

# AN ANALYSIS OF CAUSALITY BETWEEN GOVERNMENT TAX REVENUES AND EXPENDITURES IN INDIA

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**Abstract** This study examines the nexus between tax revenues of the government and expenditures in India by using co integration test methodology during 2000-01 to 2015-16. It tests two hypotheses relating to the revenue-expenditure nexus, i.e. tax-spend hypothesis, spend-tax hypothesis. The nexus is studied at centre & state (combined level). The study establishes co integrating relationship between government expenditure and tax revenue which suggests a long-run relationship between the variables. The results show that there is one-way causality running “spend and tax “both in short-run as well as in the long-run. This result justifies the operation of spend- tax hypothesis.

**Keywords** Tax Revenue, Expenditure, Co-integration, Granger Causality Test, Spend-tax.

Taxes are an important source of government revenue and the most reliable source of government funding. Tax aid has become a significant tool to boost the economic growth of any economy. In fact, taxation policy itself is a fundamental element for economic policies, ensuring that countries are able to maintain and improve its global competitiveness and to expand. Total government revenue is derived from two sources, which can be classified as tax revenue, and non-tax revenue. Government tax revenues are broadly classified into Direct Tax and Indirect tax. Direct tax revenue consists of income tax from individuals, companies, and other persons as well as stamp duty, estate duty and real property gains. Indirect taxes consist of import duties, export duties, excise duties, sales tax and service tax. Indirect taxes are not imposed directly on the taxpayer but are also a major source of contribution to government revenue. These revenues in the terms of Government expenditures play an important role to achieve the major economic goals of growth, stability. Government expenditure is the expenditure incurred by public authorities like central, state

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and local government to satisfy the collective social wants of people. Government expenditure is divided into two categories: Revenue Expenditure and Capital Expenditure. Revenue Expenditure is for the normal day to day running of government department and various services, interest charged on debt charged by government subsidies. Revenue expenditure covers all the expenditure that does not create assets such as Common Defence, Education, Health and Safety, Legal and Judicial System etc while Capital Expenditure comprises of expenditures on acquisition of assets like land, building, investments in shares and loans and advances granted by government. Thus, the total expenditure of the central government has been continuously growing and revenue expenditure has grown at higher rate as compared to capital expenditure. The total expenditure reached to the level of Rs. 98063.07 Crore in last decade, out of which Rs.88861.77 crore was revenue expenditure.

The main aspect for sharp increase in revenue expenditure of the central government from 2004-2014 was the rapid increase in subsidies. This created serious imbalances in the fiscal sector of the economy. As far as Indian economy is concerned, it is greatly affected by the fiscal deficit because the total expenditure of the country is always exceeding to the revenue of the country. The current position of fiscal deficit in India during the period of March 2014 was 3.69 trillion rupees (\$81.9 billion), the deficit is equivalent to 4 percent of India's gross domestic product and fiscal deficit is continuously growing in a fluctuating way till 2011 to 2014, which augment the risk of imbalances in the country. Thus, the co-integration between government expenditures and revenues has important public policy implications because the controls of the size of the government and budget and fiscal deficits are dependent on the relationship between these variables. It is important to understand the causality between taxes collection and expenditures. In particular, in order to determine which variable should be given chronological priority, one basically has to know whether changes in expenditures proceed, follow, are independent of or occur simultaneously with changes in taxes. It could be a one-way causality from spending (revenue) to revenue (spending), i.e. “tax-and-spend” (“spend-and-tax”) causality between revenue and spending which could give critical inputs in shaping the fiscal consolidation strategy. There are various reasons to establish the nature of link between government expenditure and revenue. First, if the “revenue-and-spend” principle holds true, budget deficits can be avoided by implementing policies that stimulate government revenue. Second, if the “spend-

revenue” principle holds true, then government spends first and pay for this spending later by raising revenues.

## REVIEW OF LITERATURE:

Friedman (1972) supports the view that increasing taxes would lead to higher level of government expenditures. According to him the direction of causality runs from tax revenue to government expenditures. Barro (1974), Peacock and Wiseman (1979) supported that the increase in taxes and borrowings are due to an increase in government expenditures. According to them a country decides how much to spend and then finds the resources to finance this spending.

