Effects of Tax Revenue and Capital Expenditure on Economic Growth : A Case Study of the Union Territory of Puducherry, India

Joel Basumatary [1]

Abstract

The growth effects of the government's own tax revenue and capital expenditure were estimated for the Union Territory of Puducherry using the ordinary least squares multivariate regression model for 2005–2018. The results suggested that both government's own tax revenue and capital expenditure had significant positive effects on the economic growth of the Union Territory. For example, one unit increase in capital expenditure could boost economic growth (NSDP) by 13%. Similarly, one unit change in the government's own tax revenue collection could potentially change the NSDP of the Union Territory by 30%. Therefore, the Puducherry government can focus on increasing its capital expenditure to enhance its economic growth. Similarly, it can increase its own tax revenue (the taxes under its jurisdiction) by broadening its tax base. These may help the government boost its growth and thus correct its internal fiscal imbalance.

Keywords : **Government's own tax revenue, capital expenditure, economic growth, NSDP, Puducherry**

JEL Classification Codes : H21, H72, O47

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To achieve economic growth and the welfare of the people, governments try to use their limited resources to the maximum possible extent. Economies worldwide started to make strategic planning, for instance, the Gosplan of the former USSR. Similarly, India started economic planning in 1951 by institutionalizing the Planning Commission as the nodal institution for planning and executing its fiscal policies. Planning is needed to realize the varied objectives of a respective economy, viz., achieving human resource development, capital formation, skill development, natural resources utilization, and the like, and helps the economy progress.

Monetary and fiscal policy are powerful instruments that help a government focus on economic growth and development. A country's central bank manages monetary policy, and the government formulates fiscal policy. A fiscal policy, which includes taxation and expenditure, among other things, is an important policy instrument of the government to run the economy. Proper formulation and implementation of these fiscal instruments of taxation and government expenditure can thus determine economic growth and development.

Historically, studies have found fiscal policy instruments to be a significant determinant of economic growth and stability (Harrod, 1939). For instance, relying on a more robust fiscal policy was better than the monetary policy for efficient economic growth (Harrod, 1948). It is argued that fiscal policy needs to be used more than monetary policy for long-term growth. However, monetary policy is used for short-term growth objectives of the economy (Harrod, 1964; Peprah et al., 2019).

Some studies have found adverse effects of tax rates on economic growth (e.g., Barro & Redlick, 2011; Dahlby

[1] *Assistant Professor,* Department of Economics, BGCW, Government of Puducherry (An Autonomous Institution affiliated with Pondicherry University), Muthialpet, Puducherry - 605 503. (Email : joesinghbasumatary@gmail.com)
ORCID iD : https://orcid.org/0000-0002-3944-9003

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& Ferede, 2012; Gemmell et al., 2011). In other words, higher tax rates have adverse effects on growth. For instance, Barro and Redlick (2011) found an increase in per capita GDP by around 0.5% due to a cut in the average marginal tax rate of one percentage point. Further, Mullen and Williams (1994), in their study of marginal tax rates and state economic growth, found that higher marginal tax rates reduced GDP growth. However, some other studies have found favorable effects of taxes on economic growth. For example, Bleaney et al. (2001) found that even though taxes can weaken economic growth, they could offset the negative impact on growth when tax revenue was used for funding productive government spending.

India is a federal country with 28 states, 8 Union Territories (UTs), and a Union Government at the Centre. The financial relationships between the Centre and the federal states and UTs are outlined in the country's constitution through the Union list, the state list, and the concurrent list, while the residuary lies with the Centre. Thus, each federal state has its tax and non-tax revenue sources, apart from the tax devolution and grants received from the Centre, based on the recommendation of the Finance Commission of India. Similarly, the expenditure responsibility of the government is also divided between the Centre and the federal states/UTs. This division of expenditure responsibilities and financial powers between the Centre and the states gives rise to horizontal and vertical fiscal imbalances. Federal states and UTs differ in their financial capacity and expenditures, which is a horizontal fiscal imbalance. Some states and UTs have better fiscal performance with better financial resources than other states and UTs. To correct this fiscal imbalance, the constitution of India embarks upon horizontal and vertical transfers through the Finance Commission of India. However, despite these transfers and grants made by the Centre to the states and the UTs based on the recommendations of the Finance Commission of India, cases of fiscal disequilibrium are seen in various state and UT governments.

