Economics Bulletin

Volume 32, Issue 4

Causal Link between Central Government Revenue and Expenditure: Evidence for India

Yashobanta Parida
INSTITUTE OF ECONOMIC GROWTH

Abstract

This paper attempts to analyze the causal relationship between central government revenue and expenditure for India using annual data over the period 1970-2010. The Johansen cointegration test suggests that there is a long-run relationship among the variables. The result from Granger causality test based on Vector Error Correction Models (VECM) suggests unidirectional causality from expenditure to revenue in the long-run supporting Spend-and-Tax hypothesis. The short-run Granger causality test based on WALD test restriction suggests that there is no causal relationship between the variables.

I would like to thanks Prof. Pulin B. Nayak, Dr. Pravakar Sahoo and Dr. K. Durairaj. Special thanks go to an anonymous referee for their valuable suggestions and comments that have improved this paper considerably. Any remaining errors are mine.
Citation: Yashobanta Parida, (2012) "Causal Link between Central Government Revenue and Expenditure: Evidence for India", *Economics Bulletin*, Vol. 32 No. 4 pp. 2808-2816.
Contact: Yashobanta Parida - yashparida@gmail.com.
Submitted: June 29, 2012. **Published:** October 09, 2012.

1. Introduction

The developing countries face dual challenges while planning and implementing fiscal adjustment policies. One arises from the increasing demand for public expenditure for infrastructure and social sector investment, and the other arises from the lack of capacity to raise revenue from domestic sources to finance the increased expenditure. Khattry (2003) has pointed out that, "the structural characteristics of low income countries, combined with prevalence of unsophisticated tax administration limit their ability to raise taxes from domestic sources, namely income and domestic indirect taxes". In addition, the existence of a large informal sector and the underground economy constrains the government's capacity for revenue growth. Fiscal policy is the instrument by which a government adjusts its levels of spending in order to monitor and influence a nation's economy. According to Keynes, running a fiscal deficit and increasing government debt can initially stimulate economic activity only when a country's output (GDP) is below its potential output. But when an economy is running near or at its potential level of output, fiscal deficits can cause high inflation. At that point fiscal deficit must be controlled.

Understanding the relationship between revenue and expenditure is a crucial prerequisite for any effective fiscal consolidation process. The fiscal deficit can be reduced via changes in government expenditures, or revenues, or both. The selection of any of these approaches should be based on the outcome of empirical investigation. The focus of this paper is to examine the causal relationship between Real Central Government Revenue (RGR) and Real Central Government Expenditure (RGE) and its policy implications for managing fiscal deficit in India. In this paper we use real Gross Domestic Product (GDP) as a control variable in order to avoid omission of relevant variable (see Payne1997, Baghestani and Mcnown 1994, Koren and Stiassny 1998 and Darrat 1998). For the purpose of estimation we have used GDP as a more appropriate control variable because the growth of revenue and expenditure of the Central Government of India is related to the overall conditions of the economy. The rest of the paper is organized as follows. Section 2 describes theoretical and empirical review of the relationship between public expenditure and revenues as tested by various researchers. Section 3 describes the fiscal position in India. Section 4 discusses the methodology and the data used in the analysis. Section 5 discusses the empirical results. Section 6 provides conclusion and policy implications.

Section-2
Review of Literature

The four main hypotheses based on the relationship between government expenditure and revenue such as Tax-and-Spend hypothesis, Spend-and-Tax hypothesis, Fiscal Synchronization and taxes and expenditure are independent of each other. The Tax-and-Spend hypothesis suggests that a change in government revenue is followed by a change in government expenditure. Friedman (1978) and Buchanan and Wagner (1977, 1978) have shown that an increase in government revenue causes an increase in government expenditure and therefore the Tax-and-Spend approach does not play any role in reducing budget deficit. Second, the Spend-and-Tax hypothesis suggests that a change in government expenditure is followed by a change in government revenue. Peacock and Wiseman (1979) have argued that temporary increase in government expenditure due to emergency purposes lead to increase in permanent increase in government taxes or other types of revenue. Barro (1974, 1978) has argued that the result suggested by Buchanan-Wagner on the relationship between government expenditure and tax due to fiscal illusion does not exist. Barro has used the Ricardian equivalence proposition. According to Barro if government meets his expenditure through borrowing, then it results in an increase in tax liabilities in future. The third kind of

relationship that may appear between these two variables is defined as Fiscal Synchronization hypothesis, which suggests that revenue and expenditure are determined simultaneously. This argument is mainly developed by Musgrave (1966) and Meltzer and Richard (1981). According to them, government expenditure and revenue are determined in the process of equalizing marginal benefit to the marginal cost of government services by the population of the country. The fourth hypothesis as mentioned by Baghestani and McNown (1994) and highlighted by Darrat (1998), relates to the institutional separation of the expenditure and revenue decisions of the government. Here, expenditure would be defined on the basis of requirements expressed by the citizenry and revenue would depend on the maximum tax burden tolerated by the population. As a result, the achievement of fiscal equilibrium would merely be a matter of coincidence.

