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Research Article

Exploring the Dynamics between Government Revenue and Expenditure of Subnational Governments: The Case of Assam in Northeast India

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Abstract: *The tools of government expenditure and government revenue are crucial for budgetary policy and play an important role in the development of any economy. Policy makers' attention has been drawn to the question of possible connections between government revenue and expenditure in the area of public finance. The demand for government investments is always growing, particularly in emerging nations, yet the low per capita income of these nations makes it difficult for the government to get large amounts of money through tax collection. Therefore, it is necessary to understand the relationship between government revenue and spending, which is also a precondition for successful fiscal consolidation. In this paper, an attempt has been made to study the relationship between government expenditure and revenue in the case of Assam economy for the time period 1980-1981 to 2022-2023. Long-term association and causal pattern between the two variables are tested using the Johansen cointegration test and Granger causality analysis. The results show the existence of bidirectional causality between government revenue and expenditure, implying long-term fiscal synchronization in the state of Assam.*

Keywords: *Cointegration, Fiscal Policy, Government Expenditure, Granger Causality, Tax Revenue.*

I. INTRODUCTION

The link between government revenue and expenditure has drawn interest from both empirical researchers and policymakers because of its significance in public finance (Gurdal et al., 2001; Karlsson, 2020). It is especially relevant because of the need to find ways to reduce the budget deficit and the awareness of the serious risks and pressures faced by the economy of developing and impoverished nations in the event of a global emergency like the COVID-19 pandemic. The spending-income relationship has drawn attention from academics because it has an impact on budgeting decisions that affect sound and long-term fiscal policy (Ambala & Adjei, 2023). The developing economies have a higher demand for government services. These nations must invest in health care, education, infrastructure, etc. Therefore, government expenditure is continuously increasing here. On the other hand, they lack sufficient financial resources to pay for these costs. In particular, the population's low income levels are the reason for poor tax collections (Lojanica, 2015). This imbalance between expenditure and revenue increases the fiscal deficit, further aggravating the fiscal situation. Planning and carrying out fiscal adjustment programs thus present dual problems for developing nations. Hence, framing an appropriate fiscal policy is crucial for maintaining price stability and economic growth (Meher, 2020). Understanding and establishing suitable linkages between government revenues and expenditures is a prerequisite for the creation of an efficient fiscal policy. Alterations in government spending, revenue, or both may be used to lower the fiscal deficit.

The theoretical literature in public finance includes four primary theories that explain the mechanics behind the creation of budget deficits and the intertemporal and causal relationship between government revenue and spending: the Fiscal Synchronization Hypothesis, the Tax and Spend Hypothesis, the Spend and Tax Hypothesis, and the Institutional Separation Hypothesis.

The Fiscal Synchronization Hypothesis, proposed by Musgrave (1966) and Meltzer and Richard (1981), suggests that government tax revenue and spending are simultaneously adjusted, with changes in spending being offset by changes in taxes. In contrast, the Tax and Spend Hypothesis, put forth by Friedman (1978), suggests that changes in revenue lead to adjustments in spending. In this perspective, government expenditure is driven by taxation, with a causal relationship that runs from taxation to spending. On the other hand, the Spend and Tax Hypothesis posits unidirectional causality from spending to taxation, where public authorities determine expenditure and then adjust revenue to meet the demand. Peacock and Wiseman (1979) state that temporary changes in government spending lead to permanent changes in the structure of revenue earning. According to Barro (1974, 1979,1986), increased government expenditure financed by budget deficits leads to increased taxation in the future period.

The Institutional Separation Hypothesis, as proposed by Baghestani and McNown (1994), posits that government decisions regarding expenditure and revenue are made independently of one another, as the executive and legislative branches of government have distinct functions. This hypothesis rules out the possibility of any causal relationship between government spending and revenue.

