Tax-Spend Debate: Empirical Evidence from Uttar Pradesh

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Abstract

The continuously mounting Debt-GDP ratio in most of Indian states had made them realise that a ponzi game cannot be played for long. A viable solution to curb the growing debts, address the budget disequilibrium and bring the budgetary figures in Line with FRBM Act is to make either expenditure or revenues as target variable. To meet these legislative requirements for fiscal prudence policy makers are often confronted with the dilemma of either changing expenditures or revenues because different hypotheses-"Tax-and-Spend", "Spend-and-Tax" and "Fiscal Synchronization" in economic literature suggest different policy prescriptions for curbing the mounting Debts. This paper empirically tries to find out right policy measure for Uttar Pradesh government using time series data over the period 1980-81 to 2012-13. Augmented Dicky Fuller (ADF) test along with Phillip Perron (PP) test was used to establish the order of integration; Engel-Yoro three step method was used for examining cointergration and estimating long run coefficients. Further, modified Granger causality test confirmed the causality from revenues to expenditures thereby confirming to Friedman's version of 'Tax-and-Spend' hypothesis. Study suggest increasing the taxes as a measure to reduce debt state will not yield anything desirable, instead it will further push up the expenditures. Instead government should try for reducing expenditures or decreasing taxes that intern will cause a decrease in expenditures.

Key Words: Fiscal Synchronization, Tax-and–Spend Hypothesis, co integration, Engel-Yoo

Introduction

Contemporary economies both at centre and state levels are plagued with huge and escalating budget deficits. The adverse consequences of these mounting deficits are manifested in form of higher interest rates, slow capital formation and high unemployment rates which turn still more adverse once this debt is financed through issuance of government bonds or seigniorage. In such a situation an apposite fiscal policy has a vital role in mitigating short run fluctuations in output and employment by bringing the economy closer to potential output (Zagler and Durnecker, 2003). But any such policy aiming at fiscal correction is contingent on Government expenditure Allocations and Revenue collections. As such understanding the nexus between government revenues and expenditures had assumed significant importance for a sound fiscal policy that could promote price stability and sustain growth in output and employment. Understanding the nature of relationship between expenditures and revenues can guide us towards appropriate policy prescription to rein in the mounting debt and associated economic ills. If the nature of relationship suggests that there exists a long run equilibrium relationship between government revenue and government expenditures and former causes latter, budget deficit can be eliminated by controlling revenues and not by increasing the revenues which will further increase the expenditure and worsen debt situation. However, if expenditures cause revenues; such a behaviour can induce capital outflow due to fear of

paying higher taxes in future. In such a situation government must aim at curtailing the expenditures for desired results. Present study aims at finding a correct policy decision at sub national level by taking data from Uttar Pradesh economy. Because Uttar Pradesh like many other Indian states is grabbling with the mounting debt problem. Payne (1998) remarked that many state operate under legislative or constitutional requirements which attempt to constrain deficits. U.P government has also passed Fiscal Responsibility and Budget Management Act (FRBM) in February 2004 thereby imposing a legislative binding for bringing about fiscal consolidation in state by curbing the growing fiscal deficit (7.33% of GSDP in 2003-04)and mounting Debt-GSDP (46% of GSDP in 2003-04) ratio of the state government. The Act also envisaged bringing down the revenue deficit to Zero and Fiscal Deficit-GSDP ratio to below 3% by the end of March 2009. Target for total government liabilities as percentage of GSDP was set at 25% to be achieved by March 2018. However, a lot is yet to be done in this line when we see the actual performance of state. The total outstanding liabilities of U.P government as percentage of GSDP are persistently more than 30 percent (38 and 36.3 percents during 2011-12 and 2012-13 respectively). Gross Fiscal deficit (GFD) as percentage of GSDP for 2011-12 and 2012-13 was 2.3 and 2.8 respectively while average figures for all non-special category states during these years were 2.2% and 2.6% respectively. The debt burden could better be understood from the fact that during 2010-11 and 2012-13 interest payments as percentage of Revenue expenditure stood at 12.5 and 10.9 percents respectively. To arrive at a rational policy Prescription for U.P we undertake this empirical exercise .The balance of this paper is organised as: Section B.1 contains review of theoretical literature while empirical literature is presented separately in section B.2. In section C Methodology and empirical analysis is presented under different subheadings. Paper ends with conclusion and policy implications given in section D.

