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Government Expenditure and Economic Growth: An Econometric Test for India

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Abstract: **The purpose of this study is to assess, in Indian context, the validity of 'Wagner's law" which has spawned a large number of empirical studies because of its important implications. According to Wagner, expenditure is an endogenous factor or outcome of growth process during industrialisation. As real national income increases there is a tendency for the public expenditure to increase relative to national income. To investigate this long run relationship between government expenditure and national income we employed Engel – Yoo three step cointegration methods along with Augmented Dickey Fuller (ADF) test and Engel –Granger causality test, on time series annual data for Indian economy over the period from 1980-81-to 2012-13. We found a unidirectional causality running from GDP/GDP per capita to public expenditure thus supporting Wagner's hypothesis of increasing public sector in India. Since there is no causality running from government expenditure to GDP, using public expenditure as effective policy instrument for long run economic growth is not supported by this empirical exercise? Although this paper makes use of only two prominent specifications for testing Wagner's law, a brief description of other commonly used models, with necessary conditions is also given in the main text.**

Keywords**: Wagner's law, Public Expenditure, Engel-Yoo cointegration, GDP growth, Government Size.**
JEL Classification: H52, C22, E62

I. INTRODUCTION

The relationship between public expenditure and aggregate income has long been debated in economic literature. In this context we have two main strands of theories that explain the long run relationship between the two variables. One is Wagner's law and another is Keynesian hypothesis. These two theories perceive functional relationship between two variables in different perspective. Wagner's law considers public expenditure as endogenous factor that is driven by national income. In contrast to it Keynesian hypothesis considers public expenditure as exogenous variable that influences economic growth. To be more precise, while Wagner's law establishes that causality runs from economic growth to public expenditure, Keynesian view establishes direction of causality to be from public expenditure to economic growth. Knowledge of precise direction of causality has important policy implications. If causality were Wagnerian then public income should be treated as important policy variable while public expenditure is relegated to a passive role. On the other hand if causality supports Keynesian view public expenditure becomes an important policy variable as was experienced during 1930's. In order to find out direction of causality in Indian context we have undertaken this study using time series data for the period 1980-81to 2012-13.Further, this study differs from other studies of the kind and known to author, in respect of methodology used for empirical analysis. We make use of Engel-Yoo three step procedure so as to get elasticity coefficients that are asymptotically efficient and which permit Gaussian Inferences.

Rest of the paper is organized as follows. Section B contains theoretical underpinnings of Wagner's law followed by literature review in section C. Methodology used is discussed in section D and time series properties of variables along with test results are presented in section E. Paper ends with section F containing a discussion on results and policy implications of empirical findings.

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II. THEORETICAL FRAME WORK

The role and size of public sector increased considerably especially after world war second. In order to explain this increasing role and size different theories were put forth that tried to touch the different aspects (economic, political, institutional and international) of the this phenomenon. Wagner's law which was originally called as 'the law of increasing state activity' is one such attempt that had received considerable attention in economic circles. Adolph Wagner (1883, 1912), a German Political economist put forth his notion that there is a long run tendency for government activities to grow relative to total economic activity. Wagner stated that during industrialization process, as real per capita of a country increases the share of its public expenditure in total expenditure increases. Wagner gives three main reasons for this increased expansion (Iyare and Lorde, 2004; Wahab, 2004). Firstly, as industrialisation progresses there is a tendency in public sector to increase its administrative and protective functions to ensure the smooth operation of market forces. Secondly, several public services such as education, cultural activities, health services, welfare expenditure are income elastic (elasticity greater than one), implying that as income increases there is more than proportionate increase in their demand. This builds a social pressure for provision of such services leading to increasing role of state and its expenditure. Thirdly, to remove monopolistic tendencies in country and invest in areas where private sector is shy to invest but are necessary for technological progress the state will take a leading role resulting in increased expenditure. Wagner ,in fact did not express his ideas in the form of a law and avoided definitive formulations .His views were latter formulated as a law and came to be known as "Wagner's law or Wagner's hypothesis" (Henrekson, 1993; Halicioglu,2003). Following the explanations and debates on theoretical front, Wagner's law has been empirically tested by various researchers. Sideris (2007) has summed up the empirical works pertaining to Wagner's law in two broad categories based upon the assumptions of regression equations involved: 1) Earlier studies which were performed before mid 1990s and which assume stationarity in time series data involved in regression (Ram, 1987; Courakis et al., 1993); 2) studies based upon use of time series econometrics techniques like cointegration analysis, causality tests which check for the stationarity in time series data. In this group, earlier studies relied mostly on use of Engel granger methodology while later have been using Johansen(1988) and other modern techniques developed in cointegration and causality analysis(Henrekson, 1993; Murthy, 1994; Ahsan *et al.*, 1996; Biswal *et al.*,1999; Kolluri *et al.*, 2000; Islam, 2001; Al-Faris, 2002; Burney, 2002; Wahab, 2004).Several empirical specifications have been used as basic test regression equations, upon which aforementioned techniques were applied to examine the validity of Wagner's law in different economies. Important versions are briefly summarized below;