This paper emerged from the fact that the UT of Puducherry has a severe fiscal imbalance problem. A report of the Comptroller and Auditor General of India (CAG), 2016–17, once a French colony, stated that the UT of Puducherry was heading towards the debt trap. Further, the unemployment figure for India (April 2020) showed that the UT of Puducherry had the highest unemployment rate in India. This anomaly in the fiscal administration requires a prudent fiscal policy of the government to restore the fiscal equilibrium. The government must focus on the growth aspect to fund productive activities because high government debt can negatively affect private investment and economic growth (IMF, 2015). For example, studies have found that high public debt hampers growth through crowding out private investment and thus growing uncertainty around taxation (Krugman, 1988). A high fiscal deficit is also inflationary and can impact growth negatively (IMF, 2015). Therefore, restoring robust growth is essential for addressing the fiscal challenges of the government of Puducherry.

Puducherry has a Legislative Assembly, unlike other UTs such as Andaman and Nicobar Islands and Lakshadweep, where there is no Legislative Assembly. Puducherry has a public representative apart from the Centre's representative, represented by the Lieutenant Governor, and they function cooperatively to run the government.

The UT of Puducherry does not get the devolution of taxes (based on the recommendation of the Finance Commission of India) from the Centre, unlike other states of India. Instead, it gets the grants-in-aid from the Centre. However, in terms of GST (Goods and Services Tax), the Centre has considered the UT of Puducherry along with the National Capital Territory (NCT) of Delhi, equivalent to other states of India (Union Territories with Legislative Assemblies), and this was done through the 101st Constitutional Amendment Act of 2016. Accordingly, the SGST (State Goods and Services Tax), and not UTGST (Union Territory GST), is applicable in the UT of Puducherry.

Literature Review

A literature review was done thematically, viz., taxation and economic growth, and capital expenditure and economic growth.

Taxation and Economic Growth

Easterly and Rebelo (1993) found that investment in transport and communication consistently correlates with growth, including taxation effects on economic growth. Kneller et al. (1999) found a spur in economic growth when government finances the productive spending from its higher tax revenue. Folster and Henrekson (2001) found a statistically significant robust relationship between economic growth and government expenditures, but not for taxes in OECD countries. It was generally understood that taxes could weaken economic growth, but when the government spent its tax revenue on productive spending or investment, it was found to offset the negative impact (Bleaney et al., 2001; Gemmell et al., 2011). For instance, Braoveanu and Braoveanu (2008) found the opposite effect of fiscal revenue on economic growth. Property taxes, especially immovable property, seemed to be the most efficient growth enhancer (Arnold, 2008). Changes in the level of revenues and the structure of the tax system can influence economic activity; however, it was found that not all tax changes have equivalent, or even positive, effects on long-term growth (Gale & Samwick, 2016).

Thus, the above literature review shows that certain taxes boost economic growth more than other taxes. Further, some taxes are a growth enhancer, while some others have the potential to constrain growth. Therefore, taxation policies need to be included in the fiscal policy in a way that they boost growth.

Government Expenditure and Economic Growth

IMF (1994) postulated that public capital expenditure and the payment of transfers are growth-enhancing and positively affect economic growth; however, distortionary taxes are growth-inhibiting. Folster and Henrekson (2001) found a robust negative relationship between government expenditure and growth in rich countries and a negative association between government expenditure and taxation and economic growth in non-OECD countries. It was found that the total effect of government size on economic growth was positive and quite significant, and it influenced the economic performance in developing countries (Ram, 1986). It was found that public expenditure on capital formation was significant and positively affected economic growth (Alexiou, 2009). Studies like Ali et al. (2010) found that up to a certain level, fiscal deficit affected economic growth positively, and when it reached a certain point, it negatively impacted growth. Oteng-Abayie (2011) concluded that the government's spending and economic growth were not integrated and, therefore, fiscal policy cannot be used to explain economic growth. Okoro (2013) found the existence of a long-run equilibrium relationship between government spending and economic growth in Nigeria. Empirical studies have shown that current expenditure can decrease economic growth and increase after a shock in capital expenditure (Roşoiu, 2015). Samuel et al. (2018) found that the most effective and efficient way to boost development is sufficient outflow via capital expenditure. Al-Sharif and Bino (2019) found capital expenditure's long-term equilibrium and short-term effects on economic growth. Recurrent government expenditures have a significant negative impact on economic growth. However, the positive impacts of public capital expenditure were not significant to economic growth (Onifade et al., 2020).

It has thus been revealed from the empirical research that there is a long-term positive effect of capital expenditure on economic growth. Some fiscal policies bring good results for certain economies but do not have favorable effects on some economies, which indicates that different economies have different requirements for economic growth and development. There is no one-size-fits-all formula for economies.

