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Tax Elasticity and Buoyancy of Indian Tax System: An Efficiency Analysis

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Abstract
This study examines the tax elasticity and buoyancy of the Indian tax system as a measure of its efficiency. Tax elasticity measures the responsiveness of tax revenue to changes in income, while tax buoyancy measures the responsiveness of tax revenue to changes in the tax base. The study has used the tax Elasticity and buoyancy approach to measure the efficiency of the tax system in India. This study aims to use regression analysis to estimate the tax elasticity and buoyancy in India from 1970-2022BE. Tax buoyancy and elasticity are used to evaluate the effectiveness of a tax system in generating revenue with and without policy changes. The study found that Indian tax system was more dynamic and efficient with coefficient of buoyancy greater than unity after introduction of several tax reforms. The Indian tax system more dynamic in after introduction of GST period as compare to that of other periods.The study found that the direct tax system is less dynamic in pre NEP as compare to post NEP. Direct tax elasticity concern, which is unitary elastic in pre NEP and greater than unity in post NEP period. The study found that Indian indirect tax system is more dynamic and efficient in post NEP as compare to pre NEP. These results suggest that the Indian tax system is efficient and can generate revenue without burdening taxpayers excessively. However, the study also highlights the need for continued efforts to improve tax administration and reduce tax evasion to ensure sustained revenue growth.

Key Words: Tax, Elasticity, Buoyancy, NEP
JEL: H2, H3, H6, C1

I. Introduction

The Indian tax system has undergone several reforms aimed at improving tax revenue productivity and funding economic and social development. Despite these efforts, the system has been unable to generate sufficient revenue to meet financing needs, resulting in large budget deficits. The government has had to rely on bank loans and external financing to finance public expenditure, which is not a sustainable solution in the medium and long term. Therefore, there is a need to design an efficient tax system that can support public services without relying on external funds.Making tax policy decisions without knowing the percentage change in tax revenue at its base can distort decision-makers' expectations of the economy's ability to generate tax revenue, leading to a fiscal imbalance. The effectiveness of the tax system is essential for the legitimacy and accountability of the government to taxpayers and promoting good management of public finances. Elasticity is a critical factor in assessing the effectiveness of the tax system. It measures the variation of a quantity caused by the variation of another quantity in economics. In contrast, inelasticity characterizes the absence of a link or independence of the variations of the two variables concerned.When measuring the productivity of the tax system, it is essential to distinguish between elasticity and buoyancy. Both concepts can lead to increased tax revenues. However, this growth in tax revenue can either be due to an automatic response or discretionary changes made by the authorities. The automatic response refers to the growth in tax revenue resulting from holding the rules, tax base, tax rates, etc., constant. On the other hand, buoyancy refers to the combined effect of the automatic response and discretionary changes made by the authorities.

Tax buoyancy is a metric used to assess the responsiveness of a country's tax system to changes in its national income. It indicates the extent to which tax revenues and collections increase or decrease in response to a rise or fall in national income (Ashraf &Sarwar, 2016). Tax buoyancy can vary in the short-term and the long-term. In the short run, buoyancy is linked to the fiscal policy's stabilization function. If the tax revenue increases more than the GDP, the tax system is considered to

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be a good automatic stabilizer. If the short-term buoyancy is less than one, tax revenue is more stable than GDP and is less effective as an automatic stabilizer. The long-term buoyancy is important for assessing the impact of economic growth on long-term fiscal sustainability. A buoyancy greater than one means that higher growth will improve the fiscal balance through the revenue side of the budget. Conversely, a long-term buoyancy smaller than one means that growth will have a negative impact on fiscal sustainability. A buoyancy of one indicates that a 1% increase in GDP would result in a 1% increase in tax revenue, thus keeping the tax-to-GDP ratio constant. A buoyancy exceeding one would lead to an increase in tax revenue greater than the increase in GDP and could lead to a decrease in the deficit ratio (Belinga. et al, 2014).

The study found that the tax reforms in Bulgaria had led to an ATR elasticity of 1.15 and a buoyancy of 2.0, indicating an improvement in the revenue productivity of the tax system (Milambo, 2001). In another research conducted by Belinga et al. at the IMF, the long-run and short-run buoyancies of various types of taxes, including aggregate revenue (AR), personal income taxes (PIT), corporate income taxes (CIT), social security contributions (SSC), goods and services taxes (GST), excise taxes, and property taxes, were estimated for 34 OECD countries during the period of 1965-2012. The results revealed that the short-run buoyancy of aggregate tax revenues had been growing steadily in 25 countries, and the long-run buoyancy of aggregate tax revenues had demonstrated a stable upward trend in 14 countries. Corporate tax revenues were found to be the most sustainable across all countries, while revenues from personal income tax and social security contributions were found to be unsustainable in both the short run and the long run (Belinga et al. 2014).