1) $\mathbf{lnE = \alpha + \beta\ lnGDP + u}$ ……*(01)*

This double log formulation was adopted by Wiseman and peacock (1961) to test the validity of Wagner's law which they interpreted as higher increase in public expenditure as compared to GDP(gross domestic Product). It requires that value of β should be greater than one.

2) $\mathbf{ln(E/GDP) = \alpha + \beta\ lnGDP + u}$ ……*(02)*

This is the modified version of Peacock-Wiseman version given in equation (1) and was suggested by Mann (1980). It represents the share of public expenditure in total output as function on total output. To maintain the validity of Wagner's law through this approach we should have elasticity of share of public expenditure in total output with respect to total output greater than zero (β >0).

3) $\mathbf{lnE = \alpha + \beta\ ln(GDP/Pop) + u}$ ……*(03)*

This was suggested by Goff man (1968) and it presents total government expenditure as function of per capita GDP. This representation implies that proportionate increase in government expenditure should be greater than proportionate increase in per capita GDP and requires β > 1.

4) $\mathbf{ln(E/Pop) = \alpha + \beta\ ln(GDP/Pop) + u}$ ……*(04)*

Gupta (1967) had used this version to test validity of law by presenting per capita expenditure as function of per capita GDP.As per his interpretation of law proportionate increase in per capita public expenditure should be more than proportionate increase in per capita output. For validity of law this specification demands β >1.

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5) **ln(E/GDP) = α + β ln(GDP/Pop) +u** ……..*(05)*

Musgrave (1969) suggested this specification and for validity of Wagner's law it requires that proportionate increase in public expenditure as share in total output should be greater than proportionate increase in per capita output. In other words share of public sector in GDP should increase as per capita GDP increases implying thereby β >0.

6) **lnFCE = α + β lnGDP+ u** ……..*(06)*

In this version final consumption expenditure of government is expressed as function of real output and requires output elasticity of government consumption should be greater than one (β >1).

7) **Ln(E/GDP) = α + β ln(GDP/Pop) + γ ln(BDef/GDP) +u** .....*(07)*

This equation represents the modified version of equation of Musgrave's version of Wagner's law and is popularly known in economic literature as augmented version presented by Murthy (1994). The inclusion of fiscal deficit in it is justified and in no way does it contradict the spirit of law. It is normally accepted that in development process budget deficit ratio increases because government revenues increase less in proportion to increase in government expenditures so that expenditure is significantly related to deficits also.

III. LITERATURE REVIEW

Kumar et al. (2009) argued that government can stimulate or restrain its economy through expansionary or contractionary fiscal policies. Before adapting this policy prescription it is of utmost importance to investigate the long run relationship and causal direction between public expenditure and economic growth (output). It is in pursuit of this finding that researchers have repeatedly referred to Wagner's law and tried to find out whether it is really that public expenditure increases at a faster rate than national income. Adolph Wagner has stated that during industrialisation process, as real per capita income increases the share of public expenditure in total expenditure increases. In essence this law implies that causality is running from national income to public expenditure. Hence, public expenditure is considered endogenous to growth of national income, in contrast to Keynesian view, which considers public spending as exogenous policy instrument which can affect growth in national income. The validity of this law has been assessed empirically for a large number of developing and developed countries using both time series and cross sectional data sets. These studies cover country specific analyses as well as group economies, mainly for the post world war II period. Some of the important studies in this context are briefly outlined below:

Among the earlier empirical analysis ,assuming stationary data, studies conducted by Peacock and Wiseman (1961), Musgrave (1969), Michas (1975), Mann (1980), Ram (1986, 1987) provide support in favour of Wagner's hypothesis. In contrast, Gandhi (1971) and Ram (1987) found no support of Wagner's Law in developing countries. However, because of serious shortcomings of these studies modern techniques have been developed and using these new techniques have produced mixed results.