Theoretical Literature Review

The literature in economics has so far identified four alternative hypotheses that characterize the dynamic relationship between revenues and government expenditures. A brief account of these alternative hypotheses is presented below.

Tax-and-Spend hypothesis

The Tax-and-Spend school championed by Friedman views expenditure as adjusting, up or down to whatever level can be supported by revenues. Friedman (1978, 82), Ram (1988) as well as Buchanan and Wagner (1977, 1978) advocate such view. According to Friedman level of spending adjusts to the level of tax available, as such causality runs from tax to expenditure. However, he did not advocate raising taxes to bring down deficits as he opined that former will invite more spending . Friedman (1982) explains:

"*You can not reduce the deficit by raising the 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."

Because of this positive causal relationship Friedman had long proposed tax cuts as a means of reducing budget deficits. He reasoned that tax cuts will lead to larger deficits which in turn will exert a mounting pressure on the governments to curtail its expenditures. Buchanan and Wagner supported same causal direction , but unlike Friedman they hypothesize a negative relationship wherein a decrease in government revenues will lead to an increase in government expenditures and vice versa. Buchanan and Wagner opined that high public deficits have been responsible for growth of public spending, and if that spending is to be financed by direct taxes ,people would have asked for decrease in public spending They argue that tax payers suffer from fiscal illusion as any reduction in taxes is perceived by them as a reduction in cost of public programmes (low price for public goods and services) and they start demanding increasing quantities. However public incurs even higher costs primarily because of indirect inflation taxation which is a consequence of excessive money creation. Also government debt financing will lead to high interest rates that may crowd out private investment . Thus tax cut in conjunction with resultant government spending would actually lead to higher spending and higher deficits. Following this reasoning Buchanan and Wagner advocate a tax increase that will be perceived as higher costs for government goods and services by tax payers , as a policy prescription for bringing down the budget deficit. Although these two views differ with regard to policy their policy prescription for bringing down the deficit both support causality from tax revenues to spending. for this reason it is also known as "Revenue Dominance hypothesis" (Hansan and Lincolon;s1997).to determine empirically the validity of this hypothesis unidirectional causality should stem from government revenues to government expenditures.

Spend-and-Tax Hypothesis

According to this hypothesis government first fixes its expenditure programme and then adjusts its tax and revenue policy to accommodate the desired spending. As such increased taxes and borrowing arises because of increased government spending. This view is more pro-Keynesian and is supported by Wiseman and Peacock (1979) and Barro's (1979) Tax –smoothing model. Wiseman and Peacock argue that a temporary increase in government spending (due to emergency purposes) leads to increase in government taxes and other types of revenues that tend to become enduring in due course of time and finally assume permanent nature. They are of the view that severe crisis that initially force up the government expenditure, more than taxes, is capable of changing public attitude about proper size of government. Narayan (2005) in this context remarks that the original tax increase due to crises becomes a permanent feature in tax policies .in empirical sense this implies that causality runs from expenditures to tax. Barro, supporting the

same causal direction uses Ricardian view to justify this hypothesis. He argues that an increased expenditure arranged through higher borrowings now results in increase in expected future taxes. With this perception of higher future tax liability tax payers decrease present spending to pay future taxes. Both these arguments establish that expenditure changes precede changes in taxation level. Under this causality pattern the optimal solution to control the budget deficit obviously is the expenditure cuts. Validity of this hypothesis is established if unidirectional causality stems from government expenditures to government revenues.