Assam is one of the 11 special category states in Indian Federalism, with unique characteristics such as international boundaries, hilly terrains, and distinct socio-economic developmental parameters. Assam's population was 312.05 lakh, accounting for 2.58% of India's total population, according to the 2011 census. In Assam, government expenditure assumes a critical position since the state's private sector is not well developed. The total budgetary allocation of the state of Assam for 2022-23 was Rs 135348 crore as against total receipts (excluding borrowings) of Rs 114392 crore. There has been an upsurge in demand for public spending in the last few years, aiming to address several welfare and developmental obligations in Assam. Despite this, it has been quite challenging for the state to generate the revenue required for these expenses. Consequently, there is a need for a sound fiscal strategy that can reduce unsustainable budget deficits through understanding the link between public expenditures and their revenues. This study aims to examine empirically the relationship between government income and expenditure in Assam, one of the states constituting the Indian Federation.

II. LITERATURE REVIEW

A vast amount of empirical literature investigates the relationship between government expenditure and revenue. Yashobanta & Smruit (2012) in their study found the existence of the fiscal synchronization hypothesis in the Indian context. Mohanty & Mishra (2017) found one-way long-run and short-run causality from tax revenue to government expenditure, giving evidence of the tax and spend hypothesis existing in the Indian economy. Their study covered a period from 1980-81 to 2013-14. Kaur & Kaur (2018) investigated the same relationship for the Indian states and found no causality between government expenditure and revenue, supporting the fiscal neutrality or institutional separation hypothesis. Akram & Rath (2019), using panel data from 26 Indian states, examined the nexus from 1980 to 2015. They found bi-directional Granger causality between the variables, showing evidence of the fiscal synchronization hypothesis. Considering a different time period from 2000-01 to 2015-16, Chawla and Saxena (2019) found the existence of the spend and tax hypothesis in the Indian context both in the short and long run.

Numerous research studies have examined the connection between government revenue and spending. However, because these studies employ varied methodologies and are country and time-specific, they cannot offer definitive findings about the relationship. Therefore, there isn't a single fiscal consolidation prescription that works in every circumstance. The different literature reviews show that in the Indian context, the fiscal synchronization and spend and tax hypothesis were more applicable based on different periods. There has not been enough research focusing rigorously on the expenditure-revenue nexus of Assam's economy. Because of the conflicting findings of the past research and the inadequacy of studies in the Assam economy, this study is an attempt to analyze the causality between government expenditure and revenue of Assam from 1980-81 to 2022-23.

IV. DATA AND METHODOLOGY

The study is based on secondary sources of data. The data has been collected from Reserve Bank of India data sources and EPW Research Foundation. The period is from 1980-81 to 2022-23, spanning a time of 43 years. The variables undertaken for the study are government revenue expenditure and tax revenue of the state, which are used as proxies for government expenditure and government revenue respectively. The stationarity of the variables is tested using the Augmented Dicky Fuller unit root test. After that, long-term association and causal pattern between the two variables are tested using the Johansen cointegration test and Granger causality analysis.

V. RESULTS AND DISCUSSION

A) Unit root test

Table 1 presents the results of the Augmented Dickey-Fuller (ADF) test. The null hypothesis of the existence of a unit root cannot be rejected at the level for both variables, and both variables are non-stationary at the level. The ADF test for the first difference of the variables shows that they are stationary at the first difference.

Table 1: Result of ADF Unit Root Test

Variable	Lag length (Automatic, based on SIC criterion, Maximum lag length=9)	ADF test statistic	Probability*	5% critical value
ADF unit root test with intercept				
LNRE	1	-0.449194	0.8903	-2.938987
DLNRE	0	-8.170405**	0.0000	-2.933158
LNTR	0	-0.638957	0.8503	-2.936942

DLNTR	0	-6.168351**	0.0000	-2.938987
ADF unit root test with trend and intercept				
LNRE	0	-2.366322	0.3907	-3.526609
DLNRE	0	-8.047251**	0.0000	-3.529658
LNTR	0	-2.157838	0.4991	-3.526609
DLNTR	0	-6.089967**	0.0001	-3.529758

**MacKinnon (1996) one-sided p-values. ** indicates rejection of the null hypothesis of the presence of unit root at a 5% significance level. 'D' stands for the first difference of the variables*.