Data and Methodology

Data Sources and the Basic Model

The data for econometric analysis were taken from the Reserve Bank of India (RBI) database. The period chosen

for the data is 14 years, ranging from 2005 to 2018. The rationale for choosing this period is the availability of the data on the selected variables. Three variables were used for the study: Net state domestic product (NSDP) at a constant price, the government's own tax revenue, and capital expenditure. The econometric analysis was done by using EViews software.

The basic model of this study is as follows:

$$NSDP = f(OwnTaxRev, CapEx) \quad (1)$$

where,

NSDP = Economic growth,

OwnTaxRev = Own tax revenue,

CapEx = Capital expenditure.

Description of Variables Used in the Model

Dependent Variable/Explained Variable

(1) ***Net State Domestic Product (NSDP).*** The dependent variable in this model is the NSDP (Net State Domestic Product) at a constant price (2011–2012 base year). It represents the measure of economic growth of the UT of Puducherry, and it is the measure of final goods and services produced within the territory. A consistent increase in it (i.e., NSDP) indicates economic growth. Economic development tends to increase when the revenue from growth is used for productive spending.

Independent Variables/Explanatory Variables

The independent variables in this model are the government's own tax revenue and capital expenditure. It is assumed that these variables have the potential to influence the economic growth of the economy.

(1) ***Own Tax Revenue (OwnTaxRev).*** It represents the tax revenue the UT of Puducherry gets within its capacity. It excludes income tax because that is under the domain of the Union Government. The UT of Puducherry does not get central tax revenue collection as tax devolution. Instead, it receives grants from the Center. Therefore, the government's own tax revenue of the UT is the tax revenue collected from various sources like taxes on sales & Trade, State Excise, Stamp Duty and Registration fees, Taxes on Vehicles, and land Revenue (CAG, 2017).

(2) ***Capital Expenditure (CapEx)***. It is the expenditure to acquire, upgrade, and maintain physical assets such as property, buildings, industrial plants, technology, or equipment. It includes the government's expenditure to build capital for future income flow. According to the established economic theory, an increase in capital expenditure leads to an increase in capital base, which can boost economic growth in the future. Therefore, it is total expenditure minus revenue expenditure and disbursement of loans and advances.

Descriptive Statistics

The descriptive statistics of the variables used in the econometric model are shown in Table 1. First, the natural log of the variables was taken, which is done as per Gujarati and Porter (2008) to present the coefficients of the model as elasticity.

Table 1. ***Descriptive Statistics***

	NSDP	*CapEx*	*OwnTaxRev*
Mean	4.959984	2.146150	3.013791
Median	5.021216	2.056979	3.254175
Maximum	5.296984	2.832409	3.712982
Minimum	4.553778	1.733797	1.967412
Std.Dev.	0.233379	0.345906	0.616357
Skewness	–0.509090	0.739933	–0.497036
Kurtosis	2.087315	2.574798	1.698235
Jarque-Bera	1.090649	1.382966	1.564949
Probability	0.579654	0.500833	0.457273
Sum	69.43977	30.04610	42.19307
Sum Sq. Dev.	0.708058	1.555463	4.938653
Observations	14	14	14

Table 2. ***Correlation Matrix***

	NSDP	*CapEx*	*OwnTaxRev*
NSDP	1		
CapEx	.870	1	
OwntaxRev	.972	.830	1

The correlation matrix of the variables of the model is shown in Table 2. There is a high correlation between the dependent and independent variables of the model. For instance, the correlation between NSDP and *CapEx* is .87 and between NSDP and *OwnTaxRev* is .97. Therefore, using these variables in the regression equation model is appropriate.

Estimated Model

The Ordinary Least Squares regression model is constructed as follows:

$$\ln NSDP = \alpha_1 + \delta_1 \ln OwnTaxRev_t + \delta_2 \ln CapEx_t + \varepsilon_3 \qquad (2)$$

where, ln is the natural log, *NSDP* (net state domestic product) is the dependent variable representing the economic growth, α_1 is the model's intercept. δ_1 and δ_2 are the coefficients of own tax revenue (*OwnTaxRev*) and capital expenditure (*CapEx*), respectively. ε_3 is the white noise (error term), where it represents the other factors not captured in the model but which might have influenced the model. The coefficients of the model were tested at 5% level of significance and 10% level of significance.