Oxley (1994) uses data for the British economy referring to the period 1870-1913 and provides evidence consistent with Wagner's hypothesis. Cotsomitis *et al.* (1996) test for the long-run validity of Wagner's hypothesis applied to People's Republic of China for 1952-1992. They found that evidence supports this secular validity, as estimated residuals of cointegrating regressions are stationary. Afxentiou and Serletis (1996), among others, examined Wagner's law for the European Union. They considered the long-run relationship between different categories of government spending and GDP. In most cases they found no significant link between government spending and GDP growth. Additionally, they also failed to detect causality from GDP to these spending categories thus rejecting Wagner's law. Ansari *et al.* (1997) applied both the Granger and Holmes and Hutton statistical procedures to test the income-expenditure hypothesis for three African countries (Ghana, Kenya and South Africa), from 1957 to 1990. For all these countries, a long-run relationship between government expenditure and national income cannot be established. In fact, over this period, government expenditure has deviated substantially and persistently from national income. Moreover, in the short run, of these three African countries only Ghana shows evidence of government expenditure being caused by national income, finding support for Wagner's hypothesis. Finally, the authors find no evidence of government expenditure causing national income. In other words, the Keynesian proposition is not supported by the data. Chletos and Kollias (1997) investigate

empirically the traditional Wagner's hypothesis in the case of Greece using disaggregated data of public expenditures and employing an error correction approach. The empirical findings suggest that Wagner's Law is valid only in the case of military expenditures. Asseery *et al.* (1999) analyze the experience of Iraq, suggesting some evidence for the existence of Wagner's Law when income and several forms of expenditure are denoted in nominal terms. When expenditure in real terms is examined, the chain of causality runs in the opposite direction. In the case of spending on economic services, there is unidirectional causality. So, the results of these Granger causality tests are to downplay the support for the existence of Wagner's Law in Iraq and to raise interesting questions regarding the use of real or nominal values. Demirbas (1999) tests Wagner's Law using aggregate Turkish data for the period 1950-1990. According to the test results, there is no cointegrating relationship between the variables. Including time trends into cointegration regressions did not change the results either. These findings show that the support of Wagner's Law found by many early researchers may be spurious. In a test on Turkish data it cannot find any long-run positive relationship between public expenditure and GNP variables. Yet, in the absence of a long-run relationship between variables, it still remains of interest to examine the short-run linkages between them. However, there is no evidence to support either Wagner's Law in any of its versions or Keynesian hypothesis. Thornton (1999) analyses the experience of six presently developed economies (Denmark, Germany, Italy, Norway, Sweden and the UK) for the period beginning around the mid-19th century and ending in 1913, and reports results in favour of the law. Albatel (2002) studies the relationship between government expenditure and measures of economic development and growth in Saudi Arabia. The results confirm the validity of Wagner's hypothesis In a similar vein, for a group of Gulf Cooperation Council Countries, as postulated by the Wagner's law, Al-Faris (2002) found causality running from national income to public expenditure but no support for causality from public expenditure to national income.. Burney (2002) analyzes the long-run equilibrium relationship between public expenditure and the relevant socioeconomic variables in Kuwait, on the basis of time-series data covering the period from 1969-94. Empirical results show little support for the existence of a long-run equilibrium relationship between public expenditure and the relevant socioeconomic variables. Chow *et al.* (2002) using UK data for the period 1948 to 1997 include a "third" variable, money supply, which re-establishes the long run link between the income and public spending variables. Multivariate causality results also indicate unidirectional causality from income and money supply to government spending in the long run, thus providing strong support for Wagner's hypothesis. These findings suggest that omitted variables may mask or overstate the long run linkages between economic development and public spending. Dilrukshini [2004] studied the relationship between public expenditure and economic growth in Sri Lanka from 1952 to 2002 using time series data to test the validity of Wagner's law and found that there is no empirical support either for the Wagner's law or Keynesian hypothesis, in the case of Sri Lanka. Using panel cointegration tests for Chinese provinces, Narayan (2005), Narayan *et al.* (2008) found mixed evidence in support of the Law for China's central and western provinces, but no support for the Law for the full panel of provinces or for the panel of China's eastern provinces. Using a two-step Engle-Granger causality test for Mexico, Iniguez-Montiel (2009) also found a unidirectional causality running from income to government expenditure. Kalam and Aziz (2009) found evidence in favor of Wagner's law for Bangladesh in both the short-run and long-run. The conflicting results as outlined above has a major implication for public expenditure as it renders one unable to decide whether public expenditure should be treated as endogenous (Wagnerian causality) or it is expansionary fiscal policies that promote economic growth(Keynesian view).

