# Nexus between Government Expenditure and Economic Growth in the Indian Economy

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***Abstract*—** The study is an empirical examination into the relationship between the Government Expenditure and Gross Domestic Product of the Indian economy. Taking quarterly data for the years post liberalization, the study tries to examine the validity of the Keynesian and the Wagner's hypothesis in the Indian framework. Applying the Johansen Co-integration test along with the Granger causality test to check the long and short run phenomena respectively, the study concluded that only Keynesian hypothesis is valid for the Indian economy over the period of study; however, there exists bi-directional causality between the two variables.

***Index Terms*—** bi-directional causality, Government expenditure Johansen Co-integration test, Wagner's hypothesis

## I. Introduction

There has been an age-old debate about the relationship between the two important macro variables, namely: Economic Growth and Public Expenditure for any economy. Going by economic theory, [2] proposed in his law of increasing state activity that as economic activity increase and grows, public expenditure increases in the same manner. However, [1] had come up with his theory stating that government expenditure is a very vital component towards boosting the total economic growth of a country.

This topic, though discussed in many other research papers holds great significance for the fact that the two variables are highly related especially in a dynamic open macro-economy like that of India. In times of recession, government needs to pursue an expansionary fiscal policy to boost the economy. Alternatively, the government needs to find the right benchmark to manage their expenditures so that the Debt to Gross Domestic Product ratio can be kept at a check.

Given that the Indian economy is trying to push its growth rate and match up with China, the debt to GDP ratio is one of the highest as compared to the BRICS nation. Since liberalization, the Indian economy has been quite resilient relatively as compared to the other economies in spite of economic downturns worldwide, and hence this study is motivated by the current economic situation in the Indian economy, and intends to study the pattern and movement of these two variables post liberalization.

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## II. Literature Review

Reference [20] studied the empirical examination of Wagner's law across 34 countries. Taking annual time series observations, it concluded that most of the countries did not follow Wagner's law.

Reference [3] studied the validity of both Keynesian and Wagner's law for both an aggregated and a disaggregated level. The study concluded that the causality between the two variables in neither Keynesian nor Wagner in nature. Similarly, [4] failed to detect any causality between public expenditure and national income for the United States. Reference [5] and [21] conducted cross-country analysis and both studies do not found any evidence of Wagner's law. Similarly, [6] found no evidence for the proposition

There is a strand in literature that examined the validity of Wagner's and Keynesian hypothesis [22-24], however there is no common pattern in the empirical results. Reference [9] investigated the relationship between spending and economic growth in Saudi Arabia during 1964-1995 by using co-integration approaches and Granger causality tests. He found evidence indicates support of Wagner's law and Keynesian hypothesis. Finally, he suggested that the country has to reduce the government size to an optimal size by adopting a policy of privatization in order to cut the spending and the budget deficits.

Reference [8] attempted to analyze the causal link between government expenditure and national income for Northern Cyprus economy for the period from 1977 to 1996. The study showed the mixed evidence in support of Wagner's hypothesis. The study also indicates the unidirectional causality from government expenditure to national income which shows the evidence of Keynesian hypothesis of public expenditure. Reference [10] supported the Wagner's law for Dominican Republic and Sudan, respectively. In contrast, the studies of [11] for Thailand, [12] for India, [13] for Nigeria, [14] for Italy and [16] for Nigeria confirmed the validity of Keynesian law of public expenditure

Reference [17] studied the Wagner's Law for Indian economy with the use of time series data from 1970–71 to 1998–1999 along with the various econometrics tools like causality, co-integration and error correction mechanism. The study showed the long run equilibrium between public expenditure and economic growth and concluded that Indian economy supports both the hypothesis i.e. Wagnerian as well as the Keynesian hypothesis.

## III. Methodology

The following study is a time-series study using quarterly data from the year 1996 to 2014. Data has been obtained from The Federal Bank of St. Louis for the variables in this study namely: Real Gross Domestic Product (RGDP) and Government Final Consumption Expenditure (GE). Although there are five major variations of Wagner's Law in the past literature, our current study focuses on whether the Indian economy has been in tandem with the Keynesian Hypothesis or the Wagner's law.