Several empirical studies have been conducted to examine the causal relationship between government revenues and expenditures with respect to the above four theoretical hypotheses, by using different types of econometric techniques. However empirical evidences have given mixed results. In the case of United States of America, Blackley (1986), Ram (1988a), Bohn (1991) and Hoover, and Shefrin (1992) have provided evidence to support the Tax-and-Spend hypothesis, while Anderson et al. (1986), Von Furstenberg et al. (1986), Jones and Joulfain (1991) and Ross, and Payne (1998) have reported findings that support the Spend-and-Tax hypothesis. Manage and Marlow (1989), Miller and Russek (1990) and Owoye (1995) suggest that the Fiscal Synchronization hypothesis is valid for US while Baghestani and McNown (1994) have supported the institutional separation hypothesis. Similarly in case of Latin American countries, Ewing and Payne (1998) find evidences of a bi-directional causality between revenues and expenditures supporting the Fiscal Synchronization hypothesis in Chile and Paraguay. For countries like Colombia, Ecuador and Guatemala, they find evidences of causality directed from revenue towards expenditure supporting the Tax-and-Spend hypothesis. Baffes and Shah (1990, 1994) have found that for Brazil, Mexico and Pakistan a strong bi-directional causality exists between revenue and expenditure, while for Argentina and Chile the Spend-and-Tax hypothesis is validated. For South Africa, Nyamongo et al. (2007) has investigated the relationship between revenue and expenditure in the framework of Vector Autoregression (VAR) approach and has concluded that revenue and expenditure are linked bi-directionally in the long-run, indicating Fiscal Synchronization hypothesis, while no evidence of causality is seen in the short-run, which leads to fiscal separation hypothesis.

Similarly there are many theoretical and empirical studies based on the issue of fiscal sustainability. At first, Hamilton and Flavin (1986) have shown that if deficits and government debt follow a stationarity process, then the intertemporal budget balance is satisfied. They find stationarity of undiscounted US debt under the assumption of constant real interest rates. The findings of Tehran and Walsh (1988) and Jayawickrama and Abeysingle (2006) support the sustainability of U.S and Canadian fiscal policies respectively. Second, Hakkio and Rush (1991) have employed the Present Value Budget Constraint (PVBC) techniques to test for fiscal sustainability in the U.S using quarterly data for the period 1950Q1 to 1988Q4. The data used in the study include real government revenue and spending inclusive of real interest. Their empirical results have shown that fiscal policy is not sustainable.

Section-3
Fiscal position in India

Fiscal policy during the 1970s has consciously focused on achieving greater equity and social justice through both taxation and expenditure policies. Accordingly, income tax rates were

raised to very high levels, with the maximum marginal rate of income tax moving up to 97 per cent and together with the incidence of wealth tax, it even crossed 100 per cent. Over the years, in addition to the commitment towards a large volume of developmental expenditure, the Government's expenditure has widened to include rising subsidies. Large interest payments on growing debt and downward rigidity in prices have further contributed to increased current expenditure. Considerable fiscal deterioration took place during 1980s and eventually it became unsustainable, though on the other hand the growth rate has increased significantly with enhancement in public investment in infrastructure. During this phase, the government expenditure was seen as an instrument determining the level of aggregate demand, resource allocation and income distribution. The government resorted to tax increases in order to reduce its deficit. The fiscal imbalances of the 1980s spilled over to the external sector resulting in the macroeconomic crisis of 1991. Another disquieting feature of the fiscal system was the large size of monetised deficit, which in turn exerted inflationary pressures. Thus the economic reforms were initiated with the objective of augmenting revenues and removing anomalies in the tax structure through restructuring, simplification, and rationalisation of both direct and indirect taxes. The Central Government through the enactment of the Fiscal Responsibility and Budget Management (FRBM) Legislation in August 2003, set for itself a rule-based fiscal consolidation framework. The Expenditure Reform Commissions set up by the Government also suggested a host of measures to curb built-in-growth in expenditure and to bring about structural changes in the composition of expenditure.

