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THE RELATIONSHIP BETWEEN PUBLIC EXPENDITURE AND ECONOMIC GROWTH: A STUDY IN THE INDIAN CONTEXT

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Abstract:
In the empirical assessments of testing for bi-directional causation between government expenditure and economic growth in underdeveloped nations, the little emphasis has been paid and particularly, there is a diminutive prominence in India to scrutinize Wagner's Law using standard econometric approaches such as cointegration and causality analysis. The empirical findings, based on the error-correction model estimates, show that both in the short and long runs, one-way causation exists between economic growth and public expenditure, validating Wagner's rule of public expenditure. The current analysis reveals that government spending is ever-increasing and prominently faster than the economy's real income, confirming Wagner's law in the instance of India.

Keywords: Public Expenditure, Economic Growth, Cointegration Analysis, Error Correction Model.
JEL Classification: C32, C52, E62, H10, H50

1. Introduction

On the relationship between public spending and national income, there are two approaches which can be expressed in terms of Wagner's law and the Keynesian hypothesis and, these two propositions formed the basis for more complex analytical modeling and empirical analysis on growth process. According to Wagner (1883), as economic growth increases, government activities tend to expand in the long run and subsequently government spending moves upward in increasing order many fold. Keynesian hypothesis states that there is an exogenous policy tool that causes changes in aggregate real production in the short term.

Cross-section analyses which were employed in the bulk of empirical studies[1] to examine the influence of government spending on long-run economic growth, the most prevalent findings, show that government spending harms economic growth. However, cross-country growth regressions ignore country-specific factors and do not capture the dynamism of the association between these two variables. As a result, a test of Wagner's Law should focus on the time-series behaviour of public expenditure in a nation over as long a public expenditure as feasible, rather than a cross-section of countries at various income levels, as Henrekson (1992) suggests. "Another flaw in these studies is that the researchers interpreted a significant coefficient of the measure of government expenditure as proof of causality from government spending to economic growth (only the Keynesian view), when in fact, this equation can be equally compatible with the Keynesian view of Wagner's law (causality from growth to government expenditure) as well as a bi-distribution of causality."

Typical growth regressions focus on the long run correlation between these two variables rather than the direction of causality. Some empirical studies have recently begun utilizing time-series

data to test for bi-directional causation, although they have primarily focused on wealthy nations. In empirical assessments of the testing for bi-directional causation between government expenditure (GE) and economic growth (G) in underdeveloped nations, little emphasis has been paid. Particularly, studies in India which examine Wagner's Law using standard econometrics approaches such as cointegration and causality analysis are rare.

2. Literature review

Various empirical researches on the link between government spending and economic growth have produced contradictory conclusions. Some studies looked at the link between total public spending and economic development, while others have rapt on specific expenditure components, such as public investment (PUI), education, or health spending, or their components, and economic growth. Some evidences do suggest that the increased government spending on socio-economic and physical infrastructure influences long-term growth rates. For example, spending on infrastructure, such as roads and power, lowers production costs while increasing private sector investment and firm profitability, assuring economic development[2]. On the other hand, findings that increased government expenditure, which is primarily non-productive, is followed by a decrease in real income growth which has countenanced the notion that the larger the government involvement, the more detrimental the influence on economic growth[3]. Jiranyakul and Brahmasrene (2007) used the Standard Granger causality test and the OLS technique to analyze the link between government spending and economic development in Thailand from 1993 to 2006. The findings revealed one-way causation between government spending and economic growth with no feedback. Furthermore, estimates from the OLS indicated that government spending had a substantial beneficial influence on economic growth during the investigation period.

Alexiou (2009) conducted a survey study using pooled time series & cross-section data for seven countries in Southeast Europe from 1995 to 2005. Five variables were used in the estimation; government spending as a dependent variable on capital formation, development assistance, Private investment, and a proxy for trade openness. All of these factors have a positive and substantial impact on economic growth, but population increase is statistically negligible. Olukayode (2009) used time-series data from 1977 to 2006 to study the effects of government spending on economic development in Nigeria. Government spending was disaggregated into Private investment, human capital investment, government investment and consumption spending at absolute levels. All of the expenditures have a favourable impact on economic growth, according to the findings.

