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Government Expenditure and Tax Revenues: Testing for Causality in India

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Abstract: **The purpose of this paper is to examine the interrelationship between government expenditure and tax revenue for India. These variables are important from a policy point of view, especially for a country like India, which is suffering from persistent budget deficits. Although a number of studies have shed light on this issue using Granger causality tests, the present study attempts to quantify various feedback between revenue and expenditure in Indian context. The findings of this paper should allow policy makers to make informed decisions. The unit-root test and Granger causality test are used to conduct the empirical analysis. The Granger's test suggests unidirectional causality flowing from tax revenues to total expenditure of the government. The outcome of the Granger test was found to be sensitive to the number of lags introduced in the model. To conclude, from the perspective of policy making and the deficit solution debate, raising taxes in India is perhaps the optimal solution to the current budget deficit predicament.**

Keywords: **Government Expenditure, Tax Revenue, Granger causality test, Dickey-fuller test.**

I. INTRODUCTION

Government Expenditures have consistently surpassed government revenues in India since 1980s. The combined fiscal deficit of the Centre and the States was 9.1 per cent of GDP in the crisis year of 1990-91, which fell to 6.1 per cent in 1996-97 before increasing to 8.7 per cent in 1998-99. The fiscal deficit stayed at over 9 per cent until 2002-03 and has since continually fallen, dropping to 4 per cent in 2007-08. The fiscal deficit increased in 2009-10 to 9.3 per cent, because of the global financial crisis. The budget estimate of 2015-16 fiscal deficit is 6.5 per cent (Source: rbi.org.in).

To reduce the fiscal deficit, various tax and expenditure reforms like cutting down unproductive expenditure or raising tax revenue are undertaken. It thus becomes important to study the relationship between these two variables.

Darrat(1998) and Craigwell, et al. (1994) found unidirectional causality flowing from tax revenue to government expenditure. On the other hand, Anderson, et al.(1986) and Aisha, et al.(2009) found unidirectional causal relation from government spending to tax revenue. Manage and Marlow (1986) found evidence of bi-directional causality between the two fiscal variables, while Sadiq (2010) founds no causation.

The present paper empirically investigates the causal relationship between tax revenues and government expenditures in India.

II. LITERATURE REVIEW

Theoretically, four hypothesis have been identified: tax and spend hypothesis, spend and tax hypothesis, the fiscal synchronization hypothesis, and the institutional hypothesis.

1. *Tax and Spend Hypothesis*

Friedman advocated that level of government expenditure adjusts to taxation. Friedman (1982) demonstrates: "You cannot reduce the deficit by raising taxes. Increasing taxes only results in more spending, leaving the deficit at the highest level conceivably accepted by the public. Political rule number one is government spends what government receives plus

as much more as it can get away with." If there is an increase in tax revenue, government spending also rises as a result. If there is a decrease in tax revenue, government spending falls as a consequence. Thus, the relationship is positive. He argues that lower fiscal deficit requires lower taxation.

Buchanan and Wagner (1977) in disagreement with Friedman on how taxes affects spending writes "Deficit spending and inflationary finance tend to alleviate the intensity of taxpayer resistance, ensuring a relative expansion in the size of public budgets. Government borrowing and monetary creation reduce the perceived price of publicly provided goods and services. In response, citizens-taxpayers increase their demand for such goods and services. Preferred budget levels will be higher, and these preferences will be sensed by politicians and translated into political outcome." They contend that tax reductions bring down the apparent cost of government given products and services, which leads to an increase in amount demanded of these goods and services. Nevertheless, general society might be paying higher prices. One explanation behind this is the indirect inflation tax due to deficit financing by the government. Another reason is higher loan costs connected with government debt financing which crowds out private investment. In total, tax reforms, changes spending and the relationship between the two is negative.

Darrat(1998) found that in case of Turkey taxes granger cause expenditure. He found a negative relationship between these two variables. Craigwell, et al. (1994) also supports tax and spend hypothesis in Barbados using granger causality. This hypothesis is also called the 'revenue dominance hypothesis'.

2. Spend and Tax Hypothesis

According to this hypothesis, the government first decides to spend and then tax policy is adjusted in line with the desired level of government spending. The causality is from government expenditure to tax revenues. This hypothesis is called the 'expenditure dominance hypothesis'.