Fiscal Synchronization Hypothesis

This hypothesis postulates that decisions regarding tax and expenditures are taken simultaneously as such causality runs in both the directions. Musgrave (1966), and Meltzer and Richard (1981) advocate this view. According to Metzler and Richard quantity and quality of public goods reflect the preferences of a community and size of government is determined by welfare maximizing choice of decisive individuals. public simultaneously determines the levels of government spending and taxation by contrasting the benefits of public goods with their costs. According to Musgrave the expenditure and tax sides of government must be decided jointly so as to maximize society's inter temporal social welfare function. This view is also in line with Wildavsky (1964) incremental budgetary process wherein the expenditures and revenues change concurrently on incremental basis. Joint determination as such implies that one has influence on other .For empirical verification of this hypothesis bi-directional causality should be proved.

Institutional Separation Hypothesis (Fiscal Neutrality)

This hypothesis which is in opposite to Fiscal Synshronisation view is supported by Hoover and Sheffrin (1992) and Baghestani and McNown (1994) suggests independence of revenues and expenditures because of laws and institutions governing the budgetary process. According to this hypothesis both legislative and executive branches of government participate in budgetary process ,but lack of agreement between these two independent decision making branches makes revenues and expenditures independent of each other. Hoover and Sheffrin attribute absence of causal link to many important actors with divergent views and interests, while Persson (2000) attributes it to disagreement between parties or groups in the decision making process. This view was verified by experience of US economy where institutional separation of allocation and taxation functions of government exists. For example, despite the reform of budget process attempted in congressional budget and Impoundment Control Act of 1974 large budgetary deficits persisted in post -1974 period reflecting continued absence of coordination between expenditure and revenue decisions. The Gram-Rudman-Holdings Act was another attempt to coordinate the revenue and expenditure decisions of government, which again failed to achieve a balanced linkage between two budget components. Hoover and Sheffrin attributed this failure to interplay of numerous diverse interests in

the context of non parliamentary US institutions. In Indian context this can be explained in terms of FRBM Act 2004.

Empirical Literature Review

For about past three decades , many studies- using concept of cointegration, Granger causality, parametric and non parametric tests, Asymmetric ECM and other econometric techniques, focused on many countries using data for different time periods. These empirical analysis have furnished mixed results and also controversial in case of certain countries including USA. These results differ both in terms of direction of causality and in terms of short run verses long run nature of relationship between revenues and expenditures for sate and central governments. A brief summary of some of empirical analysis already done in this context is presented below.

A seminal research paper by Anderson, Wallace and Warner (1986) using a VAR model on annual post-world war II data of US economy found empirical evidence in favour of 'Spend-and-Tax' hypothesis which is in sharp contrast with Friedman's hypothesis that increase in revenue causes increase in expenditures. The data also had not any support for Buchanan and Wagner's view that higher taxes lead to less government spending. This paper also finds little support for Wiseman-Peacock hypothesis that instability leads to growth in government expenditures or revenues. Further, evidence for inflation causing increase in real government expenditure is also weak. Extending the sample period back to 1929, and using only a dummy variable to capture the macroeconomic effects Manage and Marlow reverse the conclusion of Anderson et al. as they found out that either there exists unidirectional causality from revenues to expenditures or bidirectional causality depending upon the number of lags in the VAR. In the wake of these conflicting results Ram (1988) used both long period annual data (1929-83) and shorter period quarterly data (1947-83) and produced results largely consistent with Manage and Marlow(1986) with causality running from revenues to expenditures and some feedback following world war second. However, results also showed some evidence for causality running from expenditures to revenues but only in case of state and local level governments. Since, study does not involve use of macroeconomic controls it could not outrightly reject the Anderson et al. conclusion. A study involving analysis in this regard at sub national level also was conducted by Miller and Russek (1990) which shows different results in case of US economy which are in contradiction with earlier studies of Anderson et al. (1986) and Ram (1988).Their results support bidirectional causality between taxes and expenditures (both in nominal and Real terms) for federal, state and local level of governments.