For the period 1972-2009, Shahid et al. (2013) attempted to investigate the role of subcategories of government spending in Pakistan. They demonstrated that the coefficient of development spending has a favourable impact on economic growth using the ARDL model. It also backs up the public capital theory, which claims that public and private investments are mutually beneficial. The findings also revealed that current spending has little impact on economic growth. Vu Le and Suruga (2005) used the fixed effects model and threshold regression techniques to examine the simultaneous influence of PE and FDI on economic development in a panel of 105 developing and developed countries from 1970 to 2001. Their major findings were divided into three categories; foreign direct investment, governmental capital, and private investment, and all contribute to economic growth. Second, public non-capital expenditure has a negative influence on economic growth, and third, excessive public

capital expenditure might stifle FDI's positive impacts. Taban (2010) used the limits testing technique and the MWALD Granger causality test to investigate the link between government expenditure and economic growth from 1987 to 2006. The author discovered that the proportion of both government expenditure and investment to GDP had a long-term negative influence on economic growth.

Ram (1986) used cross-section and time series data to examine "the relationship between government spending and economic development for a sample of 115 nations from 1950 to 1980, and found that government spending had a positive impact on economic growth. Bose et al. (2003) used the Seemingly Unrelated Regression method to look at the impacts of government spending for a panel of 30 developing nations throughout the 1970s. Except for recurrent spending, which is negligible, their findings indicated that the percentage of government capital expenditure to GDP is positively and strongly associated with economic growth."

Dilrukshini (2002) used the Johansen co-integration approach and the Granger causality test to examine the link between public spending and economic development in Sri Lanka from 1952 to 2002. According to the author, "Evidence of cointegration is only sufficient to establish a long-run relationship between public expenditure and income as suggested by Wagner (1883). However, to support Wagner's law it would require unidirectional causality from income to public expenditure. Therefore, cointegration should be seen as a necessary condition for Wagner's law, but not sufficient. Hence, conditional on cointegration results, it is necessary to look at the causality properties of the models. Using the Granger causality test and Sri Lankan time series aggregate data, the study found no empirical support either for the Wagner's Law or the Keynesian hypothesis." For Egypt, Israel, & Syria, Abu & Abu (2003) used a multivariate co-integration and variance decomposition technique to investigate the causal link between government spending and economic development. The authors found a bi-directional (feedback) and long-run negative connection between government expenditure and economic growth in the bivariate framework. Furthermore, the causality test in the trivariate framework (which includes the share of government civilian expenditures in GDP, military burden, and economic growth) revealed that the military burden hurts economic growth in all countries, whereas civilian government expenditures have a positive impact on economic growth in only Israel & Egypt."

In the 1970s & 1980s, Niloy et al. (2003) utilized a disaggregated method to study the impact of public expenditure on economic development in 30 developing nations. The authors found that the percentage of government capital spending in GDP has a substantial positive relationship with economic growth, but that the share of government recurrent expenditure in GDP has no effect on economic growth. Government investment and education spending is the only variables at the sectoral level that have a substantial impact on economic development, especially when budget constraints and omitted variables are taken into account.

Some studies revealed conflicting results when it came to the impact of government spending on economic growth. For example, "Donald and Shuanglin (1993) looked at the impacts of various types of spending on economic growth for a sample of 58 nations. Their studies revealed that government expenditures on education and defense have an advantageous impact on economic growth, whereas welfare spending has a negligible negative impact. Belgrave and Craigwell (1995) used Engle and Granger co-integration approach to analyze the influence of government expenditure on economic development in Barbados from 1969 to 1992,

disaggregating the level of GE into functional & economic categories. Their findings indicated that capital investment, agricultural, housing & community, road, communication, & health expenditures all had a valuable impact on economic growth. The impacts of education and recurrent expenditure, on the other hand, are negative. Deverajan et al. (1996) used Ordinary Least Squares to examine the mix of public expenditure and economic development for a panel of 43 developing nations from 1970 to 1990. According to their findings, "increasing the percentage of recurring spending has positive and statistically significant growth benefits, whereas capital as a component of public expenditure has a negative influence on economic growth. These findings suggest that developing country governments have been misallocating public spending in favour of capital expenditures at the expense of ongoing expenditures, according to the research."