A bidirectional existence of causality relationship between government revenue and expenditure is reported to be in China (Xiaoming, 2001). Similarly, the studies such as (Mosayeb et.al; 2011), (Chang and Chiang, 2009) also exhibited a bidirectional causality nexus between government revenue and expenditure in both the long as well as in short term relationship. The OECD Countries basically supports bi-directional as the dominant pattern of causality between government revenue and expenditure (Ashan et.al; 1989) followed by (Yashobanta Parida 2012) supports the long run bidirectional causality between revenues and expenditures in India.

A one way long run relationship has been found in Iran between government revenue and expenditure (Seyyed Kazemi, 2012). Similar a unidirectional relationship have also been found in Pakistan, Malaysia and Korea Countries where government follows spend and tax and tax and spend principle.(M. Haider Hussain,2005; wan park ,1998.)

Some African countries, (Nyamongo et al. 2007) found a bidirectional relationship in the long run, indicating fiscal synchronisation principle between revenue and expenditure followed by (Aregbeyen and Ibrahim 2012) along their supports the tax-spend hypothesis for the Nigerian economy, Although (Amoah and Loloh, 2008) supports unidirectional causality between revenue and expenditure (tax and spend) principle in the short run for Ghana economy.

## RESEARCH GAP

The various estimates to test the revenue/tax-expenditure nexus are examined in context to different countries, despite the diversified nature of the conclusion, this study attempts to investigate the causality between government expenditure and tax revenue in India but

It differs from earlier studies on the following aspects.

Firstly, it examines two-hypothesis tax-spend or spend-tax by granger causality test verification in context of India. Secondly, it investigates for long run relationship between both of the variables or not with current data.

### **PURPOSE OF THE STUDY**

To study the relationship between Governments Tax Revenues and Expenditures in India.

### **RESEARCH METHODOLOGY**

#### **DATA:**

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.
- 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 Reserve Bank of India, Ministry of Finance. The analysis is based on annual time series data from 2000-2016.

To study the relationship between revenues and expenditure, various tools have been adopted including Co-integration test, Granger causality test methodology on E-views software.

### **HYPOTHESES**

**H<sub>01</sub>:** There is no significant effect of Government Expenditure on Government Tax Revenue

**H<sub>02</sub>:** There is no significant effect of Government Tax Revenue on Government Expenditure

## ANALYSIS OF THE STUDY

The mostly used method to estimate causality is Granger Causality Test which shows the direction of causality. Before applying the Granger Causality test it is must to check the stationary of the variables. If the variables are stationary then apply Causality test. If variables are non-stationary, then make the ADF test to the 1<sup>st</sup> difference or logarithm and obtain the stationary series because the Granger Causality, if applied on non-stationary variables will lead to spurious regression and may provide wrong results. The analysis of time series showed that the time series of real government expenditure and real revenues are stationary or not at their levels at the (1%, 5% and 10%) level of significance.

### 1; THE UNIT ROOT TEST

A test of stationary (or no stationary) that has turned out to be widely popular over the past several years is the unit root test.

$$Y_t = pY_{t-1} + u_t \quad -1 < p < 1 \quad \dots\dots\dots(1)$$

(1) Where  $u_t$  is a white noise error term.

If  $p = 1$ , that is, in the case of the unit root, it become a random walk model without drift, which is a non stationary stochastic process. Therefore, simply regress  $Y_t$  on its (one period) lagged value  $Y_{t-1}$  and find out if the estimated  $p$  is statistically equal to 1?

If it is, then  $Y_t$  is non stationary. This is the general idea behind the unit root test of stationary. For theoretical reasons, Subtract  $Y_{t-1}$  from both sides of equation 1 obtains:

$$Y_t - Y_{t-1} = pY_{t-1} - Y_{t-1} + u_t = (p - 1) Y_{t-1} + u_t \quad \dots\dots\dots(1)$$

This can be alternatively written as:

Where  $\Delta = (p - 1)$  and as usual, is the first-difference operator.