The two main equations in the study to be tested are

$$RGDP_t = \alpha + \beta GE_t + \varepsilon_{1t} \quad (1)$$

$$GE_t = \alpha + \beta RGDP_t + \varepsilon_{2t} \quad (2)$$

The Augmented Dickey-Fuller (1979) test, [18] was employed to infer the stationary of the series. If the series are non-stationary in levels and stationary in differences, then there is a chance of co-integration relationship between them which reveals the long-run relationship between the series.

$$\Delta GE = \alpha + \beta GE_{t-1} + \sum_{i=1}^{m} \theta_i \Delta GE_{t-i} + \varepsilon_t \quad (3)$$

$$\Delta RGDP = \alpha + \beta RGDP_{t-1} + \sum_{i=1}^{m} \theta_i \Delta RGDP_{t-i} + \varepsilon_t$$

To check the relationship between the two variables, Johansen's (1988) co-integration approach and Vector Error Correction Model (VECM) has been employed to investigate the causal nexus between public expenditure and economic growth in India.

The Johansen and Juselius co-integration technique [7 & 15] is based on the following equation:

$$\Delta Y_t = \pi Y_{t-1} + \sum_{i=1}^{p} \bigcup \Delta Y_{t-i} + \mu_t$$

Where,

$$\pi = -(I - \sum_{I=1}^{P-1} A_i)$$

$$\bigcup = -\sum_{i=1}^{p} A_i$$

The long run relationship can be determined on the basis of rank (r) in the matrix $\prod$. Rank (r) zero shows the absence of co-integration and if the rank (r) ≤ (n-1) then there are (n-1) co-integration relationship exists in the model. The ranks are found with Trace and Maximum Eigen value statistics-

$$\partial_{trace}(r) = -T \sum_{i=r+1}^{k} \ln(1 - \partial_i)$$

$$\partial_{trace}(r, r+1) = -T \ln(1 - \partial_{r+1})$$

The Vector Error Correction Mechanism for the model in this study can be depicted as below:

$$\Delta GE_t = \sum_{i=1}^{p-1} \alpha_{PE,i} \Delta GE_{t-i} + \sum_{i=1}^{p-1} b_{PE,i} \Delta RGDP_{t-i} + \varphi_1 ECT_{t-1} + \mu_{GE,t} \quad (4)$$

$$\Delta RGDP_t = \sum_{i=1}^{p-1} \alpha_{RGDP,i} \Delta GE_{t-i} + \sum_{i=1}^{p-1} b_{GE,i} \Delta GE_{t-i} + \mu_{RGDP,t} \quad (5)$$

## IV. Results and Analysis

Before we apply any of the econometric tests, we check the descriptive statistics for each of the variables.

Table I: Descriptive Statistics Of The Variables

| Variable | Mean | Median | Highest Value | Lowest value |
|---|---|---|---|---|
| RGDP | 12218.05 | 8908.2 | 31769.28 | 845.08 |
| GE | 1693.30 | 1494.88 | 3096.172 | 3354.2 |

After performing the preliminary descriptive statistics, the next step is to plot the graph and check the pattern of the movement of these variables over the years. The graph for both the variables is plotted and shown in the figure below:

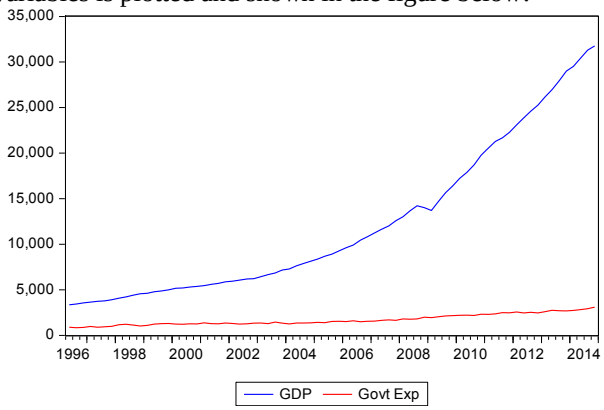


Fig1: Graph of GDP and GE from 1996 to 2014

The Augmented Dickey-Fuller test (ADF) was employed to test the stationarity of the GDP and public expenditure. The results are presented in Table 1. The test reveals that both variables become stationary when their first differences are used and it can be concluded that they have unit roots. In other words, it can be determined that both the variables- Public Expenditure and GDP- are integrated in order of one, I(1).

Table II: Results Of The Adf Test On The Variables

| **Variable** | **Constant** | **Constant and Trend** | **None** |
|---|---|---|---|
| **Level Data** | | | |
| RGDP | 4.22 | 1.63 | 5.18 |
| GE | 1.46 | 0.61 | 4.15 |
| **First Difference** | | | |
| RGDP | 0.93 | 5.96* | 0.34 |
| GE | 10.56* | 10.84* | 9.02* |

After performing the ADF test for stationarity, the Johansen test for co-integration was conducted to check for any long term relationship between the two variables in the study.