The body of knowledge on a variety of topics has been enormous. However, a few attempts have been undertaken to investigate the impact of public expenditure composition on economic growth for a given nation. In addition, the majority of the research looked at the connection using panel data from a group of developing nations. Apart from this, the majority of empirical studies used bivariate models and traditional econometric approaches. As a result, it is deemed important in the current background to revisit the question of public expenditure composition and its link with economic growth for a growing country like India. In addition, the current study investigates the influence of a few control factors in a multivariate situation.

3. Trends in Public Expenditure in India

3.1 Trends in Total Public Expenditure

The preamble of India's constitution mentions socialism and the Government of India has worked tirelessly since independence to build a welfare state and, it is observed that there is a rising tendency in overall expenditure by both state and central governments in absolute terms. The following figure 1 shows the trends in public expenditure in India.

The two trend lines depict state & federal government tendencies. It can be observed that public spending has increased substantially over the previous decade & has begun to trend higher. During this decade, government spending has increased at a rapid rate & has begun to take on a vertical structure. It is important to note that the curvature of the absolute values of expenditures becomes somewhat exponential, without taking in to account the rate of change, clearly indicating a naïve evidence for Wagner's Law. But this has to be substantiated with proper econometric analysis and subsequently the estimates will have to speak on technical side of the story.

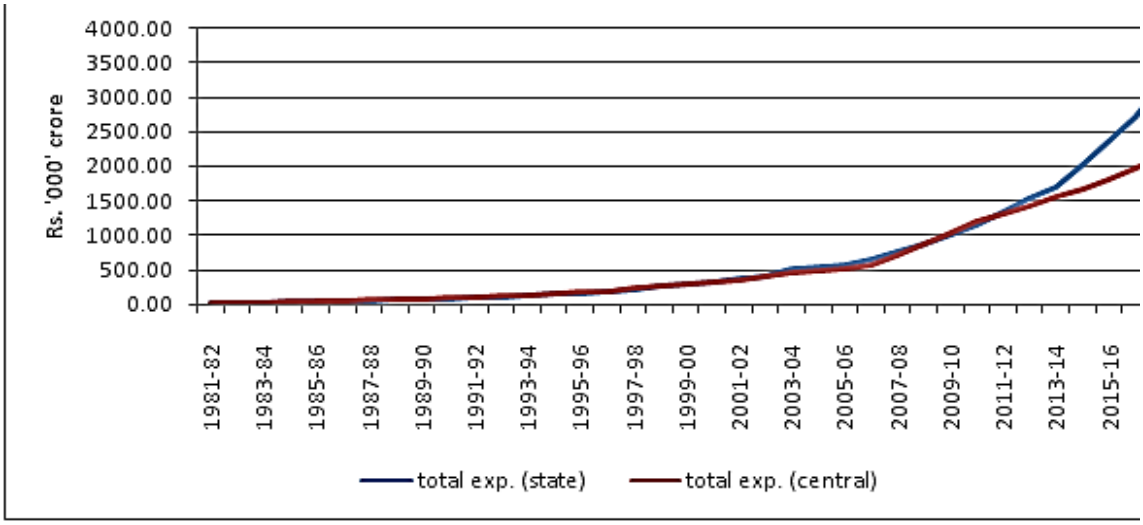

Figure 1: Trends in public expenditures in India from 1981 to 2015
Source: Budget Documents of State & Central governments of India

The state's public spending was 25.17 lakhs crores in 1981-82, grew to 28.74 lakh crores in 1982-83 with a 14.19 percent growth rate, and then fluctuated to 159.15 lakhs crores with an 18.90 percent growth rate in 1994-95. In 2003-04, it was 514.30 lakh crores, with a growth rate of 25.36 percent. However, it was 561.68 lakh crores in 2005-06, with a growth rate of 1.49 percent. The overall public spending in 2018-19 was 3559.73 lakh crores, up 12.03 percent from the previous year. From 1981-82 to 2015-16, the total state public expenditure rose at a rate of 13.92 percent. The federal government of India's public spending was 25.27 thousand crores in 1981-82, and it rose by 20.38 percent to 279.34 thousand crores in 1998-99. The growth rate of total central public expenditure has shown a broad range of fluctuations. In 2015-16, it was 2457.24 lakh crores, up 14.72 percent over the previous year. Between 1981-82 and 2015-16, however, it rose at a rate of 12.80 percent. In 1981-82, the ratio of total public expenditure to GDP was 14.37 percent, which rose in the 1980s before beginning to fall. Except for a few years, it was about 13 to 14% of GDP. In the fiscal year 2018-19, government spending accounted for 12.93 percent of GDP.

