



TRENDS IN TAX REVENUE AND RELATIONSHIP OF TAX REVENUE WITH GDP : A STUDY IN INDIAN CONTEXT

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Abstract: *The GDP growth rate is a significant indicator of a country's economic progress. GDP of a nation has a strong positive relationship with its tax revenue. Gross Domestic Product, commonly referred to as GDP, represents the ultimate monetary value of all finished goods and services that have been generated within the territorial confines of a nation over a designated timeframe, typically a year. Tax revenue is a term that encompasses the funds obtained by the Government of a nation from the imposition of taxes on different aspects of economic activity. Tax revenue is comprised of taxes collected through both direct and indirect means, which are both taken into consideration. This study explores the relationship between tax revenue and GDP, with a focus on determining whether there is a statistically significant relation between these two variables. For examining this relationship, some statistical measures including-correlation, regression and ANOVA techniques are applied in this paper. The purpose of this evaluation is to analyze the contentions presented in a rigorous academic manner. This paper concludes that Tax Revenue of Indian nation has a considerable impact on its GDP.*

Key Words: *GDP, Tax Revenue, Economy, Trend, Growth, Government.*

1. INTRODUCTION :

The implementation of taxation is an effective means of generating revenue for the government, regulating economic activity and stimulating economic growth of a nation. Taxes play a pivotal role in the economic advancement and policy formulation of any given nation. The collection of tax revenue by the government constitutes an effective means of procuring a portion or proportion of the total domestic output of a given nation. This practice represents a key mechanism through which the government exercises its control over the resources of the country. By analyzing trends in tax collections, one can effectively evaluate the performance of tax system in comparative manner. (Singh, P.). Among the various indicators used to measure a country's economic condition, Gross Domestic Product (GDP) stands out as the most widely recognized one, employed by almost all countries. The measurement of the size of a nation is often assessed through the use of GDP, which is widely regarded as a reliable and precise indicator. Furthermore, the GDP growth rate is considered to be the most effective and efficient measure for evaluating the progress and advancement of economic development of a nation.(Harit, A.).

The Gross Domestic Product (GDP) and tax revenue are two crucial indicators that collectively reflect the economic standing of a country, as well as its capacity for prospective expansion. The tax-to-GDP ratio is a critical element among the various determinants that influence a country's economic and global positioning.(Gupta, A.). Tax-to-GDP ratio measures the amount of tax collected relative to the GDP of the nation. The tax-to-GDP ratio is positively correlated with the country's financial status. The better the financial situation of the nation, higher the tax-to-GDP ratio. A greater tax-to-GDP ratio signifies the ability of government to expand its fiscal purview, ultimately reducing its dependence on borrowing.(Dahal, A.K.). The relationship between tax revenue and GDP is a crucial aspect that requires investigation for a comprehensive understanding of a nation's economic growth. The present study focuses on examining the relation between the tax revenue of India and its GDP by using statistical measures.

2. REVIEW OF LITERATURE :

Singh, P. (2019) had studied the trends and issues relating to tax revenue in India. He stated that trend analysis of tax collections may serve as a great tool to assess the performance of tax system in comparative terms. For the purpose of



trend analysis, he considered the data of direct and indirect taxes for the period from 1980-81 to 2016-17. He also carried out analysis of tax-to-GDP ratio of India and compared this ratio with the tax-to-GDP ratio of some other countries at international level. In his paper, he highlighted the impact of changes in tax structure on the tax revenue. He concluded that despite considerable improvements in overall tax collections, tax-to-GDP ratio and expansion of tax base, India still remains a country with widespread tax non-compliance.

Dahal, A. K. (2020) analyzed the tax-to-GDP ratio and the relation of tax revenue of Nepal with its GDP. He stated that there exists a significant interdependence between tax revenue and GDP. He analyzed tax-to-GDP ratio of Nepal by taking data of tax revenue and GDP of Nepal for the period from 1998-99 to 2018-19. He applied some statistical measures on the data considered. On the basis of his study, he concluded that there is considerable positive significant relationship between tax revenue and GDP of Nepal.