As opposed to Friedman, Barro (1974) doesn't see expanded tax collection as a causal instrument in the development of government; rather he sees the circumstance in converse. Higher spending leads to an increase in tax. On the subject of government bonds and net wealth, Barro writes that "there is no persuasive theoretical case for treating government debt, at the margin, as a net component of perceived household wealth." Barro's explanations depend on Ricardian equivalence wherein he says that being rational, taxpayers are expected to see an increase in government debt as delayed tax burden. Barro (1979) demonstrated that amid war and post war periods the effect of temporary increment in government spending on government debt in the end leads to an increase in taxes.

Peacock and Wiseman (1979) say that in situations of wars, natural disasters or other crisis situations, government temporarily increases expenditure and taxes to pay for this spending. But, the tax increase might become permanent showing higher tax tolerance by the public. This allows for permanent rise in government expenditure. In line with that, Anderson, et al.(1986) supports Barro hypothesis that spending causes taxes. After checking for unit roots, they used granger causality as their preferred methodology. Aisha, et al.(2009)[uses granger causality to check the direction of relationship] found unidirectional causal relation from government spending to tax revenue in Pakistan. The conclusion that TR does not cause GE can best be explained by the political economy of Pakistan where the main expenditures are determined politically by administrative and military influence (defense, debt servicing, general administration)

3. Fiscal Synchronization Hypothesis

Fiscal synchronization hypothesis theorizes that government's decisions on tax policy and spending are taken simultaneously (Meltzer & Richard, 1981). Thus, causality is bi-directional between government spending and tax revenue. According to the fiscal synchronization theory, people choose the level of spending and taxes. This is done through contrasting the advantages of government with resident's marginal cost. Thus, the inference of this hypothesis is that government expenditure and tax revenue are determined jointly. Manage and Marlow (1986) find evidence of bi-directional causality between USA's central revenues and expenditures for 1929-82.

4. Institutional Separation Hypothesis

The taxation and spending functions of the management and legislative government branches are different as these are different institutions. So all the different institutions enjoy the privilege of making independent decisions in relation to expenditure and revenue. Therefore, this indicates that no casual link can be determined between government expenditure and tax revenue. The long run economic growth dictates the government expenditure and revenue reflecting the

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separation of institutes. Disagreement between different parties is the reason behind growing public debt. Sadiq (2010) uses the granger causality test but finds no causation between government expenditure and tax revenue in Pakistan. He uses AIC criteria to find the optimal lag length.

Thus, numerous studies have been undertaken to examine the relationship between tax revenue and government expenditure but there is no consensus about the linkage between these variables. Results vary from country to country and also time periods.

III. DATA AND METHODOLOGY

For the purpose of this study, the data series for two variables have been considered:

***1. Government Tax Revenue*:** the figures represent the total of direct and indirect taxes of central and state governments combined in billions and;

***2. Total Expenditure*:** the figures represent the Total Developmental, Non-Developmental Expenditure and Other Expenditure of central and state governments combined in billions.

The data has been sourced from Handbook of Statistics on the Indian Economy, Reserve Bank of India. The analysis is based on annual time series data from 1980-2015. Given the exogenous character of the non-tax revenues (which include interest income, profits and dividends, and miscellaneous receipts) have been excluded from the study.

To study the relationship between revenues and expenditure, various approaches have been adopted including Co-integration test, Granger causality test, Error correction and Vector Autoregressive models(VAR). The Granger Causality Test is a commonly used method to estimate causality. The present paper will therefore use this method and see the direction of causation between the two variables under consideration. Granger (1969) argued that the future values cannot predict the past, but the future values might be predicted by the past values. Thus, past total expenditure and revues might explain current revenue. The causality will be from expenditure to revenue. The opposite is the case if the current total expenditure by government is explained by past tax revenues and total expenditures. The causality would then flow from revenue to expenditure. The simple model given by Granger which tests the causal relationship between revenues and expenditures is as follows:

$$TE_t = \sum_{i=1}^{n} \alpha_i \; TR_{t-i} + \sum_{j=1}^{n} \beta_j \; TE_{t-j} + u_{1t} \qquad (1)$$

$$TR_t = \sum_{i=1}^{n} \lambda_i \; TR_{t-i} + \sum_{j=1}^{n} \delta_j \; TE_{t-j} + u_{2t} \qquad (2)$$