Diagnostic tests were performed to verify the robustness of the model. The Breusch – Godfrey serial correlation or LM test was performed to verify the alternative hypothesis of serial correlation and null hypothesis, the absence of serial correlation, and the existence of serial correlation. ARCH Test was done for the heteroscedasticity Test. The CUSUM test and CUSUM of Squares Test were performed to check the stability of

the model. All hypotheses tests were tested with the null hypothesis at 5% (95% level of confidence) significance level.

Analysis and Results

The econometric results shown in Table 3 reveal that the overall model is robust, with *R*-squared (R^2) of 95% and Adjusted R^2 of 94%. In other words, it indicates that 95% (R^2) change in economic growth (NSDP) is explained by the change in own tax revenue (OwnTaxRev) of the government and capital expenditure (CapEx) of the government.

For example, one unit change in own tax revenue (OwnTaxRev) collection has the potential to change the economic growth of the state (NSDP) by 30% at 5% level of significance ($p = 0.0000$). In other words, a one-unit increase in government tax revenue can increase the NSDP of the UT by 30%. This result is in line with other studies like Kneller et al. (1999) and Arnold (2008). Therefore, the UT government must focus on tax revenue collections within its jurisdiction. The recent amendments on Goods and Services Tax (GST) included Puducherry and NCT of Delhi within the definition of a state, which allows augmenting their tax revenue by properly implementing state GST within their territories.

Further, the UT government can look into boosting its own tax revenue from state excise (liquor and petroleum products, for example). The government can look into widening the tax base and restructuring the system to boost tax revenue collection. Studies have shown that widening the tax base and restructuring the tax boost economic growth (Engen & Skinner, 1996). For example, Arnold (2008) found property tax to be a significant growth enhancer, especially on immovable property. However, increasing the tax rate is not always prudent, as many empirical studies have found that increasing the tax rate negatively impacts economic growth (Brasoveanu & Brasoveanu, 2008). Therefore, governments must emphasize the tax base rather than increasing the tax rates.

Another critical factor that influences the economic growth (NSDP) of the UT of Puducherry is capital expenditure. The econometric test results show that one unit increase in capital expenditure (CapEx) can increase economic growth (NSDP) by 13%, at 10% level of significance ($p = 0.0976$). The results are in line with other studies where it was found that capital expenditure boosts economic growth (Alexiou, 2009; Samuel et al., 2018). Therefore, it is significant for the government of Puducherry to focus on capital expenditure, which can be used as

Table 3. ***Results of the Econometric Model***

Independent variable : lnNSDP			
Method used : Least Squares			
Sample (Time Series) : 2005 – 2018			
Observations : 14			
Variable	**Coefficient**	***t* - Statistic**	**Probability**
lnCapEx	0.136452	1.810663	0.0976**
lnOwnTaxRev	0.304444	7.198426	0.0000*
C	3.749607	40.94796	0.0000
R - Squared	0.957279		
Adjusted *R* - squared	0.949511		
F - statistic	123.2408		
Durbin – Watson stat	1.530757	Prob (*F* - statistic)	0.000000

Note.*5% and **10% level of significance.

a factor to boost economic growth. However, studies like Devarajan et al. (1996) found that excessive capital expenditure, often thought to be the mainstay of development, might render them unproductive at the margin. Higher taxes allow the government to invest in social infrastructure improvements, education, or research and development, increasing the economy's productivity (Mcnabb, 2018).

Capital expenditure thus is a significant determinant of economic growth of the UT of Puducherry, with 90% precision (10% level of significance). However, less capital expenditure was noticed in the UT in recent years. For instance, the CAG (2017) reported decreasing capital expenditure of the UT in sectors such as Health and Family Welfare, Water Supply, Sanitation, Housing and Urban Development, and Social Security and Welfare (under Social Services and Agriculture and Allied activities) and Dairy Development, Fisheries, Irrigation and Flood Control, Ports and Light Houses, Energy and Tourism (under Economic Services). Therefore, the government of the UT of Puducherry must increase its capital expenditure, which would help to spur its economic growth.

The two explanatory variables used in this model, i.e., own tax revenue (OwnTaxRev) and capital expenditure (CapEx), can influence the economic growth (NSDP) of the UT, showing the R^2 (R-squared) rate at 95%, which shows that 95% variation in economic growth is explained by capital expenditure and own tax revenue. In other words, 95% of the changes in economic growth are explained by the government's own tax revenue and capital expenditure.