Kharel, K. R. (2021) examined the Nepal's economic growth and economic impact of tax revenue for the period 2000 to 2018. In his study, he applied linear regression model on the data considered. The results of his study reveals that the Gross Domestic Product of Nepal is positively and significantly impacted by tax revenue and total revenue. He stated that a relationship between total revenue, tax revenue, government expenditure and economic growth has been established due to the state's deployment of fiscal policy as a means of economic regulation. Well-structured and well-crafted taxation policies have the capability to enhance the level of economic advancement. However, there exist several impediments in the path. It cannot be assured that every tax modification result in enhancement of economic efficiency. The government should prioritize the implementation of measures that promote a tax-compliant culture.

Harit, A. (2022) conducted an empirical study on the impact of tax revenue, money supply and exchange rate on GDP in Indian economy. He analyzed the collective influence of these variables on the GDP. By applying multiple regression model on the data considered by him in his study, he found out that tax revenue, money supply and exchange rate have positive and significant relationship with the Indian economy's GDP. The GDP of the economy is largely determined by these three significant variables.

Khurana, J. (2023) conducted an analytical study of direct and indirect tax and GDP of India. She conducted an analysis of the trend values pertaining to the collections of direct and indirect taxes in India. She asserted that taxation plays a crucial role in facilitating economic development and growth of a nation. Furthermore, she examined the correlation that exists between the overall revenue and the Gross Domestic Product (GDP) by considering data of tax revenue of India for the period from 2012-13 to 2021-22. She applied some statistical measures on the data to test the significant relation of tax revenue and GDP. On the basis of her study, she concluded that there is positive and statistically significant relationship between tax revenue and GDP.

3. Objectives of the study :

- To analyze the trends in tax revenue of India.
- To examine the contribution of direct and indirect tax revenue to total tax revenue collection of India.
- To examine the relationship of tax revenue of India with its GDP by applying statistical measures.
- To examine the extent to which GDP of Indian economy is affected by trends in tax revenue collection.

4. Model :

The present analysis will make use of Linear Regression Model, which proposes a relationship between a dependent variable and an independent variable. In this study, GDP is taken as dependent variable and Tax Revenue is taken as independent variable. The least square regression equation $Y = \alpha + \beta X$ is:

$$GDP = \alpha + \beta TR$$

Here, GDP represents Gross Domestic Product

α represents intercept of the regression line

β represents the slope intercept which indicates how much GDP changes for each one-unit change in TR

TR represents Total Revenue

5. Methodology :

The present study is based on secondary data and information that was collected from websites of – Department of Revenue, Government of India, Ministry of Statistics and Programme Implementation, Press Information Bureau, OECD; various research papers, blogs, news, journals, published reports and other web sources. In the present study, some statistical measures including-correlation, regression and ANOVA techniques are applied to analyze the relationship between tax revenue and GDP of India. The following hypothesis are tested in the present study:



H₀(Null Hypothesis): There is no significant linear relationship between GDP(Gross Domestic Product) and flow of tax revenue.

H₁ (Alternative Hypothesis): There is a significant linear relationship between GDP(Gross Domestic Product) and flow of tax revenue.

6. Analysis of Data :

▪ **Trends in Tax Revenue of India**

Table 1

FINANCIAL YEAR	NET COLLECTIONS OF DIRECT TAXES (Rs. In Crores)	NET COLLECTIONS OF INDIRECT TAXES (Rs. In Crores)	TOTAL COLLECTIONS OF TAXES (NET) (Rs. In Crores)	DIRECT TAXES AS % OF TOTAL TAXES	INDIRECT TAXES AS % OF TOTAL TAXES
2012-13	391006	350871	741877	52.70%	47.30%
2013-14	460300	355554	815854	56.42%	43.58%
2014-15	492755	410860	903615	54.53%	45.47%
2015-16	471226	472539	943765	49.93%	50.07%
2016-17	517995	583378	1101373	47.03%	52.97%
2017-18	621601	620886	1242487	50.03%	49.97%
2018-19	675253	641958	1317211	51.26%	48.74%
2019-20	653754	703147	1356901	48.18%	51.82%
2020-21	580886	845401	1426287	40.73%	59.27%
2021-22 RE*	808800	956345	1765145	45.82%	54.18%
2022-23 BE**	918754	1016016	1934770	47.49%	52.51%