The error terms u_{1t} and u_{2t} are uncorrelated. $'n'$ is the given lag length. Equation (1) postulates that current total expenditure(*TE*) is related to past values of itself as well as that of tax revenues (*TR*). Equation (2) postulates a similar behavior for *TR*. In the above equations if $\sum \alpha_i \neq 0 \; and \; \sum \delta_j = 0$, it implies unidirectional causality from *TR* to *TE*. Conversely, unidirectional causality exists from *TE* to *TR* if, $\sum \delta_j \neq 0 \; and \; \sum \alpha_i = 0$. Bilateral causality is implied when the sets of *TR* and *TE* coefficients are statistically significantly different from zero in both regressions (i.e. $\sum \delta_j \neq 0 \; and \; \sum \alpha_i \neq 0$). Finally, no causality exists, when both $\sum \delta_j = 0 \; and \; \sum \alpha_i = 0$.

The null and alternate hypothesis for equation (1) are the following:

H_0: TR does not Granger-Cause TE.

H_1: TR does Granger-Cause TE.

For Equation (2) null and alternate hypothesis are the following:

H_0: TE does not Granger-cause TR.

H_1: TE does Granger-Cause TR.

Granger causality assumes the variables are stationary. If the equations are estimated with non-stationary data series, the

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Gauss-Markov theorem would not hold. It will lead to spurious regression and may provide wrong results. Stationarity for the data series on Tax revenues and Total expenditure is checked using unit root tests (Dickey-Fuller Tests) and graphical inspection. The equations to be estimated are:

$$\Delta TR_t = \beta + \delta TR_{t-1} + u_t \ and \tag{3}$$

$$\Delta TE_t = \beta + \delta TE_{t-1} + u_t \tag{4}$$

where $\delta = \rho - 1$, u_t is a white noise error term, it is stationary.

The null and alternate hypothesis for equations (3) are:

H_0: TR has a unit root or the series is nonstationary (i.e. $\delta = 0$)

H_1: TR is stationary (i.e. $\delta < 0$)

The null and alternate hypothesis for equations (4) are:

H_0: TE has a unit root or the series is nonstationary (i.e. $\delta = 0$)

H_1: TE is stationary (i.e. $\delta < 0$)

Granger causality test is done after running Vector Autoregression (VAR) on the stationary series. VAR is tested for lag lengths 1 to 10. VAR is used when there is no exogenous variables in the system of equations and we deal with two or more endogenous variables.

IV. EMPIRICAL RESULTS

Time series plot for the absolute levels of TR and TE were checked. The graphical analysis showed that there is an upward trend in both the variables (fig. 1). Augmented Dickey-Fuller (ADF) tests were then applied on both the variables. The results are tabulated in Table 1. We do not reject the null hypothesis, which says that variables have a unit root or are non stationary, if the test-statistics is less than the critical value at 1%, 5% or 10% level of significance in absolute terms. We reject the null hypothesis and accept the alternate hypothesis which says that variables are stationary, if the test-statistics is more than the critical value at 1%, 5% or 10% level of significance in absolute terms. The equations estimated include the intercept term.