Blackley (1986) used long term annual data and found causality running from revenues to expenditures. When GNP was introduced as a control variable he found block causality from GNP and revenues to expenditures but could not establish significant individual effect of either revenues or GNP on expenditures. He also found significant contemporaneous relationship between GNP

changes and revenue changes, but no lagged effects. These results again demonstrate the sensitivity of causality to the inclusion of macroeconomic control variables thereby leaving open the possibility of GNP changes being the driving force behind budgetary changes.

Ahiakpor and Amirkhalkhali (1989) carried out their study using Canadian data and their statistical analysis appears to support the claim that raising taxes would only partially reduce the deficits and will not reduce the expenditures in long run. They opined for reduction in spending or fiscal restraint rather than finding ways of raising additional revenues from taxes.

Payne (1997) also used Canadian data to explore direction of causality but made use of GDP as additional control variable. He finds out that Revenues follow a time path which is independent of both expenditures and GDP. However expenditures respond to budgetary disequilibrium since budget imbalances appear to be corrected by expenditure changes. Moreover this paper finds that expenditure variations also respond to GDP ones.

In a study of OECD countries , Joulfaian and Mookerjee (1991) find support for 'Tax-and-Spend' hypothesis in Italy and Canada; for 'Spend-and –Tax' hypothesis in case of US, Japan, Germany, France, United Kingdom, Austria, Finland and Greece and for Fiscal Synchronisation hypothesis in case of Ireland.

Hasan and Lincoln (1997) using Quarterly data for UK and applying Johansen maximum likelihood procedure found long run equilibrium relationship between growth rates of tax revenue and government spending. The sequential testing procedure indicates presence of bidirectional causality between tax revenues and government spending. Results of the paper broadly confirm Wildavsky's incremental budgetary theory (Wildavsky, 1964) and empirically accord well with Owoye (1995).

In a wider multinational study by Chang et al. (2002) mixed results were obtained regarding the dynamics of expenditure –revenue nexus. Grange causality tests suggest unidirectional causality running from Revenues to spending in case of Japan, south-Korea, Taiwan, United Kingdom and United States, thereby supporting “Tax-and-Spend' hypothesis. The reverse causality, supporting 'Spend-and -Tax' hypothesis was found in case of Australia and South Africa. In case of Canada, study found a feedback mechanism between revenues and expenditures thus supporting “Fiscal Synchronisation” hypothesis. For Newzeland and Thailand direction of causality could not be established in any direction thereby supporting institutional separation hypothesis.

Narayan (2005) studied long run relationship between government expenditures and revenues and for nine Asian countries. He found support for 'Tax-and-Spend hypothesis for Indonesia, Singapore, and Srilanka in the short run and for Nepal both in short and long run. Study reported evidence of neutrality for other countries like India, Malaysia, Pakistan, Philippines and Thailand. His results reveal that there is neither a strong support for Tax-and –Spend Hypothesis nor for Spend-and -Tax hypothesis as mixed results are obtained in case of different countries.

Narayan and Narayan (2006) found support for the Tax-and Spend hypothesis for Mauritius, El

Salvador, Haiti, Chile and Venezuela.

Methodology and Empirical Analysis

This section, for exposition motives, presents methodology applied along with the results pertaining to present study, under different sub headings**:**

Variables and Data Sources

Since the study aims at studying the nexus between expenditures and revenues at sub national level the two variables under consideration are U.P government's own revenues (R) and expenditures (E). Own revenues (R) include own tax revenues and own non tax revenues which state govt. can increase or decrease at state level. Own tax revenues inturn comprise of taxes on commodities and services, taxes on property and capital transactions, and taxes on agricultural income, professions, trade, calling and employment. Non tax revenues mainly comprise of interest receipts, dividends and profits and receipts from general, social and economic services. Expenditures include revenue (Both Plan and non plan components) and capital (Development and non development) expenditures excluding expenditures on public accounts. Data for related variables is collected from " State Finances: a study of Budgets", "Handbook of Statistics on State Government Finances -2004 and 2010 volumes" both published by Reserve Bank of India ,and U.P State budgets (various issues). Both the variables are taken in logarithm form (LR and LE) to avoid the problem of heteroscedasticity.