Source: <https://dor.gov.in/tax/direct-and-indirect-tax-collection-gdp-ratio>

* RE stands for Revised estimates

** BE stands for Budget estimates

Figure 1

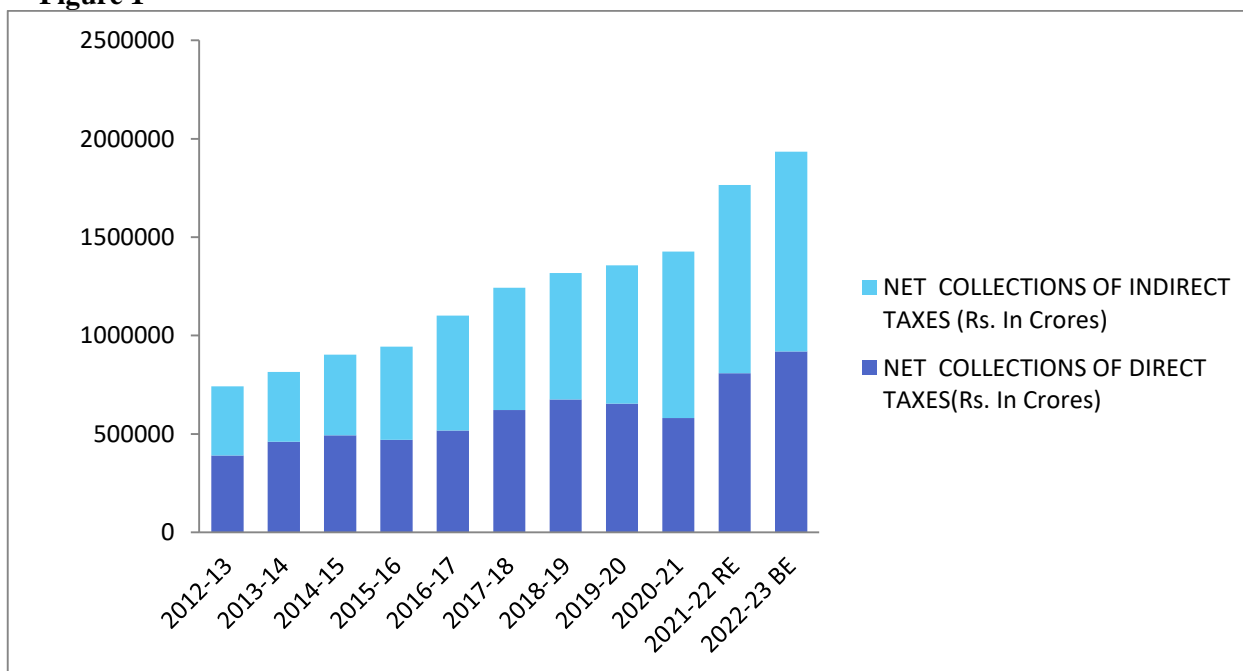
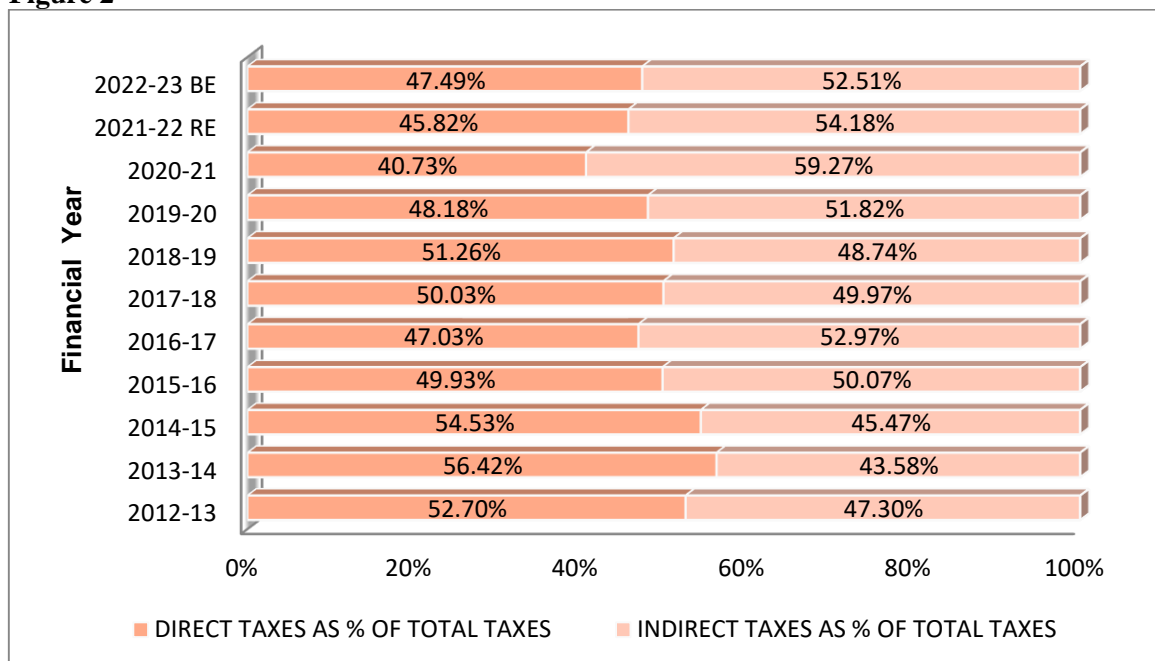




