THE RELATIONSHIP BETWEEN PUBLIC EXPENDITURE AND ECONOMIC GROWTH IN INDIA

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The objective of this paper is to examine the long run as well as causal relationship between government spending and economic growth in India using annual data over the period 1971 to 2014.According to Wagner's law, causality runs from economic growth to government spending and in the Keynesian hypothesis from government spending to economic growth Four different versions of the Wagner's law have been estimated. The results of Augmented Dickey Fuller test and the Phillips Perron test suggest that all the variables are integrated of order one I(1).The Johansen's cointegration test results indicate that there is a long run relationship between economic growth and government spending. To measure the short run relationship between the two variables, Granger Causality test is used. In only one of the four versions of the Wagner's law, empirical findings of this study implies unidirectional causality from government spending to economic growth consistent with the Keynesian viewpoint.

Key words: Economic Growth, Government Spending, Classical Model, Keynesian Hypothesis, Wagner's Law, Unit Roots, Cointegration, Granger Causality

INTRODUCTION

The phenomenon of public expenditure growth has been subject for researchers to find out what causes or has effects on it. Wagner (1883) introduces a model that public expenditures are endogenous to economic development, i.e. growth in the economy is a determinant of the public sector growth. The public sector grows at higher rate than national income due to rapid industrialization, urbanization and increased population. However, more recently, public finance economists and growth theorists have concentrated on the reverse relationship that is how government size affects economic growth. Keynes (1936) and his supporters, however, raise the thought that during recession times the use of fiscal policies boosts economic activities, i.e. expansionary fiscal policies, expanding public

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expenditures etc., increase output. Wagner's law and the Keynesian theory present two opposite perceptions in terms of the relationship between public expenditure and growth in economy's output. While according to Wagner's approach causality runs from growth in economy's output to public expenditure, the Keynesian approach assumes that causality runs from public expenditure to growth in output. In times of recessions. Keynesian economics argues that private sector decisions sometimes lead to inefficient macroeconomic outcomes and, therefore, advocates active policy responses by the public sector, including monetary policy actions by the central bank and fiscal policy actions by the government to stabilize output over the business cycle. According to Keynesian hypothesis, government spending is considered as an exogenous variable that affects economic growth. If the Government is maximizing National welfare, the Public expenditure diverts resources into channels determined by government in accordance with national objectives and public policy. As a result, scale and direction of public expenditure may affect pattern and levels of consumption, volume of production, allocation of resources, distribution of incomes, level of prices and employment, human capital formation, crowding in private investment, etc. The objective of this paper is a) Use cointegration analysis to examine the relationship between overall government spending and economic growth b) To check whether public expenditure causes economic growth (Keynesian hypothesis) or economic growth leads to an increase in the size of government sector (Wagner's law) using the Granger Causality test for India from 1971 to 2014. The remaining paper is organized as follows. Section II explains the theoretical predictions; the next section presents the studies carried out by other authors, section IV describes the trends in government expenditure and economic growth in India, data description is given in section V and the econometric methodology and empirical results are discussed in section VI.

THEORETICAL PREDICTIONS

Classical Theory verses the Keynesian Hypothesis

John Maynard Keynes in his book "General Theory of Employment, Interest and Money" published in the year 1963 strongly criticized the Classical Theory of Employment, advocated by classical economists (followers of David Ricardo-Marshall, Pigou and J.S.Mill from 1776 to early 1930's (Great Depression)).