3.2 Trends in Developmental and Non-Developmental Expenditure

The patterns in state and federal government development and non-development spending are comparable to the changes in overall public spending. In 1990-91, the state spent 63.37 lakh crores and the national government spent 58.65 lakh crores on development, while the state spent 22.60 lakh crores and the central government spent 49.35 lakh crores on non-development. Development spending has risen throughout time, reaching 205.67 thousand crores for the state and 139.39 crores for the national government in 2000-01. In 2000-01, state & central government non-development expenditures were 116.82 & 197.42 thousand crores, respectively. The general trends in all the expenditure items have been somewhat exponentially upwards and this indicates persistent rise in the government activities. Particularly, the raise in the non developmental expenditure has been alarmingly phenomenal owning to various reasons including that of political economy commitments and partially due to administrative expenditures.[4]

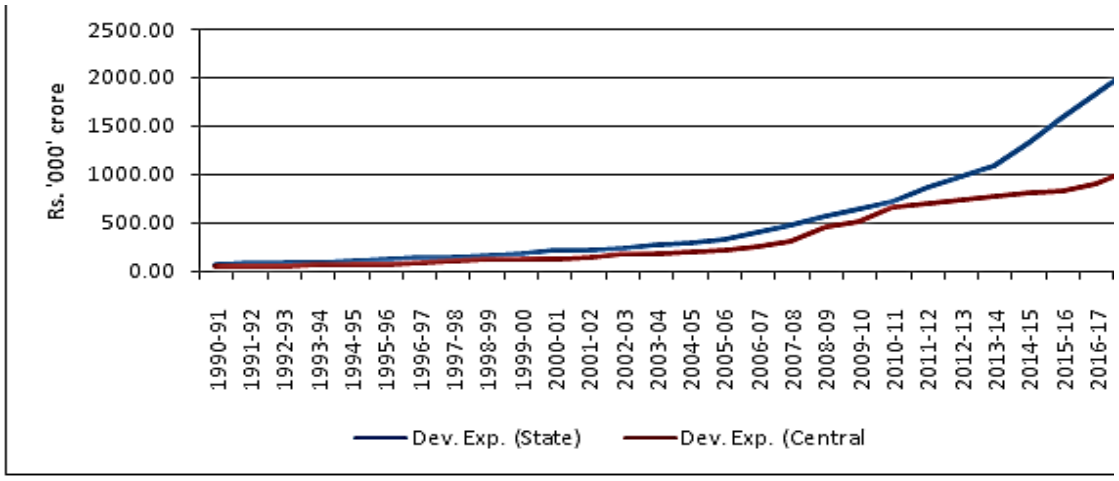

Figure 2: Trends in Developmental Expenditures by both State and Central Governments; From 1990-91 to 2016-17.

Source: Ibid.