Unit Root Tests

The very first step involved in this empirical analysis of time series data is to ascertain the nature of data (Stationary or non stationary). For this, as a preliminary we take the graphic view of two series. From the graphs [fig. 1.1and fig. 1.2] it is clear that two series ,at levels , are not maintaining a constant mean and seem to follow an upward trend. However, first differences of both fluctuate around non- zero mean [fig. 1.3 and fig.1.4].

This gives an indication for presence of unit root in level forms and stationarity of first differences of variables

Figure 1.1

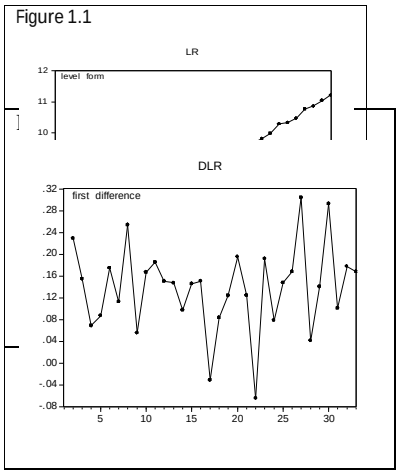
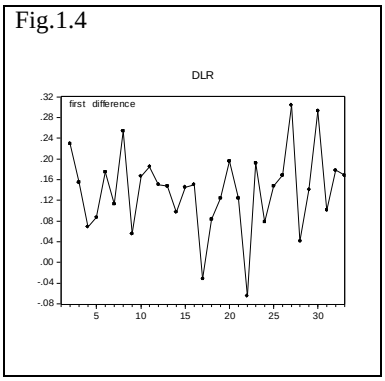
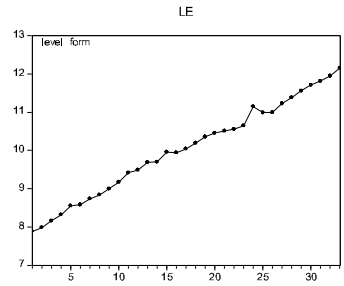


Fig.1.4



To further verify this we make use of Augmented Dicky Fuller (ADF) and Phillip Perron (PP)tests .The (ADF) test is based upon analysis of following three different forms of regression for two variables under consideration. The three forms are with Drift:

Fig 1.2



$$LE = {}_1 + {}_3 LE_{t\ 1} + \sum_{i=1}^{i=m} {}_i LE_{t\ 1} + {}_t \text{.....}(C.1)$$

$$LR = {}_1 + {}_3 LR_{t\ 1} + \sum_{i=1}^{i=m} {}_i LR_{t\ 1} + {}_t \text{.....}(C.2)$$

With constant and trend :

$$LE = {}_1 + {}_2 t + {}_3 LE_{t\ 1} + \sum_{i=1}^{i=m} {}_i\ LE_{t\ i} + {}_t \text{.....}(C.3)$$

$$LR = {}_1 + {}_2 t + {}_3 LR_{t\ 1} + \sum_{i=1}^{i=m} {}_i\ LR_{t\ i} + {}_t \text{.....}(C.4)$$

Without drift and trend:

$$LE = {}_3 LE_{t\ 1} + \sum_{i=1}^{i=m} {}_i\ LE_{t\ i} + {}_t \text{.....}(C.5)$$

$$LR = {}_3 LR_{t\ 1} + \sum_{i=1}^{i=m} {}_i\ LR_{t\ i} + {}_t \text{.....}(C.6)$$

in all the three cases hypothesis is

Null ; Ho: ${}_3 = 0$ (Unit root is present or series is non stationary)

Alternate : H1 : ${}_3 < 0$ (No unit root)

Decision rule :

i) If computed statistic is more negative than ADF critical values reject Hi implying series is stationary.

ii) If computed statistic is not more negative than ADF critical values accept Ho implying that series is non stationary.