This study focuses on analyzing whether implementing higher indirect tax rates and lower direct tax rates can lead to higher aggregate tax revenue (ATR) in India. The study has used the tax Elasticity and buoyancy approach to measure the efficiency of the tax system in India.

II. Methodology

This study aims to use regression analysis to estimate the tax elasticity and buoyancy in India from 1970-2022BE. Tax buoyancy and elasticity are used to evaluate the effectiveness of a tax system in generating revenue with and without policy changes, as noted by Cotton (Cotton, 2012). In light of recent changes in India's tax policies, it is necessary to revisit these concepts. Understanding the elasticity of various taxes enables policymakers to estimate the additional revenue that can be generated as national income increases, as observed by Mitchell and Andrews (Mitchell and Andrews, 1991).The study utilized secondary data from Various Handbook of Statistics on Indian Economy published by the Reserve Bank of India, collected data on GDP, total tax revenues, and various tax categories. The collected data was transformed into logarithms to prepare for econometric analysis. The time period covered in the study was from 1970 to 2022BE.

The study has classified the time series data into six sections with respect to major Tax Reforms committees in India to analyzeand compare the efficiency of each committee actions on Indian tax system. The classification are as follows

- 1970-1986- The Wanchoo Committee
- 1986-1991- Introduction of VAT
- 1970-1991- Pre-New Economic Policy
- 1991-2001- Chelliah Committee
- 2001-2017- The Kelkar Committee
- 2017-2022- Post New Economic Policy

The elasticity and Buoyancy have been calculated separately for each period throughout the study and a comparative analysis has been taken up.

III. Model specification for Elasticity and Buoyancy:

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

$$\text{Ln}(TR) = \alpha + \beta_1 . \text{Ln}(TB) + \epsilon \quad (1)$$

Where,

TR = Tax Revenue/Individual Taxes,

TB = Tax Base and

B_1 = Tax Elasticity/Buoyancy

According to Skeete, Coppin, and Boamah (2003), if discretionary tax changes are excluded from the tax revenue series, then the coefficient (β) represents the elasticity. However, if discretionary tax changes are included, then the coefficient represents the buoyancy.

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Table 1: Tax Base for Major Taxes

Taxes	Tax Base
Tax Revenue	Current GDP at Market Price
Direct Tax	Current GDP at factor Cost
Corporate Tax	Current GDP at factor Cost
Personal Income Tax	Current GDP at factor Cost
Indirect Tax	Current Final Private Consumption at Market Price
Custom Duties	Current Value of Imports
Excise Duties	Current GDP at Market Price

Source: Seydou 2020; Tanchev&Todorov 2019; Bonga et al 2015;

IV. Dummy Method for Buoyancy Estimation

Using the dummy method for the estimation of tax buoyancy. Since the 1970s, India has implemented several tax reforms aimed at improving the efficiency, transparency, and equity of its tax system. To capture some changes a dummy variable has been introduced in the traditional equation. The method was developed by Singer in 1968. The study introduced the dummy variable for each year in which there was an exogenous tax policy change (Bonga et al, 2015).

$$Y_t = \beta_0 + x_t\beta_1 + d_{1t}\beta_2 + d_{2t}\beta_3 + d_{3t}\beta_4 + d_{4t}\beta_5 + \varepsilon_t \quad (2)$$

Where
Y = Tax Revenue/ Individual Taxes β_0 =Intercept
β_1 β_2 β_3 β_4 β_5 are Coefficients x = Tax Base
d_1 = Dummy (1985-86) d_2 = Dummy (1991-91)
d_3 = Dummy (2001-02) d_4 = Dummy (2016-17) ε = error term t = Time

V. Results and Discussions

5.1 Total tax elasticity and buoyancy in India

Table 2 presents the tax buoyancy and elasticity coefficients for different periods in India from 1970-71 to 2021-22. Tax buoyancy measures the responsiveness of tax revenue to changes in GDP, while tax elasticity measures the sensitivity of tax revenue to changes in tax rates. The coefficients reported in the table 2 reflect the strength and direction of the relationship between tax and the base. The table 2 shows that during the 1970-71 to 1985-86, the tax buoyancy coefficient was 2.7, indicating that tax revenue was highly responsive to changes in GDP. The tax elasticity coefficient was significant which is 3.5, indicating that tax revenue was highly sensitive to changes in tax rates during this period. The 1986-87 to 1990-91 period, tax buoyancy recorded 1.5, while tax elasticity recorded 2.3 and it is statistically significant. Overall, for the pre-New Economic Policy period (1970-71 to 1990-91), tax buoyancy was 3.44, indicating that significantly tax revenue increased by 3.44 percent for every 1 percent increase in GDP. Tax elasticity was 3.20 which is statistically significant and indicating that tax revenue increased by 3.20 percent for every 1 percent increase in tax rates during this period.

