tax Revenue (STTR), (3) Combine Governments Total Tax Revenue (COMTTR), (4) Gross Domestic Product at factor price (GDP), (5) Non- Agriculture GDP (NAGDP), (6) Long term tax elasticity (LT tax elasticity) and (7) Short term tax elasticity (ST tax elasticity)

IV. Findings And Conclusion

1: Tax Elasticity for Centre Government's Tax Revenue (CTTR)

(1) $\text{Ln CTTR} = 1.606352 + 1.039982 \text{ Ln GDP}$
(7.47) (49.55)

Duration = 1990-91 to 2015-16, $R^2 = 0.99$, P-Value = 0.000 and DW = 0.6002

(2) $\text{Ln CTTR} = 3.434636 + 0.841105 \text{ Ln GDP}$
(7.85) (17.76)

Duration = 1990-91 to 1999-2000, $R^2 = 0.98$, P-Value = 0.000 and DW = 1.8099

(3) $\text{Ln CTTR} = 0.0999 + 1.184332 \text{ Ln GDP}$
(12.54) (15.59)

Duration = 2000-01 to 2010-11, $R^2 = 0.96$, P-Value = 0.000 and DW = 0.8091

(4) $\text{Ln CTTR} = 4.1440 + 0.819860 \text{ Ln GDP}$
(6.68) (15.25)

Duration = 2011-12 to 2015-16, $R^2 = 0.99$, P-Value = 0.006 and DW = 2.6484

2: Tax Buoyancy for Centre Government's Tax Revenue

(1) $\text{Ln CTTR} = 2.429734 + 0.983691 \text{ Ln NAGDP}$
(12.63) (51.09)

Duration = 1990-91 to 2015-16, $R^2 = 0.99$, P-Value = 0.000 and DW = 0.6095

(2) $\text{Ln CTTR} = 4.058037 + 0.801328 \text{ Ln NAGDP}$
(10.55) (18.57)

Duration = 1990-91 to 1999-2000, $R^2 = 0.98$, P-Value = 0.000 and DW = 1.8868

(3) $\text{Ln CTTR} = 0.896576 + 1.131889 \text{ Ln NAGDP}$

(1.32) (17.05)

Duration = 2000-01 to 2010-11, $R^2 = 0.97$, P-Value = 0.000 and DW = 0.8892

(4) $\text{Ln CTTR} = 4.689781 + 0.785981 \text{ Ln NAGDP}$

(7.79) (14.80)

Duration = 2011-12 to 2015-16, $R^2 = 0.99$, P-Value = 0.0007 and DW = 2.3494

3: Tax Elasticity for State Government's Tax Revenue (STTR)

(1) $\text{Ln STTR} = 1.275522 + 1.089786 \text{ Ln GDP}$

(9.30) (81.40)

Duration = 1990-91 to 2015-16, $R^2 = 0.99$, P-Value = 0.000 and DW = 0.4910

(2) $\text{Ln STTR} = 3.434636 + 0.944149 \text{ Ln GDP}$

(15.29) (50.76)

Duration = 1990-91 to 1999-2000, $R^2 = 0.99$, P-Value = 0.000 and DW = 2.10341

(3) $\text{Ln STTR} = 1.109704 + 1.102457 \text{ Ln GDP}$

(3.19) (33.27)

Duration = 2000-01 to 2010-11, $R^2 = 0.99$, P-Value = 0.000 and DW = 0.8748

(4) $\text{Ln STTR} = -0.397248 + 1.239803 \text{ Ln GDP}$

(-0.22) (8.06)

Duration = 2011-12 to 2015-16, $R^2 = 0.96$, P-Value = 0.0040 and DW = 1.7009

4: Tax Buoyancy for State Government's Tax Revenue

(1) $\text{Ln STTR} = 2.1416933 + 1.029934 \text{ Ln NAGDP}$

(14.86) (71.25)

Duration = 1990-91 to 2015-16, $R^2 = 0.99$, P-Value = 0.000 and DW = 0.3938

(2) $\text{Ln STTR} = 3.337623 + 0.898285 \text{ Ln NAGDP}$

(19.42) (46.61)

Duration = 1990-91 to 1999-2000, $R^2 = 0.99$, P-Value = 0.000 and DW = 1.8002

(3) $\text{Ln STTR} = 1.874251 + 1.051400 \text{ Ln GDP}$

(6.46) (37.22)