Given that both variables are found to be I (1), the study uses the Johansen Maximum Likelihood cointegration approach to determine whether there is a long-term relationship between the two variables. The first step in the Johansen cointegration test is to determine the optimum lag length.

B) Optimum Lag length

Table 2 shows that the optimum lag length for the model is 1.

Table 2: Result of Optimum Lag Length Criteria

Lag	LR	FPE	AIC	SC	HQ
0	NA	0.004198	0.202501	0.289578	0.233199
1	162.1116*	4.43e-05*	-4.349271*	-4.088041*	-4.257175*
2	4.270439	4.83e-05	-4.266506	-3.831123	-4.113013
3	4.064616	5.26e-05	-4.185777	-3.576241	-3.970887
4	4.105548	5.702-05	-4.116188	-3.332498	-3.839900

**indicates lag order selection by the criterion at 5% level of significance, LR: Sequential modified LR test statistic FPE: Final prediction error AIC: Akaike Information criterion SC: Schwarz Information criterion HQ: Hannan-Quinn Information criterion*

C) Cointegration Test

The results of the Johansen Maximum Likelihood Method are depicted in Table 3. The null hypothesis for the test is that no cointegrating relationship exists between the two underlying variables.

Table 3: Results of Johansen Maximum Likelihood Test of Cointegration

Unrestricted cointegration rank test (Trace)				
Hypothesized No of Cointegrating equations	Eigen Value	Trace Statistic	0.5 critical value	Prob*
None**	0.422089	21.74234	15.49471	0.0050
At most 1	0.009119	0.357271	3.841466	0.5500
Unrestricted cointegration rank test (Maximum Eigenvalue)				
Hypothesized No of Cointegrating equations	Eigen Value	Max Eigen Statistic	0.5 critical value	Prob**
None**	0.422089	21.38507	14.26460	0.0032
At most 1	0.009119	0.357271	3.841466	0.5500

***denoted rejection of the hypothesis at 5% level of significance * Mackinnon-Haug-Michelis (1999) p-values*

Table 3 presents the results of the unrestricted cointegration rank test and the maximum eigenvalue. Both the unrestricted cointegration rank test (trace) and the unrestricted cointegration rank test (maximum eigenvalue) find the presence of one cointegrating equation between the two variables. The long-run cointegrating equation is LNEXP=2.040793+ 0.838656LNTR (standard error=0.02300, t-statistic =-36.4577). This equation shows that the long-term elasticity of revenue expenditure relative to tax revenue is 0.83. This indicates that all other factors are constant, and government revenue expenditure will increase by 0.83% for every percentage increase in tax revenue. However, the cointegrating relationship between the two variables does not enable us to understand the causal relationship between them. Therefore, we resort to a vector error correction model to investigate the causality pattern along with the short-term interactions between the relevant variables.

D) Vector Error Correction and Granger Causality

According to Engle and Granger (1987), the presence of two cointegrated variables always results in an error correction model. In this model, changes in the explanatory variables and the error correction term address the disequilibrium level in the cointegrating relationship between the variables, thereby explaining changes in the dependent variable. The error correction term indicates the rate at which any short-term deviations from the long-term relationship between the variables are corrected to return to the long-term steady path. The VECM structure can be used to examine the long-run and short-run causation of two cointegrated variables. The VECM model consists of equations 1 and 2, respectively. In this instance, we have considered only one lag according to the VAR lag selection criteria.

$$DLNRE_t = \gamma_1 + \lambda_1 ECT1_{t-1} + \delta_{11} DLNRE_{t-1} + \delta_{12} DLNTR_{t-1} + \varepsilon_{1t} \text{ .....1}$$
$$DLNTR_t = \gamma_2 + \lambda_2 ECT2_{t-1} + \delta_{21} DLNTR_{t-1} + \delta_{22} DLNRE_{t-1} + \varepsilon_{2t} \text{ .....2}$$

In the above equations $DLNEXP_t$ and $DLNTR_t$ are the first difference of the logarithm of revenue expenditure and tax revenue variables; ECT1 and ECT2 are error correction terms. γ and δ are short-run coefficients, ε_t is the residual term.