Table 2: Tax Elasticity and Buoyancy during the 1970 -2022

Tax to Base/ Periods		Buoyancy		Elasticity		Gap
		Coef. (t-Stat)	R2	Coef. (t-Stat)	R2	
Pre New Economic Policy	1970-71 to 1985-86	2.7 (1.0)	0.07	3.5 (18.7)***	0.96	-0.8
	1986-87 to 1990-91	1.5 (1.4)	0,38	2.3 (20.6)***	0.99	-0.8
	1970-71 to 1990-91	3.44 (2.5)**	0.24	3.20 (28.9)***	0.97	0.2
Post	1991-92 to 2001-02	2.1 (1.2)	0.14	1.9 (20.8)***	0.97	0.3

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New Economic Policy	2002-03 to 2016-17	1.3 (1.7)	0.18	1.8 (30.3)***	0.99	-0.6
	2017-18 to 2021-22	9.2 (1.0)	0.25	0.8 (5.5)**	0.91	8.5
	1991-92 to 2021-22	1.6 (5.2)***	0.48	1.6 (27.1)***	0.96	0.0
Total Period	1970-71 to 2021-22	2.0 (9.6)***	0.65	2.1 (35.8)***	0.96	-0.1

*Note: * 10%, ** 5%, *** 1%;*
Source: Author Calculation

During the 1991-92 to 2001-02, tax buoyancy recorded 2.1, while tax elasticity coefficient is 1.9, which is statistically significant. The 2002-03 to 2016-17 period, tax buoyancy recorded 1.3, while tax elasticity recorded 1.8 and it is statistically significant at 1 percent. However, during the period of 2017-18 to 2021-22, there was a significant increase in tax buoyancy to 9.2, indicating that tax revenue increased substantially with the growth in GDP. The significant tax elasticity coefficient was 0.8, indicating that tax revenue was not very responsive to changes in tax rates during this period. For the entire period of 1970-71 to 2021-22, tax buoyancy was 2.0 and it is statistically significant at 1 percent, which indicating that tax revenue increased by 2 percent for every 1 percent increase in GDP. Tax elasticity was 2.1 which is also statistically significant at 1 percent level, and it indicating that tax revenue increased by 2.1 percent for every 1 percent increase in tax rates during this period.

In summary, the table 2 indicates that tax revenue in India has been relatively responsive to changes in GDP, and tax rates have had a moderate impact on tax revenue over the past 50 years. The study found that Indian tax system was more dynamic with coefficient of buoyancy greater than unity after introduction of several tax reforms. The Indian tax system more dynamic in 2017-18 to 2021-22 period as compare to that of other periods. And Indian tax system is inelastic in 2017-18 to 2021-22 period, which low elasticity does not allow enough tax revenue to be mobilized to finance developmental activities. The table 2 also highlights the significant increase in tax buoyancy in recent years, which suggests that the Indian economy has grown at a faster pace and tax revenue has increased accordingly.

5.2 Direct tax elasticity and buoyancy in India

The table 3 provides information on the buoyancy and elasticity of direct taxes in India during different periods, starting from 1970-71 to 2021-22. A buoyancy or elasticity greater than 1 indicates that tax revenue is responsive to changes in the tax base or tax rates, respectively, while a value less than 1 indicates less responsiveness. During the period 1970-71 to 1985-86, the direct tax buoyancy was 0.6 which is insignificant, and indicating that Indian tax system less dynamic because of low responsiveness of tax revenue to changes in the tax base. However, the elasticity was 1.05 and it is statistically significant at level of 1 percent, which indicating that tax revenue was responsive to changes in tax rates. From 1986-87 to 1990-91, the buoyancy increased to 4.1 but not statistically significant, but the elasticity significantly decreased slightly to 0.98. During the Pre New Economic Policy, Indian direct tax system was less dynamic because of buoyancy coefficient was 0.6, which is statistically insignificant. And direct tax elasticity is equals to one and it is statistically significant at level of one percent.

During the period of NEP, from 1991-92 to 2001-02, the buoyancy increased to 1.3, indicating moderate responsiveness of tax revenue to changes in the tax base. The elasticity also increased significantly to 1.27, indicating a higher responsiveness of tax revenue to changes in tax rates. From 2002-03 to 2016-17, the buoyancy significantly decreased to 0.6, while the elasticity remained relatively high at 1.06. In the most recent period, from 2017-18 to 2021-22, the buoyancy increased substantially to 5.7 and it is insignificant, indicating high responsiveness of tax revenue to changes in the tax base. However, the elasticity decreased to 0.40, which is inelastic and indicating a low responsiveness of tax revenue to changes in tax rates. Post NEP, the direct tax buoyancy recorded at 1.2 which statistically significant and elasticity also recorded at 1.22, it is also significant at level of 1 percent. Overall, the total period analysis shows that the direct tax buoyancy was 1.3, indicating moderate responsiveness of tax revenue to changes in the tax base, while the elasticity was 1.19, indicating a moderate responsiveness of tax revenue to changes in tax rates.