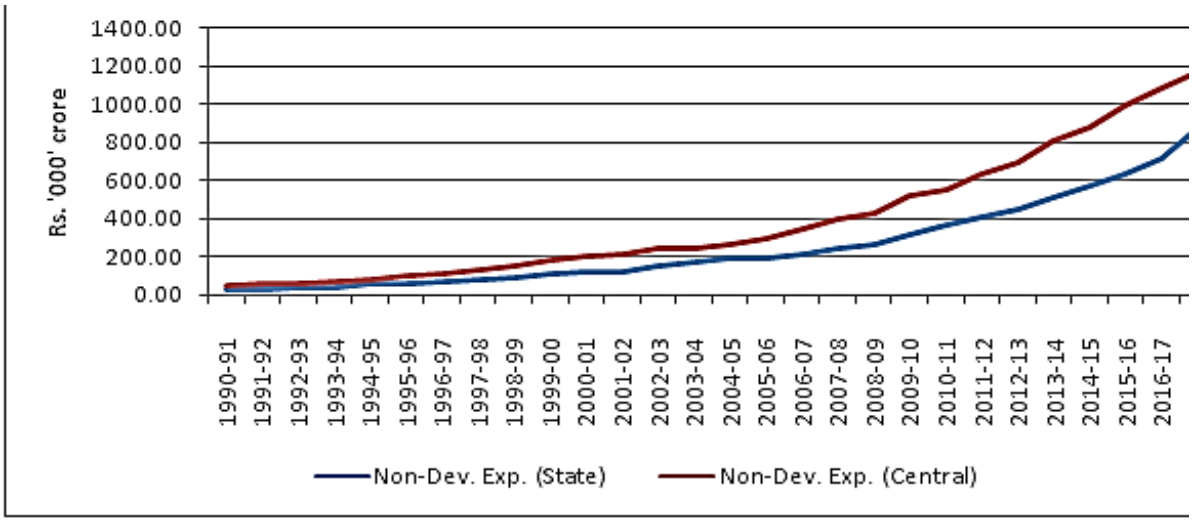

Figure 3: Trends in Non-Development expenditure by state & central government from 1990-91 to 2016-17.

Source: Ibid.

Finally, state & central government development expenditures in 2016 were 2290.51 and 1146.83 thousand crores, respectively, whereas non-development expenditures were 986.37 and 1295.39 thousand crores. From 1990 to 2016, the CAGR of development and non-development spending for the state and federal governments was 13.17 percent and 10.80 percent, respectively. Both for state and federal government developments, the non-development spending growth rates have been highly volatile over time.

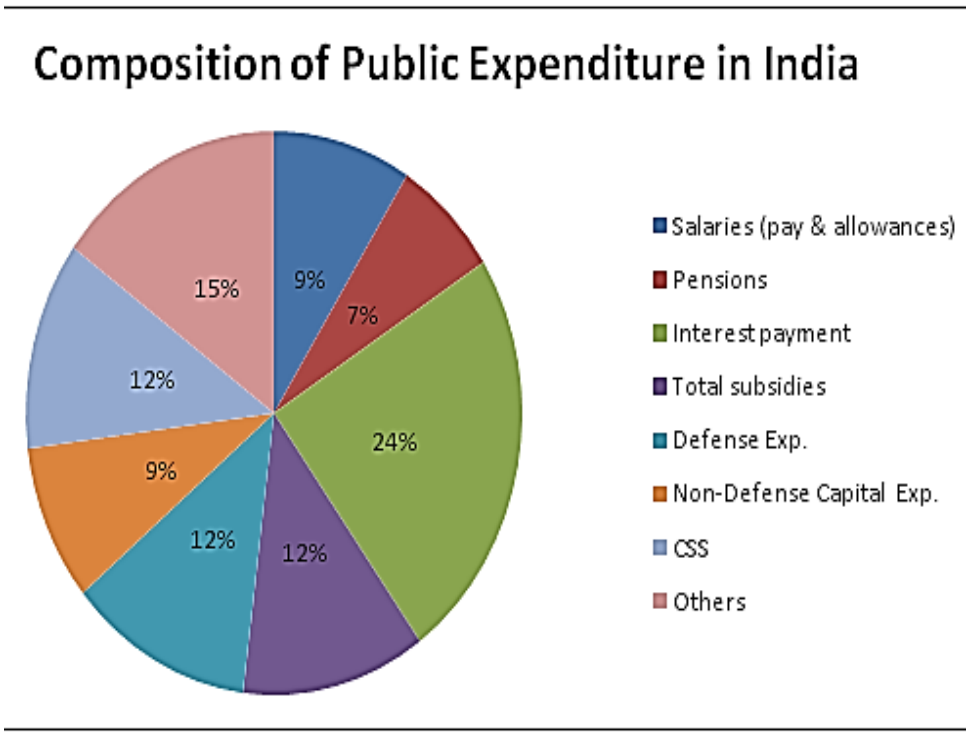

Figure 4: Composition of public expenditure in India.
Source: Union Budget Documents, Estimates for 2015-16.

The above pie chart shows that the defense expenditures, subsidies, interest payments and pension put together constitutes almost 50 percent of total expenditures which clearly indicate non developmental side of the story ultimately contributing to the price heating mechanism.