Discussion

In the econometric test results, the government's own tax revenue and capital expenditure are found to be determinants of the economic growth of the Puducherry government. Therefore, it is critically important for the government to focus on these two aspects and other factors. The government, for example, can increase the tax coverage after proper investigation on the possibility of extending taxation on various products and services apart from broadening its tax base. Furthermore, improving tax enforcement to minimize tax avoidance is critical.

The government can increase its tax revenue by developing more coastline tourism spots. The tourism sector has potential tax revenue generating capacities for the UT government owing to the region's natural beauty and because it is a heritage place of the erstwhile French colony. Youth and weekend tourism can be focused upon. For instance, studies have found that unmarried youths employed in the IT and IT-enabled services form most of the tourists visiting Puducherry on the weekends (Karmenivannan, 2016). Therefore, the tourism sector can emphasize catering to the wants and needs of this category of tourists. More nightlife facilities for the entertainment of the younger tourists, such as discos, casinos, and the like, could be developed with proper regulatory mechanisms. To cite an example from Goa, in 2012–2013, casinos contributed INR 13,545 crore to the state revenue of Goa (Nayar, 2018). Puducherry can also implement facilities and strategies in line with the mechanism followed in the state of Goa. For the state of Goa, tourism has been a great source of tax (Nayar, 2018). Another aspect of Puducherry's tourism-related requirements is the long-distance air travel facilities. The airport of Puducherry needs to be upgraded to meet the needs of domestic and foreign long-distance tourists. Currently, the tourists traveling to Puducherry have to fly to Chennai airport and travel by road to Puducherry, which is tedious.

Further, along with its advanced tourism sector, Goa has also developed its corporate sector, evident from the increase in corporate taxpayers (George & Reddy, 2015). As a result, the tiny state of Goa could achieve fiscal efficiency through sound revenue generation from different sources. Likewise, Puducherry, a tiny coastal territory, can work on many fronts to increase its revenue sources. Although the four regional territories of Puducherry, viz., Puducherry (headquarters), Mahe, Karaikal, and Yanam, are geographically non-contiguous, for economic development, they should be treated in an integrated manner, and all the four regional territories need to work in tandem. For tourism development, the connectivity of all the regions needs to be improved either by road, rail, or air, especially from the headquarters (Puducherry) to the other three regions. While the

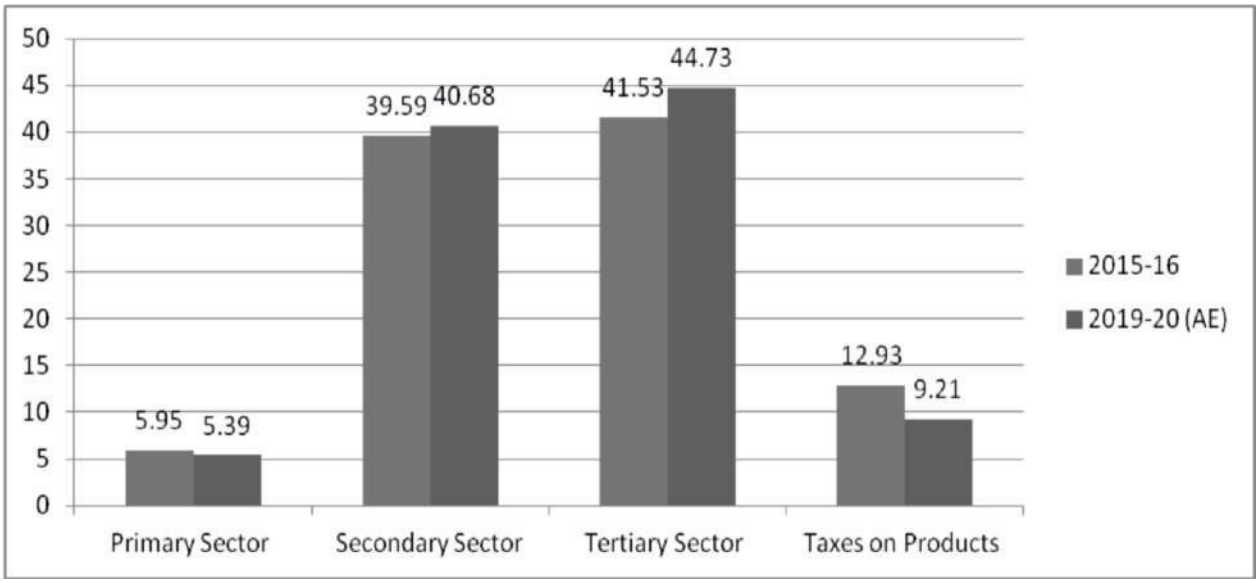
headquarters, i.e., Puducherry, attracts the majority of tourists, the other three regions also need to improve their tourism sector by specializing in their areas, which may help the government to increase its own tax revenue collection. However, more capital investment is critical to achieving such objectives. Public – private partnerships (PPP) model can be adopted to enhance the tourism sector. The government needs to focus on capital investment to spur its internal revenue-generating capacity. It was reported by the CAG (2013) that the capital expenditure of the UT of Puducherry in 2012–2013 was only 9.36% of the total expenditure.