IV. DATA AND METHODOLOGY

Data for the analysis has been taken from 'Handbook of Statistics on Indian Economy' (RBI Publication) for all the variables under consideration and our analysis period stretches from 1980-81 to 2012 - 13. Further, to establish our results we have used only two versions of the law (Wiseman-Peacock (1961) and Goffman (1968) version) from the list mentioned earlier. As such variables considered are Gross domestic product (LGDP), Per capita gross domestic Product (LGDPC) and total expenditure of the government (LTEXP). Besides all the variables have been expressed in logarithm form so as to avoid the problem of Heteroscedasticity, have stationarity at lower orders and to get elasticity values directly.

For checking the stationarity of variables we make use of Augmented Dickey Fuller test (ADF).This test is based upon analysis of following three different forms of regression for two variables under consideration (explained for one variable i.e., LEXP and same procedure repeated for other variables). The three forms are

With Drift:

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$$\Delta LEXP = \beta_1 + \beta_3 LEXP_{t-1} + \sum_{i=1}^{i=m} \alpha_i \, LEXP_{t-i} + \varepsilon_t \quad \ldots\ldots\ldots \text{(M.1)}$$

With constant and trend:

$$\Delta LEXP = \beta_1 + \beta_2 \, t + \beta_3 TE_{t-1} + \sum_{i=1}^{i=m} \alpha_i \, \Delta LEXP_{t-i} + \varepsilon_t \quad \ldots\ldots\ldots \text{(M.2)}$$

Without drift and trend:

$$\Delta LEXP = \beta_3 LEXP_{t-1} + \sum_{i=1}^{i=m} \alpha_i \, \Delta LEXP_{t-i} + \varepsilon_t \quad \ldots\ldots\ldots\ldots \text{(M.3)}$$

In all the three cases hypothesis is

Null; Ho: $\beta_3 = 0$ (Unit root is present or series is non stationary)

Alternate; H1: $\beta_3 < 0$ (No unit root)

Decision rule:

1) If computed τ statistic is more negative than ADF critical values reject Ho implying series is stationary.
2) If computed τ 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 three variables labeled as $\Delta LEXP, \Delta LGDP and \, \Delta LGDPC$ .To check their stationarity the regressions equations to be estimated will be of the form (M.4) for LEXP and likely so for other two variables.

$$\Delta^2 LEXP = \beta_1 + \beta_2 \, t + \beta_3 \Delta LEXP_{t-1} + \sum_{i=1}^{i=m} \alpha_i \, \Delta^2 LEXP_{t-i} + \varepsilon_t \quad \ldots\ldots \text{(M.4)}$$

After checking for stationarity long run relationship is established using cointegration techniques. In order to have a better estimate of long run elasticity of government expenditure with respect to economic activity (proxied by GDP and GDPPC in this analysis) 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. This 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 equally 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 (LEXP) and gross domestic product (LGDP) as our two variables we estimate the static long run relationship

$$LEXP = \alpha + \beta(LGDP) + u1 \quad \ldots\ldots\ldots\ldots\ldots\ldots \text{(M.5)}$$

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 1 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.

Step 2:

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

$$\Delta LEXP = \alpha_0 + \varphi_1 EC_{t-1}^1 + \sum_{i=1}^{i=m} \alpha_i \, \Delta LGDP_{t-i} + \sum_{j=1}^{j=n} \pi_j \, \Delta LEXP_{t-i} + \varepsilon_1 \quad \ldots \text{(M. 6)}$$

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

Step 3:

The lagged I(1) explanatory variable (LGDP) is scaled by **ρ** obtained in second step. With these scaled variables (CLGDP) we run the regression

$$\varepsilon 1t = a + b(CLGDP)\ t\text{-}1 + vt \qquad (M.7)$$

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

$\alpha_0 = \alpha + a$ and $\beta_0 = \beta + b$ and respective t statistics will be given by $t_a = a/SE(a)$ and $t_b = b/SE(b)$ where standard errors are computed from step 3.

V. EMPIRICAL RESULTS

In order to select the appropriate methodology for checking the time series properties like cointegration and causality, the concerned variables are checked for their stationarity properties using the ADF test described in methodology section. The results of test as applied on total expenditure (LEXP), Gross domestic product (LGDP) and per capita GDP (GDPC) are summarized in table (01).