The classical theory of employment was based on two main assumptions firstly, full

employment of resources and secondly, flexibility of wages and prices. The assumption of full employment implies labour and other resources are always fully employed and hence demand for labour is equal to the supply of labour at every real wage rate and hence there is no involuntary unemployment. Any unemployment in the economy is assumed to be temporary and abnormal and full employment was viewed as a normal situation, hence aggregate supply curve is vertical in the classical model. It's the second assumption of fully flexible wages and prices that brings about full employment in the economy. If there is overproduction in the economy leading to unemployment, prices and wages would automatically fall, as a result demand would increase, prices would increase leading to increase in production and hence this would eliminate unemployment. In the classical model, unemployment can be eliminated by reducing wages, this would increase demand for labour and hence stimulate production in the economy. This also implied, changes in aggregate demand would not have any impact on income and employment in the economy, it would just affect prices. The classical economist's assumption of full employment is based on Say's Law given by French economist J.B. Say (1776-1832). According to this law "supply creates its own demand", this implies there cannot be general overproduction and general unemployment in the economy. Hence, as per this law, businesses produce enough income to ensure that all its output will be sold. The supply of a product develops the demand for that product and hence prevents the problem of overproduction. Aggregate demand will be equal to aggregate supply and if there is any deficiency in demand that will be temporary. It is assumed whatever is saved is spent on investment goods and savings are always equal to investment, rate of interest is the key variable that ensures equality of savings and investment in the classical model. They believed to maintain full employment through a self correcting market mechanism in the economy and hence advocated laissez-fair policy; hence no role of the government in economic activity, its role was limited to maintaining law and order in the economy.

The laissez fair policy was accepted and followed until the Great depression (1933). The huge and lengthy period of unemployment at the time of great depression was in contradiction to the principles of classical model. Even by 1939, unemployment remained as high as 17% and hence the belief that any unemployment would be temporary and quickly eliminated turned out to be fallacious. The most powerful critic of the classical theory was given by John Maynard Keynes in his work titled "The General Theory of, Employment, Interest and Money" published in 1936. According to Keynes, supply reacts to demand or demand creates its own supply rather than supply

creating its own demand in the classical model. He was of the view that producers base their decision on how much to produce on the level of expected demand, so higher the level of demand more output producers expect to sell and higher will be total production. All the income earned by factors of production is not spent on what they produce; a fraction of income is saved and not automatically used to buy investment goods. Savings and investment are considered to be different from each other. This results in inadequate aggregate demand, which in turn leads to unemployment. So in the Keynesian model causation runs from demand to supply unlike the classical model where it runs from supply to demand. He rejected the classical assumption of full employment equilibrium in the economy, since the total spending in the economy could be inadequate resulting in involuntary unemployment. According to him demand is the key variable that determines output and employment in the economy. Insufficient spending results in unemployment and excess demand results in inflation. He also criticized the classical assumption of full flexibility in wages and prices. In the real world markets are far from perfect so you observe monopoly, oligopolistic and monopolistic markets and hence prices are slow to change. Because of the trade unions, despite unemployment, wages may not fall to ensure full employment. In his view, there is no internal market mechanism that ensures full employment. If there is unemployment or inflation in the economy, it is the responsibility of the government to rectify it through various demand side policies such as the fiscal policy- government spending, taxes and the monetary policy- altering the supply of money. If there is unemployment, government should carry out expansionary fiscal (increase its spending on goods and services, reduce taxes) and monetary policy (increase money supply), this would shift aggregate demand towards right, and increase income and employment in the economy. In case of high inflation, it should reduce aggregate demand through contractionary fiscal (reduce government spending, increase taxes) and monetary policy (reduce money supply), this would reduce inflation rate in the economy.

So the classical and the Keynesian theory represent two different views on the role of government in the economy. According to classical economists, economy is always at full employment through its own market mechanism and hence advocated a policy of laissez-faire. According to Keynes, one could not depend on free markets to attain full employment. He supported strong role of the government to control aggregate demand in the economy so as to avoid unemployment and inflation through fiscal and monetary policy.