Further, a declining trend has been observed in its capital expenditure. For instance, in 2011–2012, the capital expenditure of the Puducherry government was INR 375 crore, which came down by INR 60 crore to INR 315 crore in 2012–2013. The expenditure on development, including social sector spending and economic sectors of the government, decreased to 64% of the total expenditure in 2012–2013 compared to 72% in 2011–2012 (CAG, 2013). The capital expenditure on financial services as a percentage of total expenditure decreased from 12.18 in 2014–15 to 12.10 in 2015–16 (CAG, 2016). However, a marginal increase was noticed in the capital expenditure for the financial year 2019–2020, i.e., an increase of INR 11 crore to INR 327 crore from INR 316 crore in 2018–2019 (CAG, 2021). However, in 2019–2020, there was an increase in its fiscal deficit by INR 79 crore from INR 302 crore in 2018–2019 (CAG, 2021).

Increasing the GST collection is significant to boost revenue. For instance, GST was expected to increase GDP growth from 1 to 2% (Nayyar & Singh, 2018). Therefore, the government has to focus on how to broaden the tax base of GST. It can encourage and ensure more business transactions and entities are GST registered. Timely filing of the GST is also essential. However, studies found that the compliance rate of GSTR-3B filing by the due date is the highest in Puducherry among the minor states (Mukherjee, 2020). Therefore, the government can leverage this front. The tertiary sector contributes the highest to the GSDP of Puducherry, followed by the manufacturing sector (Figure 1). Product taxes are 9 to 12% of the GSDP (Table 1). Therefore, the government can increase the size of tax collection through proper reformations of the tax system.

The Government of Puducherry has to focus on its internal revenue generating capacity because the total

Figure 1. ***Change in Sectoral Contribution to GSDP (2015 – 2016 to 2019 – 2020)***

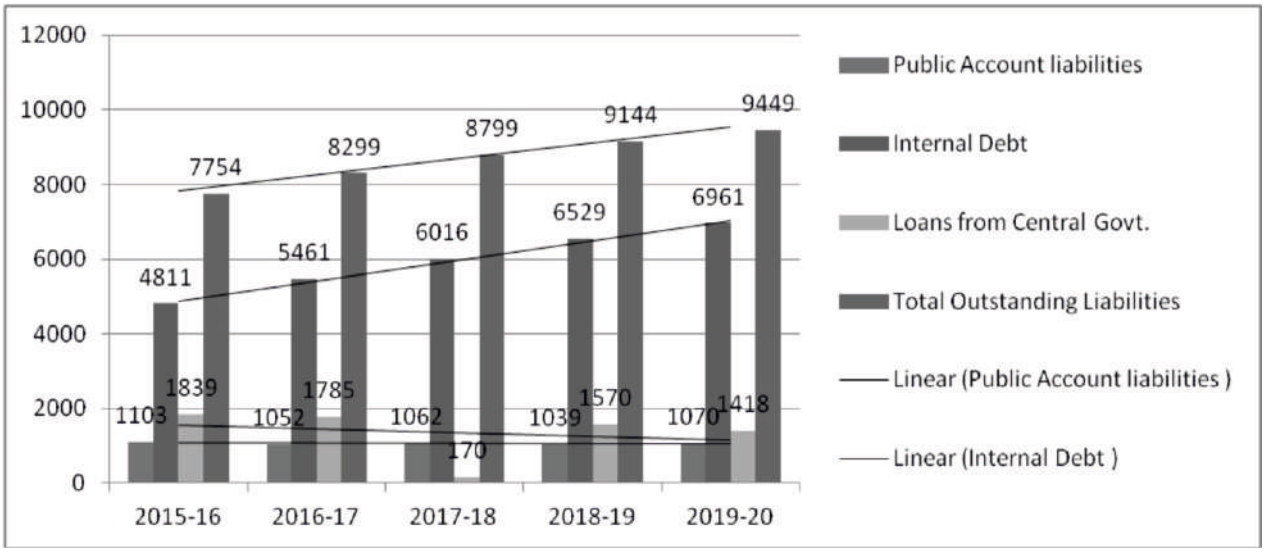


Source. CAG (2021); based on the data source of the Department of Economics and Statistics, UT Government of Puducherry.

outstanding liabilities have been showing an increasing trend (Figure 2), although the total liabilities' percentage to GSDP has decreased over the years. However, it has always been higher than the targeted outstanding liabilities (Figure 3). For instance, in FY 2019–2020, the revenue projection from its own tax revenue as per its FRM (GoI approved FRBM version of UTs) was INR 3,344 crore, but the actual receipt was only INR 2,475 crore, thus facing a deficit of 25.98%.