Having obtained these results same test is applied on first differences of two variables labeled as DLF (LE) and DLR (LE). To check their stationarity the regressions equations to be estimated will be as

$$^2LE = {}_1 + {}_2 t + {}_3\ LE_{t\ 1} + \sum_{i=1}^{i=m} {}_i\ {}^2LE_{t\ 1} + {}_t \text{.....}(C.7)$$

$$^2LR = {}_1 + {}_2 t + {}_3\ LR_{t\ 1} + \sum_{i=1}^{i=m} {}_i\ {}^2LR_{t\ 1} + {}_t \text{.....}(C.8)$$

With this back ground of ADF test we below present the test results in Table for four variables. In Addition to ADF statistics , for robustness of results, we also present results as per Phillip Perron test for same set of variables. Further following C. Hill et al.(2008) we present results for equations with drift and/or trend only as the series does not fluctuate around zero mean. It is because of this we

h rule out the possibility of no trend and drift option. from table (01) it is clear that null hypothesis of non stationary could not be rejected at 5% level of significance in case of both the variables .but for DLE and DLR null hypothesis of non stationarity is rejected as such both the variables(Revenues and Expenditures) are integrated of order one.

Name of the variable	**With Drift only**		**With drift and Trend**		(Result (at 5% level of signf.)
	Computed statistic	**P value**	**Computed statistic**	**P value**	
LE	-0.600969	0.8555	-1.623167	0.7577	**Non Stationary**
LR	0.170374	0.9662	-1.913694	0.6241	**Non Stationary**
DLE (*LE*)	-7.819009	0.0000	-7.699338	0.0000	**Stationary**
DLR (*LE*)	-6.603426	0.0000	-6.580368	0.0000	**Stationary**

Table (01)

Results of Phillip Perron Test

For robustness of results obtained from ADF test we also conduct Phillip- Perron test based upon same null hypothesis of non-stationarity. Results presented in table (02) reaffirm our earlier findings that both revenues and expenditures are non stationary in their level forms but turn to be stationary when taken in first difference.

Name of the variable	**With Drift only**		**With drift and Trend**		**Result (at 5% level of signf.)**
	Adjusted t statistic	**P value**	**Adjusted t statistic**	**P value**	
LE	-0.288629	0.9159	-3.457759	0.0776	**Non Stationary**
LR	0.226151	0.9701	-1.883869	0.6394	**Non Stationary**
DLE (*LE*)	-15.45830	0.0000	-16.07809	0.0000	**Stationary**
DLR (*LE*)	-6.633185	0.0000	-6.624733	0.0000	**Stationary**

Table (02)

Cointegration

In order to have a better estimate of long run elasticity of government expenditure with respect to

states Own tax revenues (LR) and avoid the limitations of Engel –Granger method we make use of improved method as presented by Engel and Yoo (1991). Engel-Granger method results in parameters that are asymptotically inefficient and their distribution is also not normal. The Engel-Yoo three step method involves addition of one more step in Engel Grangers methods of cointegration. By incorporating the third step it produces estimates that are asymptotically equal to full information maximum likelihood method (FIML) and whose standard errors permit Gaussian inferences. Three steps as involved in this study are outlined briefly here:

Step 1:

With government expenditure (LE) and z States own revenues (LR) as our two variables we estimate the static long run relationship

$$LE = \quad + \quad (LR) + EC \text{.....} (C.9)$$

No inference is made from the coefficients at this stage as they are to be corrected in the third stage of Engel-Yoo procedure. To establish the presence of cointegration residuals from equation (C.9) are tested for stationarity. The presence of unit root establishes non stationarity in residuals and if so we should terminate the procedure .However if stationarity is established for residuals we it implies presence of long run relationship between government expenditure and GDP and we should proceed for next step.

Results:

Variable	*Coefficient*	*Std. Error*	*T statistic*	*P value*
C	1.248832	0.139645	8.942926	0.0000
LR	0.980215	0.015436	63.50149	0.0000
R Squared 0.992371				

Table (04)

=1.2488332 and = 0.980215 these coefficients are not efficient asymptotically so we do not treat them to be as estimates of long run elasticity

Residual Test Results:

Both tests confirm that residuals are integrated of order one. Hence we conclude that revenues and expenditures are cointegrated.