Section-4
Data and Methodology

This study uses annual data on government revenues and expenditures as well as GDP over the period 1970 to 2010. All the data series are obtained from the *Hand Book of Statistics on Indian Economy* published by Reserve Bank of India (RBI). Data on government revenue combined both revenue receipt (tax revenue and non-tax revenue) and capital receipt (recovery of loan and advances and return of PSU disinvestments). Similarly the data on government expenditure combined both revenue expenditure (interest payment, subsidies, defense revenue expenditure and wages and salaries) and capital expenditure (loan and advances, capital outlay and defense capital expenditure). In order to avoid price effect, in the first step the nominal data are transformed into real data using GDP deflator in (2004-05=100). In the second step the real variables are transformed into natural logarithmic form. In this study we have first checked the stationary properties of the variables. Then we have applied the Johansen cointegration technique to investigate the long-run equilibrium relationship among the variables. Finally, short-run as well as long-run causality between government expenditure and revenue is investigated by using Granger causality test based on Vector Error Correction Model (VECM). The basic variables for the empirical analysis in the present study are as follows:

LRGR = Log of Real Central Government Revenue
LRGE = Log of Real Central Government Expenditure
LRGDP = Log of Real Gross Domestic Product

Section-5
Empirical Results

The unit root test results are presented in Table-I of the Appendix. The unit root test is carried out by assuming the presence of both the constant and trend in data. We find that all the variables are non-stationary at levels and stationary at first-differences. Therefore, we conclude that our variables are integrated of order one, I (1). We use the Akaike Information Criterion (AIC) to determine the appropriate lag lengths of the variables. Table-II summarize

the results of cointegration analysis by using the Johansen maximum likelihood approach employing eigenvalue and trace statistics. First, to determine the appropriate lag length for the Vector Autoregression (VAR) system, we have estimated an unrestricted VAR model in level form for all of the series. Second, we used Akaike Information Criteria (AIC) and Hannan-Quinn (HQC) statistics to choose appropriate lag length in the model. It is observed from the results that the optimal lag length is equal to 1 which is appropriate to get an uncorrelated and homoskedastic residual for the VAR system. The cointegration test is carried out in presence of unrestricted intercept and absence of trend to determine the cointegrating vectors among the variables. The empirical result from Table-II shows that there is one cointegrating equation among the variables. Therefore, there is a long-run relationship among the variables. The long-run relationship between these variables is derived by normalizing the Real Government Revenue (RGR), reported in the following equation (1) with their t-statistics.

$$LRGR = 0.68 + 0.13LRGE + 0.76LRGDP \quad (1)$$
$$\text{t-Statistics} \quad (0.85) \qquad (4.54)$$

In equation (1), the estimated coefficient of LRGE is positive. Therefore, the estimated coefficient of LRGE suggests that 1 per cent change in real government expenditure leads to a 0.13 per cent change in real government revenue. Similarly 1 per cent change in RGDP leads to 0.76 per cent change in RGR. The Johansen cointegration test shows the existence of one cointegrating equation among the variables, which means that the variables are causally related at least in one direction (Granger, 1969). We can use a Vector Error Correction Model (VECM) in order to investigate the short-run dynamics and also to assess the direction of Granger causality in both the short and the long-run. Table-III reports the results of the VECM and long-run Granger-causality tests. The estimated error correction coefficients ECM (–1) is negative and significant in the revenue equations.This indicates that in the long run there is a unidirectional causality from expenditure to revenue, supporting the "Spend-and-Tax" hypothesis, which indicates that the government of India should strive to transform the expenditure patterns from unproductive sectors to productive sectors of the economy in order to generate future budgetary resources to deal with the problem of fiscal deficit. Again ECM (-1) is not significant in the expenditure equation. We conclude that revenue does not granger causes expenditure in long run. In the GDP equation the error correction term is insignificant. The short run dynamics terms in all the equations in Table-III are not significant. We can infer that there is no short run causality between the variables. The Lagrange Multiplier test that is based on Breusch-Godfrey test of the residual serial correlation accepts the null hypothesis of no autocorrelation. In addition, there is no significant Autoregressive Conditional Heteroskedascity (ARCH) using 5 lags. The statistical tests used for the normality of the residual shows acceptance of the null hypothesis. The results of short-run Granger causality test are reported in Table-IV. Here it indicates that there is no causal relationship between the variables.