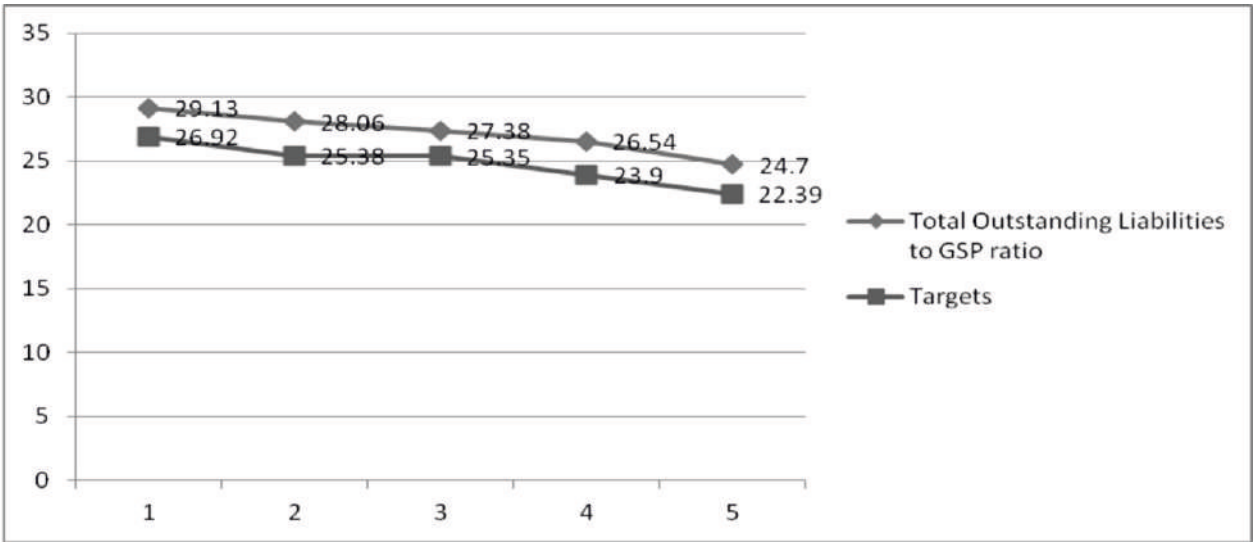
Therefore, it is critically important that the UT government looks into capital expenditure and avenues to increase its tax revenue sources, which could help the government to correct its internal fiscal imbalance.

Figure 2. ***Trends in Fiscal Liabilities of the UT of Puducherry***



Source. CAG report (2021).

Figure 3. ***Liabilities to GSDP and Targets***



Source. CAG report (2021).