4. Methodology

The causal relevance between public expenditure and economic growth in India is properly investigated by using Johansen's (1988) cointegration method and the appropriate representation of vector error correction model is planned to estimate to gauge the time series dynamics. It is important to test the stationarity of stochastic process before setting op cointegration analysis. To determine if the series was stationary, the Augmented Dickey-Fuller (1979) model is used. If the series are non-stationary in terms of levels but stationary in terms of differences, then there's a probability of a cointegration relationship between them, which can demonstrate the presence of long-term equilibrium. Accordingly the long-run association is investigated within the framework of Johansen's Cointegration technique. Furthermore, the causal link between GDP and government spending was explored by estimating the following Vector Error Correction Model (VECM);

$$\Delta \boldsymbol{X_t} = \sum_{i-1}^{p-1} \boldsymbol{\tau_i} \Delta \boldsymbol{X_{t-1}} + \in_t;\ \ \in_t | \Omega_{t-1} \sim \boldsymbol{distr}(\mathbf{0}, \boldsymbol{H_t}) \qquad (1)$$

Where;

X_t is the 2x1 vector consisting of PE_t, and G_t of log PE (public Expenditure) and log G (Gross Domestic Product) respectively, and "Δ" denotes the first difference operator, ε_t is a 2x1 vector of innovations (ε_{PEt} & ε_{Gt}) that follow unspecified conditional distribution with mean zero and

time-varying covariance matrix H_t. The vector error correction model specification contains information on both the short-and long-run adjustments to changes in X_t via the estimated parameters Γ and Π respectively.

"There are two likelihood ratio tests that can be employed to identify the co-integration between two series. The variables are cointegrated if and only if a single cointegrating equation exists. The first statistic is λ_{trace} tests which examines the number of cointegrating vectors is zero or one, and the other is λ_{max} tests and subsequently this analyses whether a single cointegrating equation is sufficient or if there are more which are present. In general, if "r" cointegrating vectors are correct, then test statistics can be constructed by contextualizing on the Maximum Likelihood framework", as under;

$$\boldsymbol{\lambda_{trace}(r) = -T\sum_{i=r+1}^{n} \ln\left(1-\bar{\lambda}_i\right)} \quad \textbf{(2)}$$

$$\boldsymbol{\lambda_{\max}(r, r+1) = -Tln(1-\bar{\lambda}_{r+i})} \quad \textbf{(3)}$$

"Where λ_i are the eigenvalues obtained from the estimate of the Π matrix and *T* is the number of usable observations. The λ_{trace} tests the null that there are at most "r" cointegrating vectors, against the alternative that the number of cointegrating vectors is greater than "r" and the λ_{max} tests the null that the number of cointegrating vectors is r, against the alternative of "r+1". Critical values for the λ_{trace} and λ_{max} statistics are provided by Osterwald-Lenum (1992)."

"Johansen and Juselius (1990) showed that the coefficient matrix Π contains the essential information about the relationship between PE_t and G_t. Specifically, if rank(Π) = 0, then Π is 2 by 2 zero matrices implying that there is no cointegration relationship between PE_t and $G_{t,t-n}$ In this case the vector error correction model reduces to a VAR model in first differences. If Π has a full rank that is rank (Π) = 2, the null variables in X_t are (0) and the appropriate modeling strategy is to estimate a VAR model in levels. If Π has a reduced rank, that is rank (Π) = 1, then there is a single cointegrating relationship between PE_t and G_t prevails, which is given by any row of matrix Π and the expression Π X_t. In this case, Π can be factored into two separate matrices α and ß' both of dimensions 2x1, where 1 represents the rank of Π, such as Π = αß' where ß' represents the vector of cointegrating parameters and α is the vector error-correction coefficients measuring the speed of convergence to the long-run steady state."

If government spending and GDP are cointegrated, then causation must exist in at least one direction (Granger, 1988). Granger causality can determine whether two variables move sequentially or concurrently. When they move at the same time, none gives information to characterize the other. If changes in X induce changes in Y, then changes in X should come first. Consider Equation (1)'s vector error correction model specification, which may be expressed as follows:

$$\Delta \boldsymbol{PE_t} = \sum_{i-1}^{p-1} \boldsymbol{a_{PE,i}} \Delta \boldsymbol{PE_{t-i}} + \sum_{i=1}^{p-1} \boldsymbol{b_{PE,i}} \Delta \boldsymbol{G_{t-i}} + \boldsymbol{\alpha_{PE} Z_{t-1}} + \in_{\boldsymbol{PE,t}} \quad \textbf{(4)}$$

$$\Delta \boldsymbol{G_t} = \sum_{i-1}^{p-1} \boldsymbol{a_{G,i}} \Delta \boldsymbol{PE_{t-i}} + \sum_{i=1}^{p-1} \boldsymbol{b_{G,i}} \Delta \boldsymbol{G_{t-i}} + \boldsymbol{\alpha_G Z_{t-1}} + \in_{\boldsymbol{G,t}} \quad \textbf{(5)}$$