Wagner's Law

Adolph Wagner came up with Wagner's law (1883) also called as the "law of increasing state activity" based on the empirical evidence of industrialized countries. According to this law, government expenditure increases as per capita income increases in the economy. Therefore growth of government expenditure is a result of economic growth. So as per this law economic growth is a key variable that explains the growth of government sector. It is based on the proposition that government expenditure increases more than proportionally relative to income. And hence elasticity government expenditures with respect to growth is greater than one. Hence, according to Wagner's law causality runs from economic growth to government spending and government spending is considered as an endogenous variable determined by economic growth. Rowley and Tollison (1994) in their paper explain Wagner's law in accordance with the law of comparative advantage. According to them, with the growth of the industrial sector, demand for services like waste disposal, transport and communication, energy grows and governments are considered to have comparative advantage in providing these services. And hence in a growing economy, public expenditures grow as a share of income. According to Wagner's law, during the process of industrialization there is both absolute and relative expansion of the government sector as per capita income in the economy increases. There are absolute and relative versions of the Wagner's law given by different economists.

In 1961, Peacock and Wiseman came up with the basic version of the Wagner's law by using the total government expenditure as the dependent variable and Gross domestic product as the independent variable. In their version of Wagner's law, growth in government expenditure depends on growth in GDP. Ln is natural log.

$Ln(GE) = c + d\,Ln(GDP)$.....Peacock and Wiseman (1961)

In another version given by Gupta (1967) he took population into account and checked if per capita government expenditures could be explained by per capita Gross domestic product.

$Ln(GE/Pop) = c + d\,Ln(GDP/Pop)$.....Gupta (1967)

These are the absolute version of the Wagner's law. Musgrave (1963) estimated the relative version of the Wagner's law where in relative share of government expenditure depends on the Gross domestic product. In his version he explains how share of nominal

government expenditures in nominal GDP depends on the per capita real GDP.

Ln(NGE / NGDP) = c + d Ln(GDP/Pop).....Musgrave (1963)

In another version of the Wagner's law, Mann (1980) estimated how share of nominal expenditures in nominal GDP depends on real GDP.

Ln(NGE / NGDP) = c + d Ln(GDP).....Mann (1980)

According to Wagner's law there are three prime reasons for the expansion of government sector with national income (Henrekson 1993). Firstly with modernization, industrialization and growing urbanization demand for government service such as regulation of private sector, maintenance of law and order would grow for efficient working of the economy. Secondly, with the growth in income demand for "cultural and welfare" expenditures would also grow. According to Wagner, government was considered more efficient in providing these services especially education, health, retirement benefits and social security. And lastly, growth in income and technology will lead to creation of large monopolies and this calls for the role of government to check the working of these firms in order to increase economic efficiency. And in some of the sectors or industries such as infrastructure (railways/railroads) the size of investment is so large that it can neither be provided nor managed by the private sector. Hence the role of government to provide these public goods and services. According to the modern version of the Wagner's law (Bird 1971), relative size of the government sector grows as per capita income increases in industrializing countries.

LITERATURE REVIEW

According to Wagner's law, economic growth is the key variable that determines the size of government. Various studies have analyzed the Wagner's law and the empirical results differ from country to country and from period to period. In a study by Ray and Ray (2012), they find that government's development expenditure and economic growth are cointegrated but don't find any short run causality between the two variables. So it neither supports Keynesian hypothesis nor Wagner's law. In another paper Srinivasan (2013) concludes that there exists a long run relationship between public expenditure and economic growth and the Granger causality runs from economic growth to public expenditure in conformity with the Wagner's law. In case of Nigeria for the period 1970-2008, Chiawa et.al (2012) find that government expenditure and economic growth are