Figure 2



As per data contained in Table 1 and demonstration by Figure 1, the direct tax revenue collection has increased in financial year 2013-14 and 2014-15 as compared to 2012-13, there is decrease in direct tax revenue in financial year 2015-16 but after that direct tax revenue has increased in the financial years 2016-17, 2017-18 and 2018-19. During the financial year 2019-20 and 2020-21, direct tax revenue has decreased but after that it has increased as per data of revised estimates for the financial year 2021-22 and budget estimates for the financial year 2022-23. Indirect tax revenue showed an increasing trend from 2012-13 to 2022-23. Total tax revenue also showed an increasing trend. Figure 2 shows the contribution of direct and indirect tax revenue to total tax revenue. In Financial years 2012-13, 2013-14, 2014-15, 2017-18 and 2018-19, the direct tax revenue contribution to total tax revenue is more as compared to indirect tax revenue. In Financial years 2015-16, 2016-17, 2019-20, 2020-21, 2021-22 and 2022-23, indirect tax revenue contributed more to total tax revenue as compared to direct tax revenue.

There has been gradual increase in tax revenue year after year (from 2012-13 to 2022-23). This may be due to the numerous policy reforms implemented by the state and central government in recent years. A notable example of these endeavors is the adoption of the Goods and Services Tax (GST) as it pertains to the provision of goods and services throughout the country. Goods and Services Tax (GST) implemented in India w.e.f. 01 July, 2017 is a significant tax in the area of indirect taxes that has replaced a considerable no. of Indirect taxes.