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Table 3: Direct Tax Elasticity and Buoyancy during the 1970 -2022

Tax to Base/ Periods		Buoyancy		Elasticity		Gap
		Coef. (t-Stat)	R2	Coef. (t-Stat)	R2	
Pre New Economic Policy	1970-71 to 1985-86	0.6 (2.0)*	0.23	1.05 (15.5)***	0.95	-0.4
	1986-87 to 1990-91	4.1 (0.7)	0.14	0.98 (5.2)**	0.90	3.1
	1970-71 to 1990-91	0.6 (1.5)	0.99	1.0 (23.0)***	0.96	-0.4
Post New Economic Policy	1991-92 to 2001-02	1.3 (2.2)*	0.35	1.27 (22.8)***	0.98	0.0
	2002-03 to 2016-17	0.6 (3.9)***	0.54	1.06 (13.9)***	0.94	-0.4
	2017-18 to 2021-22	5.7 1.6	0.45	0.40 1.0	0.23	5.3
	1991-92 to 2021-22	1.2 (11.1)***	0.81	1.22 (32.4)***	0.97	0.0
Total Period	1970-71 to 2021-22	1.3 (17.5)***	0.86	1.19 (72.1)***	0.99	0.1

*Note: * 10%, ** 5%, *** 1%*
Source: Author Calculation

In conclusion, the table suggests that the responsiveness of direct tax revenue to changes in the tax base and tax rates in India has varied significantly over time, depending on the economic and policy conditions prevailing during the period. The study found that pre NEP, the direct tax system is less dynamic as compare to post NEP. Direct tax elasticity concern, which is unitary elastic in pre NEP and greater than unity in post NEP period (Table 3).

5.3. Corporate Tax Elasticity and Buoyancy in India

The table 4 provides information on the buoyancy and elasticity of corporate taxes in India during different periods, starting from 1970-71 to 2021-22. Before the New Economic Policy (NEP) period, from 1970-71 to 1985-86, the corporate tax buoyancy was 2.2, it is statistically insignificant and indicating a high responsiveness of tax revenue to changes in the tax base. The elasticity was also high at 3.5 which highly significant, and indicating a significant responsiveness of tax revenue to changes in tax rates. From 1986-87 to 1990-91, the buoyancy increased further to 5.5 but it is insignificant, while the elasticity significantly decreased slightly to 2.2.

The pre NEP period, the buoyancy recorded 2.97 which is highly statistically significant and it indicating corporate tax system in India is more dynamic. Corporate tax elasticity is recorded 2.93, which is also highly statistically significant. During the post NEP period, form 1991-92 to 2001-02, the corporate tax buoyancy insignificantly decreased sharply to 0.1, indicating less dynamic and low responsiveness of tax revenue to changes in the tax base. However, the elasticity remained high at 2.2, which is highly significant and indicating significant responsiveness of tax revenue to changes in tax rates. From 2002-03 to 2016-17, the buoyancy insignificantly increased to 0.8, while the elasticity remained significantly high at 2.1. In the most recent period, from 2017-18 to 2021-22, the buoyancy insignificantly increased to 4.9, indicating a high responsiveness of tax revenue to changes in the tax base. However, the elasticity was 0.2, indicating a low responsiveness of tax revenue to changes in tax rates. Overall, the total period analysis shows that the corporate tax buoyancy was 2.5, indicating a high responsiveness of tax revenue to changes in the tax base, while the elasticity was 2.4, indicating a significant responsiveness of tax revenue to changes in tax rates. The t-statistic values in parentheses indicate the level of statistical significance of the estimates. Post NEP, the corporate tax buoyancy and elasticity recorded at 2.0 and 1.8 with highly significant.

In conclusion, the table 4 suggests that the responsiveness of corporate tax revenue to changes in the tax base and tax rates in India has varied significantly over time, depending on the economic and policy conditions prevailing during the period. The study found that high buoyancy and elasticity

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before the NEP period may be due to the high tax rates and low tax base. The sharp decrease in buoyancy during the NEP period may be due to the reduction in tax rates and tax base broadening measures. The recent increase in buoyancy may be due to the economic recovery and improved tax administration. The negative elasticity in the most recent period may be due to the reduction in tax rates and incentives given to corporates to promote investment and economic growth.