Step 2 :

$$LE = \quad _0 + \quad _1 EC_{t \quad 1} + \sum_{i=1}^{i=m} \quad _0 \quad LR_{t \quad i} + \sum_{j=1}^{j=n} \quad _j \quad LE_{t \quad i} + \quad _1 \text{.....} (C.10)$$

As in Engel-Granger method we develop the error correction model as

Where EC represents the estimates as obtained from first step and residuals from this step represented as are noted for use in step next step.

Dependent Variable: DLE

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.355805	0.088595	4.016063	0.0006
Ec(-1)	-0.924096	0.327298	-2.823408	0.0102
DLE(-1)	0.041950	0.252796	0.165943	0.8698
DLE(-2)	-0.089455	0.218290	-0.409800	0.6861
DLE(-3)	-0.089777	0.175783	-0.510726	0.6149
DLR(-1)	-0.531932	0.323082	-1.646433	0.1146
DLR(-2)	-0.738465	0.284721	-2.593647	0.0170
DLR(-3)	-0.180493	0.286117	-0.630836	0.5350

Table (06)

Results for equation (c.10) are presented in table (06) which show that error term is significant giving an indication for causality also. With this coefficient value and residuals of regression we proceed for last step.

Step 3:

The lagged I(1) explanatory variable (LR) is scaled by obtained in second step. With these scaled variables (SLR) we run the regression

= a+b (SLR) t-1+vt (c, 11)

Dependent Variable: ε_1
Sample (adjusted): 5 33

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.031683	0.121219	-0.261374	0.7958
SLR(-1)	0.003774	0.014337	0.263204	0.7944

R-squared	0.002559	Mean dependent var	-3.47E-17
Adjusted R-squared	-0.034383	S.D. dependent var	0.075557
S.E. of regression	0.076845	Akaike info criterion	-2.227589

Table (07)

a=-0.031683 and b=0.000374

After obtaining the estimates of a and b the corrected estimates for first step parameters will be given by

$_f = \quad + a$ and $\quad _f = \quad + b$ and respective t statistics will be given by $t_f = a / SE$ (a) and $t_f = b / SE$ (b) where standard errors are computed from step 3.

Final corrected estimates as per Engel Yoo will be

$_f = 1.248832 + -0.031683 = 1.2802515$ and $_f = 0.980215 + 0.003774 = 0.983899$

And the long run cointegration relationship will be represented by

LE = 1.2802515 + 0.983899 (LR) + ... (C.12)

From equation c.12 it is clear that revenue elasticity of expenditures is close to unity that will have policy implications which will be much more vivid once the causality is established.

Bi-Variate Granger Causality:

For conducting the granger causality test we must have stationary variables. since we have shown that LE and LR are non stationary at levels but stationary at first difference and also cointegration has been established then following the Granger representation theorem, either LE must cause LR or LR must cause LE. Since important assumption of stationarity is not valid here we make use of extended granger causality test involving Error correction mechanism. For this we estimate

$$LE = \quad 0 + \sum_{i=1}^{i=p} {}_i \; LE_{t\;i} + \sum_{i=1}^{i=q} {}_i \; LR_{t\;i} + \quad U1_{t\;1} + \; _t \; \text{.....} \; (C.13)$$

Where $U1_{t-1}$ is the lagged residual term from the cointegration regression;

which is nothing but the error correction term (because two variables are cointegrated). So there are now two sources of causation for LE : (1) through the lagged values of LR and/or (02) through the lagged value of cointegrating vector (i.e. the EC term). The standard Granger Causality test neglects the latter source of causation. The null hypothesis of no cointegration implies $= \; _2 = \; _3 = \text{.....} = \; _q = \; = 0$. This can be rejected even if $'s$ all are zero but coefficient of lagged EC term is non zero. This is becauses EC term includes the impact of TR. to test this hypothesis of no causality we use F test as:

1) Estimate equation (C.11) by OLS and obtain the residual sum of squares from this regression (RSS_{ur}).
2) Re –estimate equation dropping all the lagged terms of TR and EC term. obtain the residual sum of Squares (RSS_r) from this reduced regression.