▪ Trends in Growth rate of direct and indirect tax revenue

Table 2

FINANCIAL YEAR	NET COLLECTIONS OF DIRECT TAXES (Rs. In Crores)	DIRECT TAX GROWTH RATE	NET COLLECTIONS OF INDIRECT TAXES (Rs. In Crores)	INDIRECT TAX GROWTH RATE	TOTAL COLLECTIONS OF TAXES (NET) (Rs. In Crores)	TOTAL NET TAX GROWTH RATE
2012-13	391006	--	350871	--	741877	--
2013-14	460300	17.72%	355554	1.33%	815854	9.97%
2014-15	492755	7.05%	410860	15.55%	903615	10.76%
2015-16	471226	-4.37%	472539	15.01%	943765	4.44%
2016-17	517995	9.92%	583378	23.46%	1101373	16.70%
2017-18	621601	20.00%	620886	6.43%	1242487	12.81%
2018-19	675253	8.63%	641958	3.39%	1317211	6.01%
2019-20	653754	-3.18%	703147	9.53%	1356901	3.01%



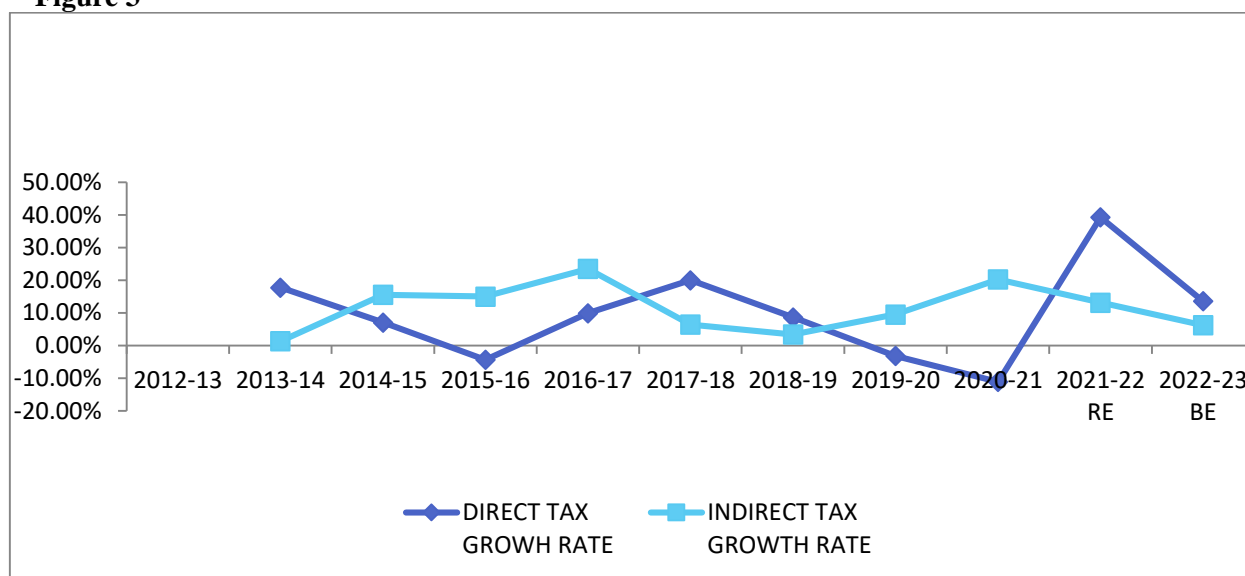
2020-21	580886	-11.15%	845401	20.23%	1426287	5.11%
2021-22 RE*	808800	39.24%	956345	13.12%	1765145	23.76%
2022-23 BE**	918754	13.59%	1016016	6.24%	1934770	9.61%

Source: <https://dor.gov.in/tax/direct-and-indirect-tax-collection-gdp-ratio>

* RE stands for Revised estimates

** BE stands for Budget estimates

Figure 3



Growth rate in direct and indirect tax revenue year after year (from 2012-13 to 2022-23) is depicted by Table 2 and Figure 3. There is fluctuating trend in growth rate of both direct and indirect taxes. For some years direct tax growth rate has decreased (as indicated by negative figures of 2015-16, 2019-20 and 2020-21) but indirect tax growth rate is in positive trend. The decline in total tax revenue observed during the financial years 2019-20 and 2020-21 (as indicated by total tax growth rate percentage in table 2) can be attributed to the disruption in economic activities resulting from the COVID-19 pandemic. However, the increase in total tax revenue during the financial year 2021-22 serves as an evidence of a significant recovery and a resilient economy that has been restored to its previous course.