TABLE III: RESULT OF THE JOHANSEN CO-INTEGRATION TEST ON THE VARIABLES

| Null Hypo. | Alternate Hypo. | Eigen value | Trace Statistic | 95% C.I |
|---|---|---|---|---|
| r=0 | r≥1 | 0.28 | 34.15* | 0.001 |
| r ≤1 | r≥2 | 0.13 | 10.13* | 0.00 |
| r=0 | r=1 | 0.28 | 24.01* | 0.00 |
| r=1 | r=2 | 0.13 | 10.13* | 0.001 |

The Johansen's co-integration tests result rejects the null hypothesis of no co-integration at the five per cent significance level. Thus, it can be concluded that GDP and public expenditure are co-integrated or they co-move in the long run.

TABLE IV: RESULT OF THE NORMALIZED CO-INTEGRATION COEFFICIENTS

| Variables | Co-integrating Vector | t-Statistic |
|---|---|---|
| RGDP | 1.000 | - |
| GE | -145.84 | (-5.65)* |

*denotes the significance of the coefficient

According to Granger Representation Theorem, if there is evidence of co-integration between two or more variables, then a valid error correction model exist between the two variables. The results of the estimated Vector Error Correction Model (VECM) are presented in Table 4.

TABLE V: RESULT OF THE ERROR CORRECTION MODEL

| Error Correction | DGDP | DGE |
|---|---|---|
| $Z_{t-1}$ | -0.003* | -0.000 |
| $DGDP_{-1}$ | 0.32* | 0.03 |
| $DGDP_{-2}$ | -0.2* | -0.02 |
| $DGE_{-1}$ | -0.3 | -0.33* |
| $DGE_{-2}$ | 0.24 | -0.22* |
| C | 362.10 | 42.22 |

From the above table, it can be seen that the error correction term is negative and significant when GDP is the dependent variable. This shows that public expenditure leads to GDP in the long run, and corrects for disequilibrium in the short run.

To check the Granger Causality in the short run, we run the Granger Causality Test [19], and get the following results:

TABLE VI: RESULT OF THE GRANGER CAUSALITY TEST ON THE VARIABLES

| Null Hypothesis | F Statistic | Probability value |
|---|---|---|
| GDP does not Granger cause Govt. Exp | 5.69 | 0.005 |
| Govt. Exp does not Granger cause GDP | 3.34 | 0.04 |

This shows us that there is two-way causality between public expenditure and GDP, and that both cause each other in the short run. This result is obvious, as economic theory tell us that if there exists a long run relationship between the two, there ought to be causality in at least one direction.

## V. CONCLUSION AND IMPLICATIONS

In this study, an empirical examination into the validity of two important economic theories has been tested. The Keynesian argument puts forth the fact that government expenditure should boost output of an economy, while the Wagner's hypothesis puts forth the fact that government expenditure will increase in proportion to increase in output.

This study holds significance, and is reliable because of longevity. Quarterly data proves to be more reliable, and the study has been performed for the years post liberalization. This paints a picture of the Indian economy and its performance post liberalization, and the crisis that happened in the year 1991. As it has been shown, Government expenditure, and GDP have both shown an upward trend, however, GDP has been moving more drastically. The results have shown that there exists both way short run causality between both variables, and have long run co-integration too. However, the VECM model shows us that the error correction term is negative and significant, implying that there exists a long run relationship between the two variables. However, there is only uni-directional long run relationship between the variables from government expenditure to GDP in the long run.

The Indian economy definitely needs to boost its government expenditure. As it is seen in the study, economic output is increasing faster than the government expenditure. The implication of this study is that the Indian economy needs to increase its revenue expenditure in terms of subsidies, interest payments, and especially the defence services. The budget is not allocation enough of resources in these sectors, and hence Wagner's law is not applicable for the Indian context.

## REFERENCES


[1] Keynes, J. M. (1936) General Theory of Employment, Interest and Money, London: Palgrave Macmillan.