Section-6
Conclusion and Policy Implications

The paper has empirically examined the causal relation between central government revenue and expenditure for India for the period 1970 to 2010. The Co-integration and causality results reveal that there is existence of long-run relationship between the variables and unidirectional causality running from expenditure to revenue. The findings support the "Spend-and-Tax" hypothesis which argues that unsustainable fiscal imbalances can be controlled by policies that can rationalize the government expenditure to improve the productivity of the economy. Therefore, the government of India should re-examine major

components of unproductive expenditures such as subsidies¸ interest payments, pension etc and rationalize expenditures in favour of growth enhancing spending such as infrastructure, research and development, education, and health. The efficient and productive allocation of government resources would improve productivity and growth, thereby government revenues without putting any additional taxes.

References

Anderson, W., M. S. Wallace. and J. T. Warner (1986) "Government Spending and Taxation What Causes What?" *Southern Economic Journal* **52**, 630-639.

Baffes, J. and A. Shah (1994) "Causality and Co movement between Taxes and Expenditures: Historical Evidence from Argentina, Brazil and Mexico" *Journal of Development Economics* **44**, 311-331.

Baffes, J. and A. Shah (1990) "Taxing Choice in Deficit Reduction" Working Paper series No.556, The World Bank, December.

Baghestani, H. and R. McNown (1994) "Do Revenues or Expenditures Respond to Budget Disequilibria?" *Southern Economic Journal* **61**, 311-322.

Barro, R. J. (1978) "Are government bonds net wealth?" *Journal of Political Economy* **81**, 1095-1117.

Barro, R. J. (1974) "Comments from an unreconstructed Ricardian" *Journal of Monetary Economics* **4**, 569-582.

Blackley, P. R. (1986) "Causality between Revenues and Expenditures and the Size of the Federal Budget" *Public Finance Quarterly* **14**, 139-156.

Bohn, H. (1991) "Budget balance through revenue or spending adjustments: Some historical evidence for the United States" *Journal of Monetary Economics* **27**,333-359.

Buchanan, J .M .and R.W. Wagner (1978) "Dialogues concerning fiscal religion" *Journal of Monetary Economics* **4**, 627-636.

Buchanan, J.M. and R.W. Wagner (1977) "Democracy in Deficit", New York: Academic Press.

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.

Dickey, D. A. and W. A. Fuller (1979) "Distribution of the Estimators for Autoregressive Time Series with a Unit Root" *Journal of American Statistical Association* **74**, 427-431.

Ewing, B. and J. Payne (1998) "Government Tax Revenue-Expenditure Nexus: Evidence from Latin America" *Journal of Economic Development* **23**, 57-69.

Friedman, M. (1978) "The limitations of tax limitations" *Policy Review* **5**, 7-14.

Granger, C.W. J. (1969) "Investigating Causal Relations by Econometric Models and Cross Spectral Methods" *Econometrica* **37**, 424-438.

Hakkio, C.S. and M. Rush (1991) "Is the Budget Deficit Too Large?"*Economic Inquiry* **29**(3), 429-445.

Hamilton, J. and M. Flavin (1986) "On the limitations of government borrowing: a Framework for empirical testing" *American Economic Review* **76,** 808-819.

Hoover, K. D. and S. M .Shefrin (1992) "Causation, Spending and Taxes: Sand in the Sandbox or Tax Collector for the Welfare State" *American Economic Review* **82**(1), 225-248.

Jayawickrama, A. and T. Abeysinghe (2006) "*Sustainability of Fiscal Deficit: The U.S Experience 1929-2004"*, SCAPE, Working Paper 2007/01.

Johansen, S. (1995) "Likelihood Based Inferenc in Cointegrated Vector Autoregressive Models", Oxford University Press: Oxford.

Jones, J. D. and D. Joulfain (1991) "Federal Government Expenditures and Revenue in the Early Years of the American Republic: Evidence From 1792-1860" *Journal of Macroeconomics* **13**(1), 133-155.

Khattry, B. (2003) "Trade liberalization and the Fiscal Squeeze: Implications for Public Investment" *Development and Change* **349**(3), 401-424.

Koren, S. and A. Stiassny (1998) "Tax and Spend or Spend and Tax? An International Study" *Journal of Policy Modeling* **20**(2), 163-191.

Manage, N. and M. L. Marlow (1989) "The Causal Relation between Federal Expenditures and Receipts" *Southern Economic Journal* **54**, 617-629.

Meltzer, A. H. and S. P Richard (1981) "A Rational Theory of the Size of Government" *Journal of Political Economy* **89**, 914-927.

Miller, S. M. and F. S. Russek (1990) "Cointegration and Error-correction Models: Temporal Causality between Government Taxes and Spending" *Southern Economic Journal* **57**, 33-51.