Table 4: Corporate Tax Elasticity and Buoyancy during the 1970 -2022

Tax to Base/ Periods		Buoyancy		Elasticity		Gap
		Coef. (t-Stat)	**R2**	**Coef. (t-Stat)**	**R2**	
Pre New Economic Policy	1970-71 to 1985-86	2.2 (2.0)*	0.2	3.5 (17.1)***	0.95	-1.3
	1986-87 to 1990-91	5.5 (1.4)	0.4	2.2 (16.5)***	0.98	3.3
	1970-71 to 1990-91	2.97 (4.6)***	0.53	2.93 (21.5)***	0.96	0.04
Post New Economic Policy	1991-92 to 2001-02	0.1 (0.0)	0.00	2.2 (10.4)***	0.92	-2.1
	2002-03 to 2016-17	0.8 (2.8)**	0.4	2.1 (12.5)***	0.92	-1.3
	2017-18 to 2021-22	4.9 (1.4)	0.4	0.2 (-0.8)	0.02	4.7
	1991-92 to 2021-22	2.0 (7.2)***	0.6	1.8 (16.3)***	0.90	0.2
Total Period	1970-71 to 2021-22	2.5 (16.9)***	0.9	2.4 (32.2)***	0.95	0.1

*Note: * 10%, ** 5%, *** 1%*
Source: Author Calculation

5.4. Personal Income Tax Elasticity and Buoyancy in India

Table 5 shows the personal income tax buoyancy and elasticity in India during the period of 1970-2022. During the pre-New Economic Policy period, from 1970-71 to 1990-91, the buoyancy coefficient of personal income tax was 1.8 which is insignificant and elasticity was 2.4, it is highly significant. The 1970-71 to 1985-86 period, buoyancy was 1.2 which is insignificant and elasticity was 2.8 which is highly significant. Greater than 1 value of buoyancy and elasticity indicating that personal income tax system is most dynamic. The buoyancy recorded at 0.4 and elasticity is 2.9 in the second sub-period of pre NEP (1986-87 to 1990-91), which are statistically insignificant. The elasticity coefficient was positive in both sub-periods, indicating that the personal income tax base increased as income increased.

Table 5: Personal Income Tax Elasticity and Buoyancy during the 1970 -2022

Tax to Base/ Periods		**Buoyancy**		**Elasticity**		**Gap**
		Coef. (t-Stat)	**R2**	**Coef. (t-Stat)**	**R2**	
Pre New Economic Policy	1970-71 to 1985-86	1.2 (-0.8)	0.05	2.8 (4.7)***	0.61	-1.6
	1986-87 to 1990-91	0.4 (0.1)	0.00	2.9 (2.1)	0.59	-2.5
	1970-71 to 1990-91	1.8 (1.9)*	0.15	2.4 (7.4)***	0.74	-0.7
Post	1991-92 to 2001-02	4.8 (3.7)***	0.6	4.5 (8.0)***	0.87	0.3

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New Economic Policy	2002-03 to 2016-17	2.0 (2.5)**	0.3	2.0 (21.5)***	0.97	0.0
	2017-18 to 2021-22	1.1 (0.0)	0.0	1.2 (4.6)**	0.88	-0.1
	1991-92 to 2021-22	1.4 (2.8)***	0.2	2.4 (15.6)***	0.89	-1.0
Total Period	1970-71 to 2021-22	2.3 (9.0)***	0.6	2.8 (32.9)***	0.96	-0.5

*Note: * 10%, ** 5%, *** 1%*
Source: Author Calculation

In the post-New Economic Policy period, which was from 1991-92 to 2021-22, the buoyancy coefficient was positive in all sub-periods, but it decreased over time. The elasticity coefficient was also positive in all sub-periods, and it decreased over time as well. Overall, the total period (1970-71 to 2021-22) had a positive buoyancy coefficient of 2.3, which is statistically highly significant, and indicating that the personal income tax base increased more than proportionally with income growth. The elasticity coefficient was also positive and higher at 2.8 with highly statistically significant, and indicating that the personal income tax base was relatively more sensitive to changes in income.

In summary, the personal income tax buoyancy and elasticity in India have been positive over the long-term, indicating that the tax base has expanded with economic growth. However, the buoyancy and elasticity coefficients have decreased over time, suggesting that the personal income tax has become less responsive to income growth in recent years. The study found that there is no change in personal income tax elasticity but there is a change in buoyancy in post NEP as compare to post NEP.

5.5. Indirect Tax Elasticity and Buoyancy in India

Table 6 presents the results of the elasticity and buoyancy analysis of indirect taxes during the period 1970-2022 in India. The table is divided into two sections: pre and post NEP. The NEP refers to the economic reforms introduced in India in 1991, which aimed at liberalizing and deregulating the economy. The pre NEP period shows a high buoyancy coefficient of 1.2 and an elasticity coefficient of 1.2 both are statistically significant at level of 1 percent. This indicates that during this period, the indirect tax revenue increased by 1.2 percent for every 1 percent increase in the tax base. Moreover, the indirect tax revenue was responsive to changes in the tax base, with a 1 percent increase in the tax base resulting in a 1.2 percent increase in tax revenue.