In practice, therefore, we test the (null) hypothesis that  $\alpha = 0$ . If  $\alpha = 0$ , then  $p = 1$ , that is we have a unit root, meaning the time series under consideration is non stationary.

Before we proceed to estimate, if  $\alpha = 0$ , equation 1 is now

$$\Delta Y_t = (Y_t - Y_{t-1}) = u_t$$

Since  $u_t$  is a white noise error term, it is stationary, which means that the first differences of a random walk time series are stationary.

Now first differences of  $Y_t$  and regress them on  $Y_{t-1}$  and if the estimated slope coefficient in this regression ( $= \hat{\alpha}$ ) is zero or not.

If it is zero, we conclude that  $Y_t$  is non stationary. But if it is negative, we conclude that  $Y_t$  is stationary. The only question is which test we use to find out if the estimated coefficient of  $Y_{t-1}$  is zero or not. Dickey and Fuller have shown that under the null hypothesis that  $\alpha = 0$ , the estimated  $t$  value of the coefficient of  $Y_{t-1}$  follows the  $\hat{\alpha}$  (tau) statistic.

The actual procedure of implementing the DF test involves several decisions. A random walk process may have no drift, or it may have drift or it may have both deterministic and stochastic trends. To allow for the various possibilities, the DF test is estimated in three different forms, that is, fewer than three different null hypotheses.

$$Y_t \text{ is a random walk: } Y_t = \alpha Y_{t-1} + u_t \dots\dots\dots(2)$$

$$Y_t \text{ is a random walk with drift: } Y_t = \hat{\alpha}_1 + \alpha Y_{t-1} + u_t \dots\dots\dots(3)$$

$$Y_t \text{ is a random walk with drift around a stochastic trend: } Y_t = \hat{\alpha}_1 + \hat{\alpha}_2 t + \alpha Y_{t-1} + u_t$$

Where  $t$  is the time or trend variable. In each case, the null hypothesis is that  $\alpha = 0$ ; that is, there is a unit root—the time series is non stationary. The alternative hypothesis is that  $\alpha$  is less than zero; that is, the time series is stationary. If the null hypothesis is rejected, it means that  $Y_t$  is stationary.

### The Augmented Dickey–Fuller (ADF) Test

In conducting the DF test, it was assumed that the error term  $u_t$  was uncorrelated. But in case the  $u_t$  is correlated, Dickey and Fuller have developed a test, known as the augmented Dickey–Fuller (ADF) test. This test is conducted by “augmenting” the preceding three equations by adding the lagged values of the dependent variable

$$Y_t = \hat{\alpha}_1 + \hat{\alpha}_2 t + \hat{\alpha}_3 Y_{t-1} + Y_{t-i} + u_t$$

Where  $\hat{\alpha}_t$  is a pure white noise error term and where  $Y_{t-1} = (Y_t - Y_{t-2})$ ,  $Y_{t-2} = (Y_{t-2} - Y_{t-3})$ , etc. The number of lagged difference terms to include is often determined empirically, the idea being to include enough terms so that the error term in is serially uncorrelated. In ADF we still test whether  $\hat{\alpha} = 0$  and the ADF test follows the same asymptotic distribution as the DF statistic, so the same critical values can be used.

## ANALYSIS

1) First we will check stationary by applying Unit Root, DF/ADF

**Null Hypothesis:** D (GE) has a unit root

**Exogenous:** Constant

**Lag Length:** 0 (Automatic based on SIC, MAXLAG=0)

Augmented Dickey-Fuller			
ADF	Critical Value	T-statistics	Prob.
<b>- 6.579640</b>	1% level	- 3.646341	00000
	5% level	- 2.743042	00000
	10% level	-2.618512	00000

**The result shows that GE (government expenditure) is stationary at 1st difference.**

Now for TR (**Tax Revenue**) Unit Root test results are

**Null Hypothesis:** D (TR) has a unit root

**Exogenous:** Constant

Augmented Dickey-Fuller			
ADF	Critical Value	T-statistics	Prob.
<b>-8.579640</b>	1% level	-3.646341	00000
	5% level	-2.743042	00000
	10% level	-2.618512	00000

The result shows that TR (Tax Revenue) is stationary at 1st difference.