[2] Wagner, A. (1883) Three Extracts on Public Finance, in R. A. Musgrave and A. T. Peacock eds 1958. Classics in the Theory of Public Finance, London: Macmillan

[3] Singh, B. and Sahni, B. S. (1984) Causality between Public Expenditure and National Income, The Review of Economics and Statistics, 664(4), 630-644. https://doi.org/10.2307/1935987

[4] Ahsan, S. M., Andy C. K. and Balbir S. S. (1992) Public Expenditure and National Income Causality: Further Evidence on the Role of Omitted Variables, Southern Economic Journal, 58(3), 623-634. https://doi.org/10.2307/1059830

[5] Afxentiou, P. C. and Serletis, A. (1996) Government Expenditures in the European Union: Do They Converge or Follow Wagners Law, International Economic Journal, 10(3), 33-47. https://doi.org/10.1080/10168739600080018

[6] Abizadeh, S. and Yousefi, M. (1998) An Empirical Analysis of South Koreas Economic Development and Public Expenditure Growth, The Journal of Socio-Economics, 27(6), 687-94 https://doi.org/10.1016/S1053-5357(99)80003-1

[7] Johansen, S. (1988) Statistical Analysis and Cointegrating Vectors, Journal of Economic Dynamics and Control, 12(2-3), 231−254. https://doi.org/10.1016/0165-1889(88)90041-3

[8] Jackson, P., Fethi, M. and Fethi, S. (1999). Cointegration, Causality and Wagner's Law: A test for Northern Cyprus 1977–1996 Discussion Paper in Public Sector Economic Series 99/2. Department of Economics, University of Leicester.

[9] Albatel, A.H. (2002) "The Relationship Between Government Revenue and Expenditures in Saudi Arabia", Journal of the Gulf and Arabian Peninsula, 104(28): 13-36.

[10] Grullón, S. (2012) National Income and Government Spending: Co-integration and Causality Results for the Dominican Republic, Developing Country Studies, 2(3), 89-98.

[11] Jiranyakul, K. and Brahmasrene, T. (2007) The Relationship Between Government Expenditures and Economic Growth in Thailand, Journal of Economics and Economic Education Research, 8(1), 93 – 102.

[12] Babatunde, M. A. (2008) A bound testing analysis of Wagners law in Nigeria: 1970-2006, Conference Paper presented at African Econometric Society, 13th Annual conference on econometric modeling in Africa 9-11 July 2008, University of Pretoria, South Africa.
[13] Pradhan, P. P. (2007) Wagners Law: Is It Valid in India?, The IUP Journal of Public Finance, 5(2), 7-20
[14] Magazzino, C. (2010) Wagners Law in Italy: Empirical Evidence from 1960 to 2008, Global and Local Economic Review, 2(January-June), 91-116.
[15] Johansen, S. and Juselius, K. (1990) Maximum Likelihood Estimation and Inference on Cointegration with Applications for the Demand for Money, Oxford Bulletin of Economics and Statistics, 52(2), 169-210. https://doi.org/10.1111/j.1468-0084.1990.mp52002003.x
[16] Ighodaro, C. A. U. and Oriakhi, D. E. (2010) Does the Relationship between Government Expenditure and Economic Growth follow Wagners Law in Nigeria?, Annals of the University of Petroşani, Economics, 10(2), 185-1
[17] Sahoo, P. (2001), "Wagner Hypothesis: Further Empirical Evidence from India", Journal of Indian School of Political Economy, Vol. 13, No. 1, pp. 45-53
[18] Dickey, D. A. and Fuller, W. A. (1979) Distribution of the estimates for autoregressive time series with a unit root, Journal of American Statistical Association, 74(366), 427-431 https://doi.org/10.2307/2286348
[19] Granger, C. W. J. (1988) Some Recent Developments in a Concept of Causality, Journal of Econometrics, 16(1), 121-130. Grullón, S. (2012) National Income
[20] Wagner, R.E., and W.E. Weber, (1977), "Wagner's Law, Fiscal Institutions, and the Growth of Government", *National Tax Journal*, Vol. 30, No.1, pp. 59-68.
[21] M.I.,Ansari, D.V., Gordon, & C. ., Akuamoah. (1997). Keynes vs Wagner:Public Expenditure and National Incomw for three African countries *Applied Economics*,29(4), 543-550. https://doi.org/10.1080/000368497327038
[22] Samudram, M., Nair, M., Vaithilingam, S. (2009)," Keynes And Wagner On Government Expenditures And Economic Development: The Case Of A Developing Economy", Empirical Economics, 36(3),697-712. https://doi.org/10.1007/s00181-009-0264-z
[23] Katrakilidis, C. & Tsaliki , P. 2009, "Further evidence of causal relationship between government spending and economic growth: the case of Greece, 1958-2004", *Acta Economica*, 59(1), 57-78 https://doi.org/10.1556/AOecon.59.2009.1.3
[24] Liu, L.C., Hsu, C.E., & Younis, M. (2008) "The Association between Government Expenditure and economic growth: Granger Causality Test of US data, 1947-2002". *Journal of Public Budgeting, Accounting and Fimancial Management*, 20(4), 537-553.