Table (01)

Variable	**level**		**First Difference**		**Order of integration**
	intercept	Intercept and trend	intercept	Intercept and trend	
GDP	3.3838	-1.26409	-4.1982*	- 3.77018**	I(1)
LEXP	-1.1146	-3.2970	-3.8514*	¨3.9502*	I(1)
LGDPC	3.6072	-0.9375	-3.8024*	- 3.4375*	I(1)

*& ** imply that null hypothesis of non stationarity is rejected at 5 and 10 per cent levels of significance respectively.

From the table results it is clear that all the variables under consideration are non stationarity but first difference of LGDP is stationary at 5% significance level while first differences of LEXP and LGDPC are stationary at 1% level of significance. These results remain unaltered whether we consider equations for ADF test in with intercept alone or with intercept and trend. As graphs of all the time series show an increasing trend, the option of no trend and no intercept is not considered. In order to establish the cointegration using Engel-Yoo three step procedure as described above we present the results of three steps as under

Step 1:

Since we are considering two versions to carry out our analysis with three different variables the four equations estimated are as

$$LEXP = \alpha_1 + \beta_1(LGDP) + U1 \quad \ldots\ldots\ldots\ldots\ldots\ldots (E.01)$$

$$LGDP = \alpha_2 + \beta_2(LEXP) + U2 \quad \ldots\ldots\ldots\ldots\ldots\ldots .. (E.02)$$

$$LEXP = \alpha_3 + \beta_3(LGDPC) + U3 \quad \ldots\ldots\ldots\ldots\ldots\ldots (E.03)$$

$$LGDPC = \alpha_4 + \beta_4(LEXP) + U4 \quad \ldots\ldots\ldots\ldots\ldots\ldots (E.04)$$

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WhereUi's, represents the error terms for different regressions which become basis for our tests of cointegration. To confirm the presence of long run relationship we apply ADF test on Ui's, results of which are presented in table (02);

Table (02)

Null Hypothesis: Ui has a unit root			
Residual	Test statistic	p-value	Result
U1	-2.5024*	0.014	Stationary
U2	-2.1774**	0.030	stationary
U3	-2.222*	0.027	stationary
U4	-1.726	0.078	stationary(at 7.8%)

Above results reveal that although variables under consideration are I(1) but residuals obtained from their regression are stationary implying the presence of long run relationship between expenditure on one side and GDP or GDP per capita on other side. Although for equation (E.04) residual is stationary at relatively higher level of significance but considering the fact that residual for (E.03) is stationary and involves the same two variables one could think of presence of long run relationship between expenditure and per capita GDP.

Step 2:

In this step following error corrections were estimated

$$\Delta LEXP = \alpha_0 + \varphi_1 EC^1_{t-1} + \sum_{i=1}^{i=m} \alpha_i \, \Delta LGDP_{t-i} + \sum_{j=1}^{j=n} \pi_j \, \Delta LEXP_{t-i} + \varepsilon_1 \quad \ldots(\mathbf{E.5})$$

$$\Delta LGDP = \alpha_0 + \varphi_2 EC^2_{t-1} + \sum_{i=1}^{i=m} \alpha_i \, \Delta LGDP_{t-i} + \sum_{j=1}^{j=n} \pi_j \, \Delta LEXP_{t-i} + \varepsilon_2 \quad \ldots(\mathbf{E.6})$$

$$\Delta LEXP = \alpha_0 + \varphi_3 EC^3_{t-1} + \sum_{i=1}^{i=m} \alpha_i \, \Delta LGDPC_{t-i} + \sum_{j=1}^{j=n} \pi_j \, \Delta LEXP_{t-i} + \varepsilon_3 \quad \ldots(\mathbf{E.7})$$

$$\Delta LGDPC = \alpha_0 + \varphi_4 EC^4_{t-1} + \sum_{i=1}^{i=m} \alpha_i \, \Delta LGDPC_{t-i} + \sum_{j=1}^{j=n} \pi_j \, \Delta LEXP_{t-i} + \varepsilon_4 \quad (\mathbf{E.8})$$

The number of lags for each equation was chosen using AIC criteria and important results from this as required in step third are summarised in table (03)

Table (03)

Equation no.	Error correction term coefficient	P value
E.5	-0.27707	0.0031
E.6	0.08114	0.4530
E.7	-0.1953	0.0023
E.8	-0.0394	0.6440