"Where $\mathbf{a_{PE,i}}$, $\mathbf{b_{PE,i}}$, $\mathbf{a_{G,i}}$, $\mathbf{b_{G,i}}$, are the short-run coefficients, $\mathbf{z_{t-1}=ß'X_{t-1}}$ is the error- correction term which measures how the dependent variable adjusts to the previous period's deviation from long-run equilibrium from equation (1), and $\boldsymbol{\varepsilon_{PE,t}}$ and $\boldsymbol{\varepsilon_{G,t}}$ are residuals."

"In the above equations of Vector Error Correction Model, the unidirectional causality from Gross Domestic Product (G) to (PE) Public Expenditure (GDP Granger causes PE) requires:

(i) that some of the $b_{PE,i}$ Coefficients, I = 1,2, ...,p-1, are non-zero and/or (ii) $\boldsymbol{\alpha_{PE}}$, the error-correction coefficient in Equation (4), should be significant at conventional levels. Similarly, unidirectional causality from PE to Gross Domestic Product (PE Granger causes GDP) requires: (i) that some of the $a_{G,\,i}$, coefficients, i = 1, 2, p-1, are non-zero and/or (ii) $\boldsymbol{\alpha_G}$ is significant at conventional levels. If both variables Granger cause each other, then it is said that this gives to raise two-way feedback relationship between PE_t and G_t[5]. The hypotheses can be tested by applying Wald tests on the joint significance of the lagged estimated coefficients of PE_t and G_t When the residuals of the error-correction equations exhibit heteroskedasticity, the t-statistics are adjusted by White (1980) heteroskedasticity correction."

5. Results & Discussion

The stationarity of GDP and public expenditure was tested using the Augmented Dickey-Fuller test (ADF). Table 1 summarizes the findings. When the initial differences are utilized, the test indicates that both variables become stable, indicating that they have unit roots. To put it another way, Table 1: shows that both variables, public expenditure and GDP, are inter twined.

Table 1: Augmented Dickey-Fuller test for unit roots

Sl. No.	Variables	Constant	Constant & Trend	Without constant & Trend
I	Levels			
1	lnG_t	0.742	-1.329	0.845
2	$lnPE_t$	-1.352	-1.571	1.735
II	First Difference			
1	ΔlnG_t	-3.061**	-4.379*	-4.367**
2	$\Delta lnPE_t$	-4.885*	-4.829*	-3.386*

Notes: PE and G are the Public Expenditure and Gross Domestic Product, respectively. * and **indicate significance at one and five percent levels, respectively. Optimal lag length is determined by SIC and AIC.

The long-run equilibrium between public expenditure and GDP was examined through Johansen's cointegration test, and the findings of which are shown in table 2.

Table 2: Johansen cointegration test estimates

H_0	H_1	Eigen Value	95% CV λ_{trace} test	99% CV λ_{trace} test	Trace Statistics
r = 0	r ≥ 1	0.8204	32.006*	19.96	26.42
r ≤ 1	r ≥ 2	0.3761	6.340	9.24	10.85
			λ_{max} test	λ_{max} test	
r = 0	r = 1	0.2879	25.666*	15.67	24.58
r = 1	r = 2	0.1327	6.340	9.24	9.55

Notes: * - indicates significance at five percent level. The significance of the statistics is based values obtained from Osterwald-Lenum (1992).

The "r" is the number of cointegrating vectors. **Ho** represents the null hypothesis of the presence of no cointegrating vector and $\mathbf{H_1}$ represents the alternative hypothesis of the presence of cointegrating vector. At the 5% significance level, Johansen's cointegration test rejects the null hypothesis of no co-integration. As a result, it may be argued that GDP and government spending are cointegrated or move together in the long run.