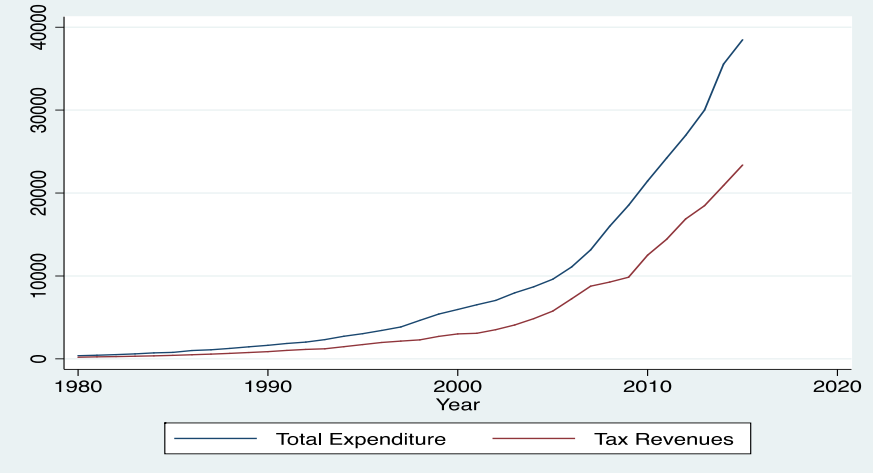

Fig. 1

TABLE 1: Results of ADF Test

		Critical Values			
Variable	Test-statistic	1%	5%	10%	Result
TR	11.615	-3.682	-2.972	-2.618	Nonstationary
TE	13.738	-3.682	-2.972	-2.618	Nonstationary

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We do not reject the null hypothesis for either variable. Thus, both variables are nonstationary. To make the series stationary, first difference of both the variables were taken and checked for unit root. The transformed variables also show the problem of non stationarity. Therefore, the first difference of log of variables had been taken to make the series stationary. The series is no longer non stationary as can be seen by visual inspection (Fig. 2). The results for ADF tests have been tabulated in Table 2.

Fig. 2

*FLTE = first difference of log of total expenditure
FLTR = first difference of log of tax revenues

TABLE 2: Results of ADF Test

		Critical Values			
Variable	Test-statistic	1%	5%	10%	Result
FLTR	-5.186	-3.689	-2.975	-2.619	stationary
FLTE	-5.865	-3.689	-2.975	-2.619	stationary

FLTR is the first difference of log of tax revenues. The test statistic is more than the critical value at all the significance level in absolute terms. Thus, we reject the null hypothesis of non stationarity. FLTE is the first difference of log of total expenditures. The test statistic is more than the critical value at all the significance level in absolute terms. Thus, we accept the alternate hypothesis of stationarity. Now, both the series are stationary.

Next the data was analysed using vector autoregression (VAR) model for lag lengths 1 to 10. Granger Causality tests were run on each model.

The equations for Granger Causality were estimated by the following model:

$$FLTE_t = \sum_{i=1}^{n} \alpha_i \; FLTR_{t-i} + \sum_{j=1}^{n} \beta_j \; FLTE_{t-j} + u_{1t} \qquad (5)$$

$$FLTR_t = \sum_{i=1}^{n} \lambda_i \; FLTR_{t-i} + \sum_{j=1}^{n} \delta_j \; FLTE_{t-j} + u_{2t} \qquad (6)$$

The null and alternate hypothesis for equation (5) are the following:

H_0: FLTR does not Granger-Cause FLTE.

H_1: FLTR does Granger-Cause FLTE.

For Equation (6) null and alternate hypothesis are the following:

H_0: FLTE does not Granger-cause FLTR.

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H_1: FLTE does Granger-Cause FLTR.

The results were tested against 5% significance level. We do not reject the null hypothesis if p-value is more than 5%. The null hypothesis is rejected if p-value is less than 5%. The results for granger causality test on VAR models are presented in Table 3.

TABLE 3: Results of Granger Causality Test

Direction of Causality	Number of lags	p-value	Decision (at 5%)
FLTE → FLTR	2	0.813	Do not reject
FLTR → FLTE	2	0.594	Do not reject
FLTE → FLTR	3	0.898	Do not reject
FLTR → FLTE	3	0.128	Do not reject
FLTE → FLTR	4	0.959	Do not reject
FLTR → FLTE	4	0.001	Reject
FLTE → FLTR	5	0.986	Do not reject
FLTR → FLTE	5	0.000	Reject
FLTE → FLTR	6	0.998	Do not reject
FLTR → FLTE	6	0.000	Reject
FLTE → FLTR	7	0.845	Do not reject
FLTR → FLTE	7	0.000	Reject
FLTE → FLTR	8	0.553	Do not reject
FLTR → FLTE	8	0.000	Reject
FLTE → FLTR	9	0.000	Reject
FLTR → FLTE	9	0.000	Reject
FLTE → FLTR	10	0.000	Reject
FLTR → FLTE	10	0.000	Reject

At lag lengths 2 and 3, the null hypothesis that tax revenues do not Granger causes total expenditure is accepted against the alternate hypothesis that tax revenues do Granger cause total expenditure at 5 percent significance. Similarly, the null hypothesis that total expenditure does not cause tax revenues is also accepted against the alternate that total expenditure does Granger cause tax revenues. Thus, there is no causality between these variables.