Table 6: Indirect Tax Elasticity and Buoyancy during the 1970 -2022

Tax to Base/ Periods		**Buoyancy**		**Elasticity**		**Gap**
		Coef. (t-Stat)	**R2**	**Coef. (t-Stat)**	**R2**	
Pre New Economic Policy	1970-71 to 1985-86	1.3 (4.2)***	0.56	1.2 (34.8)***	0.99	0.1
	1986-87 to 1990-91	0.1 (0.4)	0.05	1.1 (16.9)***	0.98	-1.0
	1970-71 to 1990-91	1.2 (7.2)***	0.73	1.2 (57.8)***	0.99	0.0
Post New Economic Policy	1991-92 to 2001-02	0.3 (-0.2)	0.01	0.7 (15.6)***	0.96	-0.4
	2002-03 to 2016-17	0.8 (3.1)***	0.43	0.9 (20.1)***	0.97	-0.1
	2017-18 to 2021-22	7.9 (1.6)	0.46	1.0 (2.1)	0.60	7.0
	1991-92 to 2021-22	1.3 (6.2)***	0.57	0.8 (52.1)***	0.99	0.5
Total	1970-71 to 2021-22	0.9	0.73	1.0	0.99	0.0

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Period		(11.5)***		(82.8)***		

*Note: * 10%, ** 5%, *** 1%*
Source: Author Calculation

In the post-NEP period, the buoyancy coefficient increased to 1.3, which is statistically significant at level of 1 percent during 1991-92 to 2021-22. The high buoyancy coefficient during 2017-2022 may indicate that the indirect tax revenue was responsive to changes in the tax base, resulting in a significant increase in revenue. The study found that Indian Tax system is most dynamic in both pre and post NEP, but post NEP has more as compare to pre NEP.

5.6. Custom Duty Elasticity and Buoyancy in India

Table 7 shows the elasticity and buoyancy of custom duty during the period of 1970-2022. The analysis of the table 4.6 is as follows: The buoyancy of custom duty during the pre-New Economic Policy period (1970-71 to 1990-91) was 1.0 which is statistically significant and it indicating a positive relationship between custom duty and its base. However, the elasticity of custom duty during the pre-New Economic Policy period was greater than one (1.1), indicating that the percentage change in custom duty was greater than the percentage change in its base.

Table 7: Custom Duty Elasticity and Buoyancy during the 1970 -2022

Tax to Base/ Periods		Buoyancy		Elasticity		Gap
		Coef. (t-Stat)	R2	Coef. (t-Stat)	R2	
Pre New Economic Policy	1970-71 to 1985-86	1.0 (5.7)***	0.70	1.0 (19.9)***	0.97	0.0
	1986-87 to 1990-91	0.2 (-0.7)	0.13	0.7 (11.4)***	0.97	-0.2
	1970-71 to 1990-91	1.0 (8.4)***	0.78	1.1 (23.8)***	0.96	-0.1
Post New Economic Policy	1991-92 to 2001-02	0.6 (1.1)	0.11	0.3 (3.1)**	0.52	0.3
	2002-03 to 2016-17	0.1 (0.3)	0.01	0.7 (17.1)***	0.96	-0.6
	2017-18 to 2021-22	6.2 (1.4)	0.38	0.6 (1.8)	0.56	5.6
	1991-92 to 2021-22	0.3 (2.3)**	0.16	0.4 (11.9)***	0.83	-0.1
Total Period	1970-71 to 2021-22	0.5 (9.8)***	0.66	0.6 (22.4)***	0.91	-0.1

*Note: * 10%, ** 5%, *** 1%*
Source: Author Calculation

During the post-New Economic Policy period (1991-92 to 2021-22), the buoyancy of custom duty was 0.3, it is significant at level of 1 percent. This indicates a weaker positive relationship between custom duty and its base and Indian custom duty system is less dynamic. The elasticity of custom duty during the post-New Economic Policy period was 0.4 which is statistically highly significant, and indicating that inelastic and the percentage change in custom duty was less than the percentage change in its base. Overall, the total period (1970-71 to 2021-22) shows a buoyancy of 0.5 and an elasticity of 0.6, indicating a weak positive relationship between custom duty and its base and a less than proportional response of custom duty to changes in its base. In summary, the buoyancy and elasticity of custom duty have weakened over time, suggesting that custom duty is becoming a less effective source of revenue for the government (Table 7).

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5.7. Excise Duty Elasticity and Buoyancy in India

The table 8 shows the buoyancy and elasticity coefficients of excise duty during different periods from 1970 to 2022. Buoyancy coefficient measures the responsiveness of tax revenue to changes in the tax base, while elasticity coefficient measures the responsiveness of tax revenue to changes in the tax rate. Before the New Economic Policy's (NEP) first period (1970-71 to 1985-86), the excise duty had a buoyancy coefficient of 2.4 which is statistically highly significant, and indicating that a 1 percent increase in the tax base led to a 2.4 percent increase in tax revenue. The elasticity coefficient was 0.7 which is also statistically highly significant and inelastic, and suggesting that a 1 percent increase in the tax rate led to only a 0.7 percent increase in tax revenue.