Table 3: Normalized cointegrating coefficients for dependent variable PE

Variables	Cointegration vector	t-statistics
G	3.205	6.852* (0.437)
C	8.612	3.882* (0.018)

Notes: ** indicates* significance at1%level (Standard error in parentheses).
PE and G are the Public Expenditure and Gross Domestic Product respectively.

The calculated cointegration equation is shown in Table 3 and is normalized to the natural log values of public expenditure on GDP. According to the estimates, India's GDP and public expenditure have a statistically consequential positive connection. If there is evidence of cointegration between two or more variables, the Granger Representation Theorem states that a suitable error correction model exists between the two variables. Table 4 shows the results of the estimated vector error correction model.

Table 4: Vector error correction model estimates

Independent Variables	Dependent Variables	
	ΔPE_t	ΔG_t
C	-0.562 (-0.864)	-0.773 (0.438)
ΔPE_{t-1}	0.537 (1.840)	-0.438 (-0.945)
ΔPE_{t-2}	0.034 (0.651)	-0.021 (-0.879)
ΔG_{t-1}	-0.843 (-3.560)**	0.458 (4.873)*
ΔG_{t-2}	-0.342 (-1.846)***	0.053 (1.024)
Z_{t-1}	-0.647 (-4.533)*	0.234 (0.437)
R^2 **Wald F-Statistics**	0.76 7.653*	0.38 1.765

Notes: 1. Optimal lag length is determined by the SIC and AIC
2. PE and G are the Public Expenditure and Gross Domestic Product, respectively.

3. Parenthesis shows t-statistics.
4. *, ** & *** denote the significance at the one, five and ten per cent level, respectively.

The error correction term in expenditure equation is found to be negative and significant at the one percent level. This means that in the short run, the cointegrated variables move out of equilibrium path, and it is the public expenditure that adjusts the most to re-establish equilibrium. In other words, in the long term, GDP leads to governmental spending. Furthermore, the lagged GDP variable in the expenditure equation is significant, implying that GDP precedes public expenditure. In the short run to medium run, this indicates a substantial correlation between GDP and government spending. Overall, the empirical findings show that there is a one-way causal link between economic development and public spending, both in the short and long run. The insignificant expenditure coefficients and estimated error correction parameter of growth equation reconfirms fact that public expenditure does not lead to growth.

6. Conclusion

The goal of this study is to use a cointegration method and an error correction model to explore the causal relationship between public expenditure and economic growth in India. The research was conducted during the period between 1995 & 2016. The outcome of the cointegration analysis indicates that there is a long-run equilibrium link between government spending and economic growth in India. The empirical findings, based on the error-correction model estimates, show that in the short and long term, one-way causation exists between economic growth and public expenditure, validating Wagner's rule of public expenditure. The current analysis shows that government spending is increasing faster than the economy's real income, confirming Wagner's law in the instance of India. This is mostly due to an increase in non-developmental and revenue expenditures such as subsidies, interest payments, administrative, and defense services. As a result, the Indian government must examine various components of non-developmental spending and place a greater focus on developmental projects and activities.

Notes:

1. For More details, one can refer to Abizadeh and Yousefi (1998), Abu and Abdulahi (2010) and Magazzino (2010).
2. Afxentiou and Serletis (1996) examined in demonstrating whether growth convergence has taken place through fiscal actions or wagner’s rule prevailed and Detailed analysis can also be had from Mamatzakis (2001), Niloy, Emmanuel and Denise (2003)
3. Ghali (1999) study used multivariate cointegration techniques and attempted to model the dynamic interactions between government size and economic growth in a five variable system consisting of the growth rates of GDP, total government spending, investment, exports, and imports. According to him, “(i) Government size Granger-causes growth in all the countries with some disparities concerning the proportion by which government size contributes to explaining future changes in the growth rates. An innovation shock at the growth rate of government size generates a permanent effect on the growth rate of GDP that, for some countries, reaches from 26% to 60% of the total change in growth: (ii) Government size also Granger-causes investment and international trade and, for some countries government size Granger-causes growth indirectly either through investment or the trade variables; and (iii) In almost all

countries, international trade and investment generate permanent effects on growth. In particular we found that exports and imports do not have the same effects on growth as is the case in cross-country growth models."

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5. The detailed perspectives can be found from Bose, Haque, and Osborn (2003).

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