Table 4: Result of the VECM Model

Dependent Variable	Variables	Coefficient	Standard error	't' value	Probability
$DLNRE_t$	$ECT1_{t-1}$***	-0.597438	0.184890	-3.231308	0.0019
	$DLNRE_{t-1}$	0.041266	0.171107	0.241170	0.8101
	$DLNTR_{t-1}$**	-0.211399	0.150131	-1.408099	0.1635
	γ_1	0.071965	0.016594	4.336901	0.0000
$DLNTR_t$	$ECT2_{t-1}$**	-0.468215	0.185098	-2.529548	0.0137
	$DLNTR_{t-1}$	0.200881	0.180636	1.112072	0.2699
	$DLNRE_{t-1}$	-0.100090	0.205874	-0.486169	0.6284
	γ_2***	0.055680	0.019965	2.788827	0.0068

***(***) implies significance at 5% (1%) level of significance*

Table 4 indicates that the error correction term for the expenditure variable is significant and negative. The negative sign of the error correction term and its significance indicate that any short-term divergence of the expenditure series from the long-term equilibrium steady path is only temporary and will eventually be corrected. The value of the error correction term for revenue expenditure is 0.597438, indicating that 59% of the deviations in the expenditure variable are automatically corrected within the current year. As for the revenue variables, its error correction term is also negative and significant, with a value of 0.468215. This implies 46% of the short deviations in the revenue variable are automatically corrected to the long-run equilibrium path within one year. Both error correction terms' negative value and significance suggest the presence of bidirectional causality between the variables, indicating that the fiscal synchronization hypothesis is valid for Assam in the long run.

Table 5: Result of Pairwise Granger Causality Test

Test statistic	Value	Probability
Null hypothesis: LNTR does not Granger cause LNRE		
F-statistic	10.6088	0.0024**
Null hypothesis: LNRE does not Granger cause LNTR		
F-statistic	6.44231	0.0155**

*** implies significance at 5% level of significance*

Table 5 reveals that it is possible to reject the null hypothesis that there is no causality from government revenue to expenditure at the 5% significance level, indicating the existence of short-run Granger causality between tax revenue and government spending. Again, at a 5% significance level, the null hypothesis that there is no causality from spending to revenue can be rejected, which means that, in the short term, government spending leads to government revenue. This concludes that there is bidirectional causality in Assam between government tax income and government expenditure, supporting the existence of the fiscal synchronization hypothesis.

E) VECM Diagnostic Tests

Several diagnostic tests are used in this part to evaluate the estimated VECM model's effectiveness. In this case, the Jarque-Bera test statistic is utilized to determine whether or not the residuals of the VECM's estimated equations are normally distributed; the ARCH test is used to look for heteroscedastic errors; and the Breusch-Godfrey Serial Correlation LM test is used to determine whether or not serial correlation is present in the error terms.

Table 6: Results of Diagnostic Tests

Variables	Normality Test		ARCH test of heteroscedasticity		Serial Correlation LM test	
	JB statistic	Probability	Obs*R-squared	Probability	Obs*R-squared	Probability
LNTR	3.022350	0.220651	0.001196	0.9724	1.410166	0.4941
LNRE	1.114649	0.572739	0.005903	0.9388	2.648736	0.2660

The findings indicate that the normalcy assumption is satisfied by both the equations as the null hypothesis of normally distributed errors is accepted, shown by the p-value of JB statistic being more than 0.05. The results also indicate that the VECM is free from heteroscedastic errors. This allows us to accept the null hypothesis that the ARCH test contains no heteroscedastic errors. The probability values of the serial correlation LM test further demonstrate that no serial correlation issues affect the estimated model.