During the pre NEP's second period (1986-87 to 1990-91), the buoyancy coefficient was 0.7, which means that tax revenue did not increase much with the increase in the tax base and it is less dynamic. However, the elasticity coefficient was 2.2, indicating that a 1 percent increase in the tax rate led to a 2.2 percent increase in tax revenue and it is more elastic. From 1970-71 to 1990-91, the excise duty had a buoyancy coefficient of 2.5 which is statistically highly significant and more dynamic. An elasticity coefficient of 2.6, it is significant at level of 1 percent and indicating a high responsiveness of tax revenue to changes in the tax rate.

After the NEP period, during 1991-92 to 2001-02, the excise duty had a significant buoyancy coefficient of 8 and an elasticity coefficient of 2.0, indicating a high responsiveness of tax revenue to changes in both the tax base and tax rate. The 2002-03 to 2016-17 period, the buoyancy coefficient was 2.1 statistically significant at level 1 percent, and the highly significant elasticity coefficient was 1.2, indicating a moderate responsiveness of tax revenue to changes in the tax base and tax rate. During 2017-18 to 2021-22, the buoyancy coefficient was 15.6 which is statistically significant, and indicating a high responsiveness of tax revenue to changes in the tax base which means excise duty system more dynamic. However, the elasticity coefficient was only 1.5, indicating more elastic. This period buoyancy is greater as compare to that of other periods.

Table 8: Excise Duty Elasticity and Buoyancy during the 1970 -2022

Tax to Base/ Periods		Buoyancy		Elasticity		Gap
		Coef. (t-Stat)	R2	Coef. (t-Stat)	R2	
Pre New Economic Policy	1970-71 to 1985-86	2.4 (3.0)***	0.40	0.7 (18.1)***	0.96	1.7
	1986-87 to 1990-91	0.7 (0.4)	0.04	2.2 (13.4)***	0.96	-1.6
	1970-71 to 1990-91	2.5 (6.1)***	0.66	2.6 (27.4)***	0.97	0.0
Post New Economic Policy	1991-92 to 2001-02	4.7 (4.7)***	0.71	2.0 (10.3)***	0.92	2.6
	2002-03 to 2016-17	2.1 (2.9)***	0.39	1.2 (8.7)***	0.85	0.9
	2017-18 to 2021-22	15.6 (4.1)**	0.85	1.5 (1.2)	0.34	14.1
	1991-92 to 2021-22	1.7 (6.5)***	0.59	1.3 (18.9)***	0.92	0.4
Total Period	1970-71 to 2021-22	1.8 (14.5)***	0.81	0.8 (68.3)***	0.99	1.0

*Note: * 10%, ** 5%, *** 1%*
Source: Author Calculation

Overall, the table 8 shows that the excise duty has been responsive to changes in the tax base and tax rate, with higher buoyancy and elasticity coefficients during some periods than others. The study found that excise duty buoyancy and elasticity rates are more in pre NEP as compare to post NEP (Table 8).

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5.8 Dummy Method for Buoyancy Estimation

The table 9 show that the tax revenue buoyancy coefficient was 1.28 but it is statistically insignificant. Which is greater than unity, indicates that Indian Tax system was more dynamic since 1970-2022. All dummy variable coefficients (D1 0.56; D2 -0.09; D3 0.42; D4 -0.18) are statistically insignificant in the tax revenue equation. Implying that whatever tax reforms have been done, such as D1, New Economic Policy, D3, and introduction of GST have not affected the performance of tax revenue in India.

The direct tax revenue buoyancy coefficient was 0.66 which is statistically significant at level of 5 percent. It's buoyancy value is lesser than unity, indicates that Indian Direct Tax system was less dynamic since 1970-2022. dummy 2 (0.87) and dummy 3 (0.57) coefficients are statistically significant at level of 1 percent and 5 percent. Indicating that New economic policy (NEP) and D3 has positive impact on direct tax system in India. The study found that there is a statistical difference in direct tax revenue performance after introduction of NEP and D3. But D1 and D2 has no effect on direct tax revenue performance system in India due to their coefficients are statistically insignificant (Table 9).

The corporate tax buoyancy coefficient was 0.80 which is statistically insignificant. It's buoyancy value is lesser than unity, indicates that Indian Corporate Tax system was less dynamic since 1970-2022. dummy 2 (0.47) and dummy 3 (0.77) coefficients are statistically significant at level of 5 percent and 1 percent. Indicating that New economic policy (NEP) and D3 has positive impact on direct tax system in India. The study found that there is a statistical difference in corporate tax revenue performance after introduction of NEP and D3. But D1 and D2 has no effect on corporate tax revenue performance system in India due to their coefficients are statistically insignificant (Table 9).