At lag lengths 4 to 8, there is evidence of unidirectional causality from FLTR to FLTE. expenditures. The null hypothesis that tax revenues do not Granger cause total expenditure is rejected against the alternate that tax revenue do Granger cause total expenditure at 5 percent significance. Conversely, the null hypothesis that total expenditure does not cause tax revenue is accepted against the alternate that total expenditure does Granger cause tax revenues. Thus, tax revenues granger-cause total expenditure.

At lag lengths 9 and 10, bidirectional causality is found between the two variables. The null hypothesis that tax revenues do not Granger cause total expenditure is rejected against the alternate that tax revenue do Granger cause total expenditure at 5 percent significance. Similarly, the null hypothesis that total expenditure does not cause tax revenue is also rejected against the alternate that total expenditure does Granger cause tax revenue.

V. CONCLUSION

The present empirical study was undertaken to determine the direction of causality between tax revenues and total expenditure of Central and State governments combined in India, as these variables are deemed important from a policy point of view. Several empirical studies have shed light on this relationship. The results are diverse and are country specific. The unit-root test and Granger causality test were used to conduct the empirical analysis in the present study. The Granger test was run for various lags. In general, the results of the study under consideration support the tax and spend hypothesis propagated by Friedman. The Granger's test suggests unidirectional causality flowing from tax revenues to total expenditure of the government. The outcome of the Granger test was found to be sensitive to the number of lags

introduced in the model. The findings of this paper should allow policy makers to make informed decisions. To conclude, from the perspective of policy making and the deficit solution debate, raising taxes in India is perhaps the optimal solution to the current budget deficit problems.

REFERENCES

[1] Aisha, Z., & Khatoon, S. (2009). Government Expenditure and Tax Revenue, Causality, and Cointegration: The Experience of Pakistan (1972-2007). The Pakistan Development Review, 48(4), 951-959.

[2] Anderson, W., Wallace, M.S. & Warner, J. (1986). "Government spending and taxation: what causes what?". Southern Economic Journal, 52, 630-639.

[3] Barro, R.J. (1974). Are Government Bonds Net Wealth?. Journal of Political Economy, 82(6), 1095-1117.

[4] Barro, J. R. (1979). On the Determination of the Public Debt. Journal of P Economy 87(5), 940-971.

[5] Buchanan, J., & Wagner, R. (1977). Democracy in Deficit. New York: Academic Press.

[6] Budget documents of Government of India and the State Governments. https://dbie.rbi.org.in/DBIE/dbie.rbi?site =statistics

[7] Craigwell, R. C., Leon, H., & Mascoll, C. (1994). Government Revenue and Expenditure Causality in the presence of Seasonality in Barbados. Social and Economic Studies, 43(4), 197-218.

[8] Darrat, A. F. (1998). Tax and Spend, or Spend and Tax? An inquiry into the Turkish Budgetary Process. Southern Economic Journal, 64(4), 940-956.

[9] Friedman, M. (1978). The Limitations of Tax Limitation. Policy Review, Summer, 7-14.

[10] Granger, J. W. C. (1969). Investigating Causal Relationship by Econometric Model Cross Spectural Methods. Econometrica, 37(3), 424-438.

[11] Manage, N., & Marlow, M.L. (1986). The Causal Relation between Federal Expenditures and Receipts. Southern Economic Journal, 52(3), 617-629.

[12] Meltzer, A.H., & Richard, S.F. (1981). A rational theory of the size of the government. Journal of Political Economy, 89, 914-27.

[13] Peacock, A. & Wiseman, J. (1979). Approaches to the analysis of government expenditure growth. Public Finance Quarterly, 7, 3-23.

[14] Sadiq, T., & Ghani, E. (2010). The causality between revenues and expenditure of the federal and provincial governments of Pakistan (with comments). The Pakistan Development Review, 49(4), 651-662.