Musgrave, R. (1966) "Principles of Budget Determination" In *Public Finance: Selected Readings*, (Eds) H. Cameron and W. Henderson, New York: Random House.

Nyamongo, M. E., M. M. Sichei .and N. J. Schoeman (2007) "Government Revenue and Government Expenditure Nexus in South Africa" Working Paper, University of Pretoria, Department of Economics.

Owoye, O. (1995) "The Causal Relationship between Taxes and Expenditures in the G7 Countries: Cointegration and Error-Correction Models" *Applied Economics Letters* **2**(1), 19-22.

Payne, J.F. (1997) "The Tax-spend Debate: The Case of Canada" *Applied Economics Letters* **4**, 381-386.

Peacock, S. M. and J. Wiseman. (1979) "Approaches to the Analysis of Government Expenditures Growth" *Public Finance Quarterly* **7**, 3-23.

Phillips, P. and P .Perron (1988) "Testing for a Unit Root in Time Series Regression" *Biometrika* **75**, 335-346.

Ram, R. (1988a) "A Multicountry Perspective on Causality between Government Revenue and Government Expenditure" *Public Finance/Finance Publiques* **2**, 261-269.

RBI (2010) "*Hand Book of Statistics on Indian Economy*", 2010-11.

Ross, K.L. and J.E. Payne (1998) "A Re-Examination of Budgetary Disequilibria" *Public Finance Review* **26**(1), 69-79.

Trehan, B. and C. E. Walsh (1988) "Common trends, the government's budget constraint, and revenue smoothing" Journal *of Economic Dynamics and Control* **12**, 425-444.

Von Furstenberg, G.M., R. J. Green and J .H. Jeong (1986) "Tax and Spe nd, or Spend and Tax?" *Review of Economics and Statistics* **68**, 179-188.

Appendix

Table I: Unit Root Test

Variables	ADF	PP
	Level	
LRGR	-2.62	-2.42
LRGE	-2.37	-2.53
LGDP	-1.20	-1.20
	First Difference	
LRGR	-7.21**	-8.82**
LRGE	-6.25**	-6.21**
LGDP	-7.53**	-8.55**

Note: **indicates 5% level of significance

Table II: Cointegration Result

Null	Alternative	Trace Statistic	5% Critical Values
$r = 0$	$r \geq 1$	32.85*	29.79
$r \leq 1$	$r \geq 2$	14.74	15.49
$r \leq 2$	$r \geq 3$	3.32	4.84
Null	Alternative	Max-Eigen Statistic	5% Critical Values
$r = 0$	$r = 1$	28.10*	21.13
$r \leq 1$	$r = 2$	10.42	14.26
$r \leq 2$	$r = 3$	3.32	4.84

Note: * Denote rejection of the null hypothesis at the 5% level, maximal Eigenvalue and Trace-Statistic indicates 1 cointegrating equation at 5% level.

Table III: VECM and Long-Run Causality Test

	ΔLRGR	ΔLRGE	ΔLRGDP
ΔLRGR(-1)	-0.02 (-0.11)	-0.14 (-0.93)	0.10 (1.65)
ΔLRGE(-1)	-0.11 (-0.45)	-0.09 (-0.44)	-0.08 (-1.06)
ΔLGDP(-1)	0.63 (1.06)	0.35 (0.73)	0.14 (0.76)
ECM(-1)	-0.37* (-1.91)	-0.14 (-0.93)	0.10 (1.65)
Intercept	0.02 (0.91)	0.03 (1.44)	0.05** (5.40)

Note: 1. *Denotes significance at 10% level, ** Denotes significance at 5% level.
2. t-statistics are in parentheses

Table IV: Short-Run Causality Test

Panel A: ΔLRGE as a Dependent Variable			
Excluded	Chi-sq	DF	Probability
ΔLRGR	0.41	1	0.51
ΔLGDP	0.54	1	0.46
All	1.14	2	0.56
Panel B: ΔLRGR as a Dependent Variable			
Excluded	Chi-sq	DF	Probability
ΔLRGE	0.20	1	0.65
ΔLGDP	1.13	1	0.28
All	1.17	2	0.55
Panel C: ΔLGDP as a Dependent Variable			
Excluded	Chi-sq	DF	Probability
ΔLRGR	1.16	1	0.27
ΔLRGE	1.14	1	0.28
All	3.14	2	0.15

Note: Chi-sq statistics are not significance. We can conclude that there is no short-run causality between the variables.