VI. CONCLUSION

This study empirically examines the relationship between government revenue and expenditure in Assam from 1980-81 to 2022-23. The results of the Johansen cointegration test confirm a long-term equilibrium relationship between government revenue and expenditure. The Vector Error Correction Model (VECM) shows the existence of bidirectional causality between revenue and expenditure, implying long-term fiscal synchronization in the state. The error correction terms for both variables are significant and negative. This indicates that short-term deviations from the long-term equilibrium are corrected over time, with expenditure and revenue adjusting at moderate rates to return to their steady-state paths. The Granger causality test results give evidence of the presence of bidirectional causality in the short term and show that the fiscal synchronization hypothesis is valid in the state both in the short run and long run. This implies that revenue and expenditure decisions are taken simultaneously in Assam. The diagnostic tests validate the robustness of the VECM model, which ensures that the study's findings are reliable.

VII. REFERENCES

[1] Vaseem Akram and Badri Narayan Rath, Is there any evidence of tax-and-spend, spend-and-tax or fiscal synchronization from panel of Indian state? Applied Economics Letters, Taylor & Francis Journals. 26(18) (2019)1544-1547.

[2] Nsor Randolph Ambala and Emmanuel Asafo-Adjei, The government revenue – expenditure nexus in Ghana: A wavelet analysis, Cogent Economics and Finance. 11(2023) 1-28.

[3] Hamid Baghestani and Robert McNown,Do Revenues or Expenditure Respond to Budgetary Disequilibria?,Southern Economic Journal. 60 (1994) 311-22.

[4] Priyanka Chawla and Pravin Saxena, An Analysis of Causality between Government Tax Revenues and Expenditures in India. Journal of Emerging Technologies and Innovative Research. 6(1) (2019)586-596.

[5] Robert F. Engle and C. W. J. Granger, Cointegration and Error Correction: Representation, Estimation, and Testing, Econometrica . 55(2) (1987) 251-276.

[6] Milton Friedman, The Limitations of Tax Limitation, Policy Review. 5 (1978) 7-14.

[7] Clive Granger, Some Recent Development in a Concept of Causality. Journal of Econometrics.39(1-2)(1988)199-211.

[8] Temel Gurdal, Mucahit Aydin and Veysel Inal , The Relationship between Tax Revenue, Government Expenditure, and Economic Growth in G7 countries: New Evidence from Time and Frequency Domain Approaches, Economic Change and Restructuring. 54(2) (2021)305–337.

[9] Rashpaljeet Kaur and Rajinder Kaur, A Causal link between Receipts and Expenditure of State Governments in India. Pacific Business Review International. 10(8) (2018) 97-103.

[10] Rashpaljeet Kaur, Investigation of Causality Relation between State Governments' Expenditure and GDP in India. Abhigyan. XL(1) (2022) 134-41.

[11] Hyunjoo Kim Karlsson, Investigation of the Time-Dependent Dynamics between Government Revenue and Expenditure in China: A Wavelet Approach. Journal of the Asia Pacific Economy. 25(2)(2020) 250–269.

[12] Nemanja Lojanica, Government Expenditure and Government Revenue-The Causality on the Example of Republic of Serbia, MIC 2015: Managing Sustainable Growth; Proceeding of the Joint International Conference (2015)

[13] Karabee Medhi, State Government Spending and Economic Growth in Assam: An Econometric Analysis. PhD Thesis, Department of Economics, Dibrugarh University (2020)

[14] Shibalal Meher, Dynamic Causal Relationship between Government Expenditure and Revenue in Odisha: A Trivariate Analysis. Presented at 56th Annual Conference of the Indian Econometric Society (TIES), Madurai Kamaraj University, Madurai, India (2020)

[15] Allan H. Meltzer and Scott F. Richard, A Rational Theory of the Size of Government. Journal of Political Economy. 89 (2014) 914-927.

[16] Asit Ranjan Mohanty and Bibhuti Ranjan Mishra,(2017)Cointegration between Government Expenditure and Revenue: Evidence from India. Advances in Economics and Business. 5(1) (2017)33-40.

[17] Richard A Musgrave, (1966) Principles of Budget Determination. In Cameron, A.H. & Henerson, W.(Eds.), Public Finance: Selected Readings, New York: Random House. (1966) 15-20

[18] Yashobanta Parida and Smruti Ranjan Behera, Causal link between Central Government Revenue and Expenditure: Evidence for India. MPRA Paper No. 43072. (2012) 1-30**.**