Diagnostic Tests

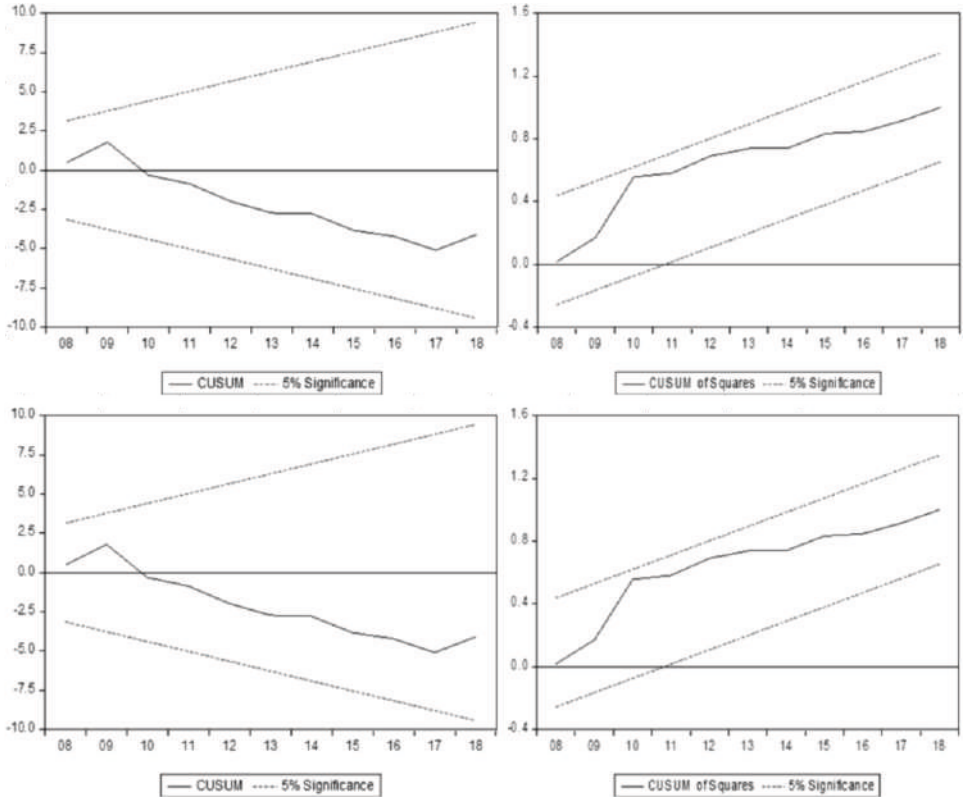
Various diagnostics tests were performed to check the robustness and reliability of the results. Breusch–Godfrey Serial Correlation LM Test results show no serial correlation, and ARCH Test results show no heteroscedasticity (Table 4). The Durbin–Watson statistic shows no autocorrelation between the variables used in the model (Table 4). CUSUM Test and CUSUM of Squares Test results show that the estimated line is within the 5% significance level (Figure 4). Thus, the results of the econometric model used in this study are reliable and may be used for policy formulation.

Table 4. ***Reliability Tests of the Model***

Serial Correlation LM Test (Breusch–Godfrey)		
		Probability
F-statistic	0.215802	0.8099
Obs**R* - squared	0.640659	0.7259
Heteroskedasticity Test : ARCH		
		Probability
F - statistic	0.296201	0.7506
Obs**R* - squared	0.741090	0.6904

Note. 5% level of significance.

Figure 4. ***CUSUM Test and CUSUM of Squares***



Conclusion

This paper investigates the effects of the government's capital expenditure and own tax revenue in the UT of Puducherry. The OLS econometric model is used to estimate the effects of the government's own tax revenue (ownTaxRev) and capital expenditure (CapEx) on economic growth (NSDP). Based on the model, the empirical results suggest a strong positive correlation between the government's own tax revenue and economic growth (NSDP), and the government's own tax revenue positively affects economic growth (NSDP). Further, a strong positive correlation is observed between the government's capital expenditure and economic growth (NSDP), and the state's capital expenditure positively impacts the economic growth (NSDP).

Therefore, the UT government of Puducherry has to look into avenues to raise its own tax revenue by structuring a sound tax system under its jurisdiction. The government may focus on raising revenue by adequately implementing the tax system. Furthermore, the government may focus on capital expenditure to help establish assets and become the potential source to raise revenue for the government in the long run. These procedures will help the government boost its economic growth and may help correct its internal fiscal imbalance.

Limitations of the Study and Scope for Further Research

The data used in this study is its major limitation. The observation is for 14 years, from 2005 to 2018. The reason for selecting this period is the unavailability of data for UT of Puducherry beyond that period. Therefore, a thorough analysis of the CAG reports of various years, including the recent ones submitted to the Lieutenant Governor of the UT of Puducherry, will help us better understand the financial aspects of the government.

Author's Contribution

Dr. Joel Basumatary conceived the idea of the research problem presented in the paper. He compiled and analyzed the data by applying the econometric model using EViews software. The whole paper was written and completed by him.

Conflict of Interest

The author certifies that he has no affiliation with or involvement in any organization or entity with any financial or non-financial interest in the subject matter or materials discussed in this manuscript. He wrote the paper independently as an academician.

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About the Author

Dr. Joel Basumatary is an Assistant Professor of Economics at the Department of Economics, BGCW, Government of Puducherry, an autonomous institution affiliated with Pondicherry University, India. He has been appointed by the Union Public Service Commission (UPSC) as Assistant Professor of Economics for the Union Territory of Puducherry. He teaches public finance and Indian economic development. He has published several papers in international and national peer-reviewed journals covering public finance, poverty studies, and health economics.