Duration = 2000-01 to 2010-11, $R^2 = 0.99$, P-Value = 0.000 and DW = 1.2741

(4) $\text{Ln STTR} = 0.384393 + 1.192423 \text{ Ln GDP}$

(0.24) (8.64)

Duration = 2011-12 to 2015-16, $R^2 = 0.99$, P-Value = 0.0007 and DW = 2.3494

5: Tax Elasticity for Combine Government's Tax Revenue (COMTTR)

(1) $\text{Ln COMTTR} = 2.112370 + 1.067720 \text{ Ln GDP}$

(13.94) (72.18)

Duration = 1990-91 to 2015-16, $R^2 = 0.99$, P-Value = 0.000 and DW = 0.5090

(2) $\text{Ln COMTTR} = 3.787153 + 0.886063 \text{ Ln GDP}$

(16.45) (35.53)

Duration = 1990-91 to 1999-2000, $R^2 = 0.99$, P-Value = 0.000 and DW = 2.0755

(3) $\text{Ln COMTTR} = 1.383492 + 1.136218 \text{ Ln GDP}$

(2.77) (23.82)

Duration = 2000-01 to 2010-11, $R^2 = 0.98$, P-Value = 0.000 and DW = 0.8028

(4) $\text{Ln COMTTR} = 1.458929 + 1.126787 \text{ Ln GDP}$

(1.30) (11.49)

Duration = 2011-12 to 2015-16, $R^2 = 0.98$, P-Value = 0.0014 and DW = 1.9916

6: Tax Buoyancy for State Government's Tax Revenue

(1) $\text{Ln COMTTR} = 2.961866 + 1.009510 \text{ Ln NAGDP}$

(2.96) (70.29)

Duration = 1990-91 to 2015-16, $R^2 = 0.99$, P-Value = 0.000 and DW = 0.4562

(2) $\text{Ln COMTTR} = 4.4495 + 0.843492 \text{ Ln NAGDP}$

(22.17) (37.47)

Duration = 1990-91 to 1999-2000, $R^2 = 0.99$, P-Value = 0.000 and DW = 2.1683

(3) $\text{Ln COMTTR} = 2.161243 + 1.084593 \text{ Ln NAGDP}$

(5.24) (26.99)

Duration = 2000-01 to 2010-11, $R^2 = 0.99$, P-Value = 0.000 and DW = 0.9684

(4) $\text{Ln COMTTR} = 2.185414 + 1.082306 \text{ Ln NAGDP}$

(2.20) (12.37)

Duration = 2011-12 to 2015-16, $R^2 = 0.98$, P-Value = 0.0011 and DW = 2.1017

Table 2: Tax Elasticity and Tax Buoyancy for Centre, State and Combine Government

Duration	Tax Elasticity of Centre	Tax Buoyancy of Centre	Tax Elasticity of State	Tax Buoyancy of State	Tax Elasticity of Combine	Tax Buoyancy of Combine
1990-91 to 2015-16	1.04	0.98	1.09	1.03	1.07	1.01
1990-91 to 1999-2000	0.84	0.80	0.94	0.90	0.89	0.84
2000-01 to 2010-11	1.18	1.13	1.10	1.05	1.14	1.08
2011-12 to 2015-16	0.82	0.78	1.24	1.19	1.13	1.08

V. Findings

- (1) For All form of government the value of tax buoyancy remained less than tax elasticity that indicated discriminatory measures have created negative effect to tax productivity.
- (2) Compare to first decade of economic reforms in second decade, the both value tax elasticity and tax buoyancy has increased for Center government which revealed that overall tax productivity for Centre government has improved. But in last five years of study period again the tax productivity has reached to initial level of first decade.
- (3) It is observed in case of State government; gradually the tax elasticity and tax buoyancy value has increased.
- (4) For combine government, tax elasticity and tax buoyancy value has improved compare to 1990-91 to 1999-2000 and during 2000-2001 to 2014-15 the both vale has not changed.
- (5) For all forms of government, the long run value of tax elasticity and tax buoyancy has remained near to 1.

VI. Conclusion

The study revealed that the discriminatory measures have adversely affected the productivity of tax in case of both Centre as well as State government, so there is need of cut exemption, tax rebate and other popular electoral measures especially in case of Centre. The States are comparatively more successful than Centre to raise tax productivity. The study advises Centre government to tax corrective measures for raising tax productivity.

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