Table 3

FINANCIAL YEAR	GDP AT CURRENT MARKET PRICES (Rs. In Crores)	TOTAL COLLECTIONS OF TAXES (NET) (Rs. In Crores)
2012-13	9944013	741877
2013-14	11233522	815854
2014-15	12467959	903615
2015-16	13771874	943765
2016-17	15391669	1101373
2017-18	17090042	1242487
2018-19	18899668	1317211
2019-20	20074856	1356901
2020-21	19800914	1426287
2021-22 RE*	23214703	1765145
2022-23 BE**	25800000	1934770

Source: <https://dor.gov.in/tax/direct-and-indirect-tax-collection-gdp-ratio>

* RE stands for Revised estimates

** BE stands for Budget estimates

Table 4

▪ **Statistical measures of Tax Revenue and GDP**

GDP AT CURRENT MARKET PRICES (Rs. In Crores)		TOTAL COLLECTIONS OF TAXES (NET) (Rs. In Crores)	
Mean	17062656.36	Mean	1231753.182



Standard Deviation	5035098.776	Standard Deviation	382128.8747
Coefficient of Variation (CV%) *	29.50%	Coefficient of Variation (CV%)	31.02%
Coefficient of Correlation (r)	0.991433267		
Probable Error (P.E. _r) **	0.003469498		
6×P.E. _r	0.020816986		

Source: Calculated on the basis of data contained in table 3 by using Microsoft Excel.

$$* \text{ Coefficient of Variation(CV\%)} = \frac{\text{Standard Deviation}}{\text{Mean}} \times 100$$

$$** \text{ Probable Error (P.E._r)} = 0.6745 \times \frac{1-r^2}{\sqrt{N}}$$

Here, r = Correlation Coefficient N = Total number of observations

The standard deviation of tax revenue exhibits a comparatively lower value in contrast to the standard deviation of GDP, thereby implying that the mean of tax revenue is a more representative measure. Standard deviation is an indispensable tool in evaluating the representativeness of the mean. The variability of tax revenue is higher than that of GDP, as indicated by the coefficient of tax revenue variation being greater than the coefficient of GDP variation. Since the value of r exceeds that of 6 times the value of P.E._r, it is asserted that the correlation coefficient (r) exhibits a high level of significance.

Table 5
Correlation Table

	<i>GDP AT CURRENT MARKET PRICES (Rs. In Crores)</i>	<i>TOTAL COLLECTIONS OF TAXES (Net) (Rs. In Crores)</i>
<i>GDP AT CURRENT MARKET PRICES (Rs. In Crores)</i>	1	
<i>TOTAL COLLECTIONS OF TAXES (Net) (Rs. In Crores)</i>	0.991433267	1

Source: Calculated on the basis of data contained in table 3 by using Microsoft Excel.

The correlation coefficient is used to quantify the degree of association between two variables. The two variables considered here are- GDP at current market prices and total tax revenue of the Indian nation. The value of coefficient of correlation between Total Tax Revenue and GDP is 0.991, which signifies strong positive relationship.

Hypothesis Formation

The null hypothesis (H₀) and alternative hypothesis (H₁) are as follows.

H₀ : There is no significant linear relationship between GDP(Gross Domestic Product) and flow of tax revenue.

H₁ : There is a significant linear relationship between GDP(Gross Domestic Product) and flow of tax revenue.

Hypothesis testing by applying Regression analysis

On the basis of Regression analysis, the following findings and results are revealed:

Table 6

<i>Regression Statistics</i>	
Multiple R	0.991433267
R Square	0.982939923
Standard Error	693229.8231
Observations	11

Source: Calculated on the basis of data contained in table 3 by using Microsoft Excel.

Table 7

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>
Intercept	971571.717	736893.2277	1.31847014	0.219911071
TOTAL COLLECTIONS OF TAXES (Net) (Rs. In Cores)	13.06356248	0.573676926	22.77163657	2.88236E-09

Source: Calculated on the basis of data contained in table 3 by using Microsoft Excel.