#### COINTEGRATION:

We have informed that the regression of a non stationary time series on another any stationary time series may produce a false regression.

We will find that they both are I (1); that is, they contain a unit root. Suppose, then, that we regress tax revenue on government expenditure as follows:

$$TR_t = \hat{\alpha}_1 + \hat{\alpha}_2 GET_t + u_t$$

$$u_t = TR_t - \hat{\alpha}_1 - \hat{\alpha}_2 GET_t$$

If  $u_t$  is stationary, there is co-integration and long run relationship is present between both of the variable.

#### ANALYSIS

After checking the stationary in order to check long run relationship find out by applying

Engle Granger test

Engle Granger test			
EGT	Critical Value	T-statistics	Prob.
<b>-6.183872</b>	1% level	- 3.623414	00000
	5% level	- 2.950112	00000
	10% level	-2.614300	00000

The result is significant shows that there exists long run relationship between the tax revenue and government expenditure.



**GRANGER CAUSALITY TEST:**

The Granger causality test assumes that the information relevant to the prediction of the respective variables, TR and GE, is contained solely in the time series data on these variables. The test involves estimating the following pair of regressions:

$$TR = \alpha_1 GE_{t-1} + \alpha_2 TR_{t-1} + u_t$$

$$GE = \beta_1 TR_{t-1} + \beta_2 GE_{t-1} + u_t$$

Here it is assumed that the disturbances  $u_{1t}$  and  $u_{2t}$  are uncorrelated. In passing, note that,

Since we have two variables, we are dealing with **bilateral causality**. On the basis of hypotheses following assumptions have been made:

1. Unidirectional causality from GE to TR indicated if the estimated coefficient on the lagged GE is not statistically different from zero as a group and the set of estimated coefficients on the lagged TR statistically different from zero.
2. On the contrary, unidirectional causality from TR to GE exists if the set of lagged TR coefficients is not statistically different from zero and the set of the lagged GE coefficients is statistically different from zero
3. Bi-lateral causality, is suggested when the sets of TR and GE coefficients are statistically significantly different from zero in both regressions.
4. Finally, independence is suggested when the sets of GE and TR coefficients are not statistically significant in both the regressions.

**ANALYSIS****GRANGER CAUSALITY RESULT:**

Null Hypothesis:	Obs	F Statistic	Probability
TR does not Granger Cause GE	33	1.16467	0.32669
GE does not Granger Cause TR		6.12618	0.00621

In case of India, tax revenues are not basis to government expenditure but GE are reason to TR that shows in India tax revenue determine after GE and unilateral causality verify the spend and tax hypothesis.

## CONCLUSION

The goal of this paper is to investigate is to know the causal relationship between the government expenditure and tax revenues in India using co integration technique and the direction of causality is long run through integrating the Error Correction Model into the traditional Granger causality test. Data properties were analyzed to determine their stationary using the PP unit root tests which indicated that the series of the co integration based on Granger two steps and Johansen technique indicate that there is a long run equilibrium relationship between government expenditure and tax revenue are jointly statically significant at more than (1%, 5% & 10%) level of significance in both government expenditure and tax revenues equations which indicate that there is a uni-directional causality between government expenditure and revenues in the long run the causal relationship between Total Expenditures and Tax Revenue has been analyzed. In general, our results support hypothesis  $H_{a1}$  that government expenditure causes revenues. The result that  $GE$  causes  $TR$  because political economy of India where the main expenditures are the outlays chiefly determined by politically military influence (defence, debt servicing, general administration). Most of these consumption expenditures pose self and/or group interests rather than overall welfare. Although debt servicing is a liability transfer from previous periods, it is included here too because the debts taken have not been reflected in increased development and other investment expenditure over the years and have arguably been used for self interests rather than communal welfare by politicians. Thus the spend and tax hypothesis has been adopted by the Indian economy.

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