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From table results it is clear that only in equations wherein l differenced expenditure appears as the dependent variable, coefficients of error correction term have right sign and they are also significant. This indicates speed of adjustment towards long run equilibrium in these cases. Also in these equations significance of the error correction coefficient could be taken as indication of GDP and GDPC acting as long run driving forces for expenditure, keeping in view the fact that error correction term contains some element of explanatory variable also. Hence from above we could conclude that in case of India, data supports the Wagner's law wherein long run GDP growth pulls up the public expenditure. To further confirm these results we apply the Granger causality test also the results of which are presented in table (04) below;

Table (04)

Null Hypothesis:	F statistic	P value
LGDP does not Granger Cause LEXP	3.34686	0.0298
LEXP does not Granger Cause LGDP	0.23691	0.9142
LGDPC does not Granger Cause LEXP	3.15754	0.0364
LEXP does not Granger Cause LGDPC	0.35372	0.8384

Pair wise Granger causality test (Lags=4, No. of observations =29)

These results further reaffirm our previous results that causality runs from GDP/GDPC to total expenditure, thereby implying Wagner's law holds in case of Indian economy.

With causality having been established we now focus on equations E.01 and E.03 only as they represent the right regression forms as per our causality results .To have better estimates for these as per Engel-Yoo three step method we carry out the third step estimates as follows

Step 3*:*

The equations estimated in this step are

$$\varepsilon 1 = a1+b1(C1LGDP)\ t\text{-}1+v1 \qquad \text{.....(E.9)}$$
$$\varepsilon 3 = a2+b2(C3LGDPC)\ t\text{-}1+v2 \qquad \text{.....(E.10)}$$

where CILGDP and C3LGDPC represent the scaled values of explanatory variables in equations E.01 and E.03, respectively scaled by coefficients of error correction terms in equations E.05 and E.07.The estimated coefficients of these equations are given in table(05).

Table (05)

a1	**a2**	**b1**	**b2**
0.213465	0.119974	-0.052819	-0.061358

As suggested by Engel –Yoo corrected long term elasticities will be given by $\alpha_0 = \alpha_1 + a_1$ and $\beta_0 = \beta_1 + b_1$ for both these equations making the necessary calculations our final equations will be represented as

$$\text{LEXP} = -17.6906 + 2.0257(\text{LGDP}) \qquad (\text{E. 11})$$
$$\text{LEXP} = -16.968 + 2.883(\text{LGDPC}) \qquad (\text{E.12})$$

As is clear the coefficients representing elasticities in both the cases are greater than one, confirming the Wagner's Law as required conditions are fulfilled for specifications choosen. The residuals from these equations were further tested for stationarity which confirmed the presence of long run relationship with these elasticity values.

VI. CONCLUSION

In this paper cointegration and causality tests were applied to test the long run relationship between public expenditure and GDP using annual data from 1980-81 to 2012-13 pertaining to Indian economy. Stationarity tests established that all variables under consideration are integrated of order one. Using Engel-Yoo three step cointegration method it was found that cointegration exists between GDP and public expenditure. Error Correction Models established a right sign for coefficients of error correction terms. However, causality inferences of error correction coefficients and Engel Granger causality supported unidirectional causality from GDP/GDPC to public expenditure and not the other way around. Thus Wagnerian causality is supported in contrast to Keynesian view which predicts direction of causality from public expenditure to GDP. Keynesian hypothesis seems not to be supported by actual behavior of these variables in Indian context for specified period. The empirical evidence suggests two important things. First, as suggested by elasticity values in equations E.11 and E.12 (2.0257 and 2.883), that public expenditure in national economy has increased at a higher rate with the progress of Indian economy. Second, as suggested by failure of Keynesian Causality, that government expenditure has not turned out to be an effective policy instrument for fostering economic growth. Thus government should strive to channelise the public expenditure in a productive manner so as public expenditure could effectively be transformed into higher GDP for Indian economy. Hence ,as evidenced in India while on one hand increased GDP and GDP per capita fosters in higher role for Government, on the other hand increased government expenditure is not effective in increasing the national output. This is worrisome and indicates inefficiency of public expenditure and thus making fiscal policy a weak policy instrument in India that may not prove good for health of Indian economy in long run. Further, this study paves way for a much broader study and deeper understanding in this aspect by involving more variables and by focusing on composition of public expenditure and taking disaggregated data for analytical purpose.

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