The personal income tax buoyancy coefficient was 1.49 which is statistically insignificant. It's buoyancy value is greater than unity, indicates that Indian personal income tax system was more dynamic since 1970-2022. All dummy variable coefficients (D1 0.27; D2 0.47; D3 0.47; D4 -0.57) are statistically insignificant in the personal tax revenue equation. Implying that whatever tax reforms have been done, such as D1, New Economic Policy, D3, and introduction of GST have not affected the performance of personal income tax revenue in India (Table 9).

The indirect tax buoyancy coefficient was 0.71 which is statistically significant at level of 5 percent. It's buoyancy value is lesser than unity, indicates that Indian indirect tax system was less dynamic since 1970-2022. dummy 2 (-0.52) and dummy 3 (0.61) coefficients are statistically significant at level of 10 percent and 5 percent. Indicating that New economic policy (NEP) has negative and D3 has positive impact on indirect tax system in India. The study found that there is a statistical difference in indirect tax performance after introduction of NEP and D3. But D1 and D2 has no effect on indirect tax performance system in India due to their coefficients are statistically insignificant (Table 9).

The custom duty buoyancy coefficient was 0.53 which is statistically significant at level of 5 percent. It's buoyancy value is lesser than unity, indicates that Indian custom duty system was less dynamic since 1970-2022. dummy 1 (0.43) has positive impact at level of 10 percent of statistical significance. Other dummies of model namely D2, D3 and D4 has no effect on custom duty performance system in India due to their coefficients are statistically insignificant (Table 9).

The excise duty buoyancy coefficient was 2.07 which is statistically significant at level of 1 percent. It's buoyancy value is greater than unity, indicates that Indian excise duty system was more dynamic since 1970-2022. All dummy variable coefficients (D1 0.12; D2 0.14; D3 0.08; D4 -0.28) are statistically insignificant in the excise duty equation. Implying that whatever tax reforms have been done, such as D1, New Economic Policy, D3, and introduction of GST have not affected the performance of excise duty in India (Table 9).

Table 9: Tax Buoyancy During 1970-71 to 2021-22

Tax to Base	Buoyancy	D1	D2	D3	D4
Tax Revenue	1.28 (0.14)	0.56 (0.12)	-0.09 (0.81)	0.42 (0.29)	-0.18 0.70
Direct Tax	0.66 (0.01)**	-0.30 (0.23)	0.87 (0.00)***	0.57 (0.02)**	0.21 0.37
Corporate Tax	0.80 (0.14)	0.37 (0.09)	0.47 (0.04)**	0.77 (0.00)***	0.27 0.36

Personal Income Tax	1.49 (0.14)	0.27 (0.50)	0.47 (0.26)	0.40 (0.38)	-0.57 0.28
Indirect Tax	0.71 (0.02)**	0.33 (0.23)	-0.52 (0.06)*	0.61 (0.02)**	0.15 0.57
Custom Duties	0.53 (0.01)**	0.43 (0.08)*	-0.15 (0.54)	-0.25 (0.31)	0.04 0.87
Excise Duties	2.07 (0.00)***	0.12 (0.58)	-0.14 (0.54)	-0.08 (0.73)	-0.28 0.32

*Note: * 10%, ** 5%, *** 1%.*
D1 1985-86(VAT), D2 1991-91(NEP), D3 2001-02(Kelkar), D4 2016-17(GST).
Source: Author Calculation

5.9 Conclusions and Policy Suggestions

The direct tax revenue buoyancy coefficient was 0.66 which is statistically significant at level of 5 percent. It's buoyancy value is lesser than unity, indicates that Indian Direct Tax system was less dynamic since 1970-2022. The indirect tax buoyancy coefficient was 0.71 which is also statistically significant at level of 5 percent. It's buoyancy value is lesser than unity, indicatingless dynamism of Indian Indirect tax system since 1970-2022.Both direct and indirect taxes are found to be more buoyant in the Pre NEP period. In contrast, The Tax revenue for the entire period of 1970-71 to 2021-22, bounces a tax buoyancy of 2.0 which is statistically significant at 1 percent, indicating that, 2 percent increase in Tax revenue is determined by every 1 percent increase in GDP. On the other hand, Tax elasticity is 2.1 which is also statistically significant at 1 percent level, indicating that tax revenue increases by 2.1 percent for every 1 percent increase in tax rates.

These results suggest that the Indian tax system is efficient and can generate revenue without burdening taxpayers excessively. However, the study also highlights the need for continued efforts to improve tax administration and reduce tax evasion to ensure sustained revenue growth.In conclusion, improving the efficiency of the tax system is essential for sustained economic growth and development in India. The study suggests rationalizing tax rates and exemptions, strengthening tax administration, simplifying tax compliance procedures, and encouraging voluntary compliance would help to enhance the effectiveness of the tax system, increase revenue collection, reduce the burden of compliance, and improve public trust in the tax system. An efficient tax system can create a positive environment for business growth, attract investment, and contribute to the extensive development of the country.

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