   Compute the F statistic as

$$F = \frac{(RSSr \quad RSS)/m}{RSS(n \quad K)}$$ with m and (n-K) degrees of freedom.

Where m is the number of restrictions imposed , k is number of parameter estimated in unrestricted regression and n is the sample size.

If computed value of F exceeds the critical value of F (for specified degrees of freedom) then we reject the null hypothesis of $= {}_2 = {}_3 = \ldots\ldots\ldots\ldots = {}_q = \quad = 0.$

In other words we accept that TR is caused either by lagged values of TE or EC term or both. Same procedure is repeated for the an equation containing variables in reverse order to test causality direction in reverse order. Results for two Directions of causality are presented below

LR does not granger cause LE

Residuals were obtained from cointegration equation

$$LE = a_0 + a_1 LR + U1 \ldots\ldots\ldots\ldots\ldots\ldots\ldots (C.14)$$

And following equation was estimated the following equation.

$$TE = {}_0 + TE_{t\ 1} + TR_{t\ 1} + U_{t\ 1} + {}_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots (C.15)$$

Since we are dealing with annual data we have used only one lag. However, higher lags were also tested and results remained unaltered. After applying necessary restrictions through Wald test following results were obtained

8)

Test statistic	Value	d.f	Probability
F statistic	5.46447	(2, 27)	0.0101
Chi square	10.9289	2	0.0042

Table (0

From result table it is clear that null hypothesis of Revenues does not Granger cause expenditures is rejected both by F and Chi-Square statistic or to be simple results support the Tax-and-Spend hypothesis .

LE does not Granger cause LR

For checking this direction of causality we obtain residuals for the cointegration equation

$$LR = {}_0 + {}_1 LE + U2_{t\ 1} + {}_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots (C.15)$$

Then we estimate the unrestricted equation

$$LR = {}_0 + LR_{t\ 1} + LE_{t\ 1} + U2_{t\ 1} + {}_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots (C.16)$$

and applying wald test with restrictions we have following results.

Test Statistic	value	d.f	Probability
F Statistics	0.522458	(2, 27)	0.5989
Chi square	1.044916	2	0.5931

From results given in table (09), the null hypothesis of expenditures does not granger cause revenues can not be rejected and we infer that empirical results do favour Spend-and-Tax hypothesis.

Hence from bi directional Grager causality test we conclude that behaviour of U.P Economy supports 'Spend-and-Tax' hypothesis thereby confirming to Friedmans view and in accordance with the empirical results found earlier by

Conclusion and Policy Implications

In this study causal nexus between government Revenues and Expenditures has been studied using annual data of Uttar Pradesh for the time period 1980-81 to 2012-13. We test four alternative hypotheses- first, Tax and Spend hypothesis; second, Spend and tax hypothesis; third, fiscal synchronization hypothesis and fourth, institutional separation hypothesis. In the empirical exercise ADF test was used to check the stationarity of variables, modified Engel-granger and Cointegration Regression Durbin Watson tests were used to examine long run Equilibrium relationship between two variables and Error correction model was used to analyse the reconciliation of long run and short run behaviour of two variables. Further, Engel granger test for Non stationary series was used to examine the direction of causality . Empirical analysis revealed that there exists a long run equilibrium relationship between tax revenues and expenditures. Both ECM model and Engel Granger tests established that in Indian context there exists unidirectional causality and direction of causality is from TR to TE. Thus historical behavior of two variables in India supports tax and Spend hypothesis. Further, unidirectional causal impact of TR on TE is negative in accordance with Buchanan and Wagner's hypotheses. Therefore from the policy perspective it would be in order to raise the tax levels so as to bring down expenditures and consequent desirable decrease in deficits.

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