cointegrated and there is a bidirectional relationship between the two variables. Verma and Arora (2010) estimate six versions of Wagner's law explained by different economists for India during 1950-51 to 2007-08. The empirical evidence indicates that there is long run relationship between rate of growth of government expenditure and economic growth and findings support the Wagner's law in both pre and post reforms period. Loizides and Vamvoukas (2004) carry out bivariate and trivariate analysis by including unemployment and inflation as explanatory variables for Greece, U.K. and Ireland. Their results suggest that in all the three countries causation runs from government expenditure to economic growth either in the short or the long run. Greece is the only country that supports Wagner's law in the bivariate as well as trivariate model. Chandra (2010) in his paper examines the relationship between education spending and economic growth in India using linear and non-linear Granger causality tests. He finds that there is a bidirectional causality between government spending on education and economic growth that is, economic growth affects education spending by the government and investments in education also affect economic growth but after a few lags. Likewise Jiranyakul (2007) in his study ascertains that economic growth and government expenditures are not cointegrated but, government expenditures have a significant effect on economic growth. Using the Swedish data from 1861-1990, Henrekson (1993) fail to find any relationship between government expenditure and income. In another study by Lamartina and Zaghini, empirical evidence indicates a higher positive correlation between government expenditures and per capita income for countries with higher GDP consistent with the Wagner's law for 23 OECD countries. In case of Srilanka, Kesavahraja (2012) examines the six versions of the Wagner's law and empirical findings indicate the existence of a long run relationship between public expenditures and GDP. Mahdavi (2009) analyzes the U.S. state and local expenditure data over 1957 to 2006 and results indicate that government expenditure and some of its categories such as insurance trust benefits, income maintenance and social services grew at rate higher than inflation adjusted state personal income, consistent with the Wagner's law. In China, Zheng etal (2010) find no empirical evidence to support the Wagner's law. Tang (2009) examines the data from 1960-2005 for Malaysia and the empirical results are consistent with both the Wagner's law and Keynesian hypothesis. Dimitrios and Richter examine the long run relationship between income and government spending from 1833-2010. They find that there is a long run relationship between the two variables and results of Granger causality indicate that national income has significant effect on government spending. Cheng and Lai (1997), study the relationship between government spending and economic growth for one of the NIC,

South Korea, from 1954 to 1994 in the trivariate framework by adding money supply as an explanatory variable. The results support both the Wagner's law and the Keynesian hypothesis.

As per Keynesian hypothesis government expenditure is considered as an exogenous variable that can be used as a policy tool to positively affect economic growth. Again the empirical results are mixed, some support the Keynesian hypothesis and some don't. Atrayee Ghosh Roy (2009) used time series data for U.S over the period 1950-98, to examine the effect of government size on Economic Growth. The results indicate that government size has a significant and negative effect on economic growth. In another paper, Schaltegger and Torgler (2006) use the disaggregated data at the state and local level to examine the effect of government expenditure on economic growth for 26 Swiss cantons over the period 1981 to 2001. The authors found a very strong negative relationship between the size of government and economic growth in general. In a seminal paper Robert J. Barro (1991) analyzed the cross section data for 98 countries over the period 1960 to 1985 to investigate determinants of economic growth. The author found a significant negative influence of the share of government consumption in gross domestic product (GDP), but no significant effect of the share of public investment on economic growth. Using the panel data for OECD countries from 1980 to 2005 Davide, Furceri and Aleksandra, Zdzienicka (2011), study the short term effects of social spending (different policies) on economic activity. The empirical results show that social spending has expansionary effects on GDP. Among spending subcategories, social spending in Health and Unemployment benefits have the greatest effects. Social spending also positively affects private consumption while it has negligible effects on investment. Similarly Bose, Haque and Osborn (2003), examine the growth effects of government expenditure for a panel of thirty developing countries over the period 1970-1990, with a particular focus on sectoral expenditures. Their study indicates that share of government capital expenditure in GDP is positively and significantly correlated with economic growth, but current expenditure is insignificant. And, at the sectoral level, government investment and total expenditures in education are the only outlays that are significantly associated with growth once the budget constraint and omitted variables are taken into consideration.

GOVERNMENT SPENDING AND ECONOMIC GROWTH IN INDIA

Since the time India became independent in 1947, government took the main

responsibility of encouraging economic growth through its spending on industry and infrastructure and social wellbeing of its people. Because of which the public expenditures have continuously grown after independence from 56.24 billion rupees in 1971 to 15594.5 billion rupees in 2014. The total expenditure of the Central government is divided into two components revenue expenditure and capital expenditure. Revenue expenditure is expenditure that neither create any asset nor reduce liabilities, such as interest payments on the loans taken by the government, subsidies, salaries and pensions of government employees. In other countries it is also called current expenditure. Whereas any expenditure that creates an asset or reduces liability is termed as capital expenditure, such as expenditure on purchase of machinery, land and building, investment in shares, etc.