Table 8
ANOVA

	<i>Df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	1	2.49197E+14	2.49197E+14	518.5474323	2.88236E-09
Residual	9	4.32511E+12	4.80568E+11		
Total	10	2.53522E+14			

Source: Calculated on the basis of data contained in table 3 by using Microsoft Excel.

Multiple R denotes the Pearson Correlation Coefficient, a statistical measure used to quantify the strength and direction of a linear relationship between two variables. The value of the coefficient of determination (R^2) is 0.98, which indicates that about 98% of the variations in Gross Domestic Product (GDP) is explained by the aggregate tax revenue. This implies that the proposed model is a highly suitable match for the given data.

The slope coefficient of Total Tax Revenue is 13.06356248. The Regression equation is:

$$GDP = 971571.717 + 13.06356248 \text{ TTR}$$

Here, TTR = Total Tax Revenue

As indicated by the aforementioned equation, an increase of one unit in Total Tax Revenue leads to a corresponding upward shift of 13.06356248 in GDP and conversely, a decrease in Total Tax Revenue will result in a corresponding downward shift in GDP.

The standard error is a precision measure that represents an estimation of the coefficient's standard deviation. Coefficient 971571.717 is larger compared to S.E. 736893.2277, indicating a limited degree of variation. The slope coefficient 13.06356248 also is larger compared to its S.E. Both coefficients differ significantly from 0, which indicates that they hold considerable significance.

Based on the results of Table 7 and Table 8, the p-value and significance F are 2.88236E-09, which is less than 0.05 (5% level of significance). So, The null hypothesis, which states that there is no significant linear relationship between GDP(Gross Domestic Product) and flow of tax revenue, is rejected and the alternative hypothesis is accepted.

Interpretation of results in summarized form

		Interpretation
R²	0.982939923	$R^2=0.982939923$ indicates that about 98% of the variation in the GDP is explained by the aggregate tax revenue.
Intercept α	971571.717	The coefficient of X variable i.e. $\beta=13.06356248$ measures the slope of the GDP line. It indicates that if tax revenue increases/decreases by Rs. 1, the estimated increase/decrease in GDP is Rs. 13.06356248
Slope β	13.06356248	
Regression Equation	$GDP = 971571.717 + 13.06356248 \text{ TTR}$	
S.E. (α)	736893.2277	Coefficient 971571.717 is large compared to S.E. 736893.2277 and so it does not vary much. The slope coefficient 13.06356248 also is large compared to its S.E. 0.573676926. Both coefficients differ significantly from 0, which indicates that they hold considerable significance.
S.E. (β)	0.573676926	
P value	2.88236E-09	The P value= $2.88236E-09$ is less than 0.05. So, The null hypothesis, which states that there is no significant linear relationship between GDP(Gross Domestic Product) and flow of tax revenue, is rejected and the alternative hypothesis is accepted.

7. CONCLUSION :

It is evident from the present study that GDP of a nation is much affected by tax revenue of that nation. There is significant positive relationship between GDP and tax revenue. Taxation is a significant source of generating revenue for the government. Therefore, the effective management and administration of tax revenue is a key priority for policymakers and government officials alike. In a nation, the presence of tax evasion and avoidance leads to reduction in the level of tax revenue generation. To accelerate the level of tax revenue, the Government of the nation should undertake measures to create a conducive tax-paying environment, where the possibility of tax evasion and avoidance is minimized. In Indian nation, to enhance the efficiency of the taxation system and establish a more candid environment in the nation, numerous policy reforms have been implemented by the state and central governments in recent years. A



notable example of these endeavors is the adoption of the Goods and Services Tax (GST) as it pertains to the provision of goods and services throughout the country. If the tax revenue level is escalated, it could result in a beneficial impact on the GDP of the country. Therefore, the focus should be on broadening the tax base rather than just intensifying it.

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