Table 1: Trends in Revenue, Capital and Total Expenditure

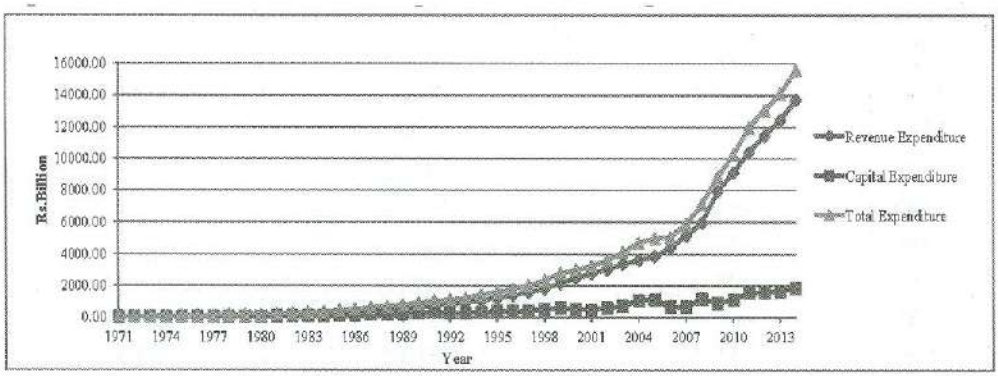
Year	Revenue Expenditure (Rs.Billion)	Capital Expenditure (Rs.Billion)	Total Expenditure (Rs.Billion)
1971	31.30	24.94	56.24
1972	39.68	29.24	68.92
1973	45.38	33.19	78.57
1974	47.77	34.41	82.18
1975	56.77	42.59	99.36
1976	69.78	54.01	123.79
1977	82.70	53.87	136.57
1978	91.08	63.98	155.06
1979	106.82	80.84	187.66
1980	118.03	71.59	189.62
1981	144.10	83.58	227.68
1982	154.08	98.57	252.65
1983	187.42	120.49	307.91
1984	222.51	132.83	355.34
1985	276.91	159.41	436.32
1986	339.24	187.42	526.66
1987	408.60	220.56	629.16
1988	461.74	220.87	682.61
1989	541.06	250.05	791.11
1990	642.10	286.98	929.08
1991	735.16	317.82	1052.98
1992	822.92	291.22	1114.14
1993	927.02	299.16	1226.18
1994	1081.69	336.84	1418.53

1995	1221.12	386.27	1607.39
1996	1398.61	384.14	1782.75
1997	1589.33	420.74	2010.07
1998	1803.35	517.18	2320.53
1999	2164.61	628.79	2793.40
2000	2490.78	489.75	2980.53
2001	2778.39	477.53	3255.92
2002	3014.68	608.42	3623.10
2003	3387.13	745.35	4132.48
2004	3620.74	1091.29	4712.03
2005	3843.29	1133.31	4982.52
2006	4393.76	663.62	5057.38
2007	5146.09	687.78	5833.87
2008	5944.33	1182.38	7126.71
2009	7937.98	901.58	8839.56
2010	9118.09	1126.78	10244.87
2011	10407.23	1566.05	11973.28
2012	11457.85	1585.80	13043.65
2013	12435.14	1668.58	14103.72
2014	13717.72	1876.75	15594.47
2015	14887.80	1923.78	16811.58

Source- RBI Website, Database on Indian Economy

Note: 1. Data for 2014 are revised estimates and data for 2015 are Budget Estimates.

Figure 1: Trends in Revenue, Capital and Total Expenditure



Note: Constructed from Table No.1

The share of revenue expenditure in the total expenditure has continuously increased on account of rapid increase in subsidies from 1976 to 1980. Subsequently, the increase was

due to higher expenditure on interest payments, defense, grants and loans to states, employment guarantee scheme, agricultural loans.

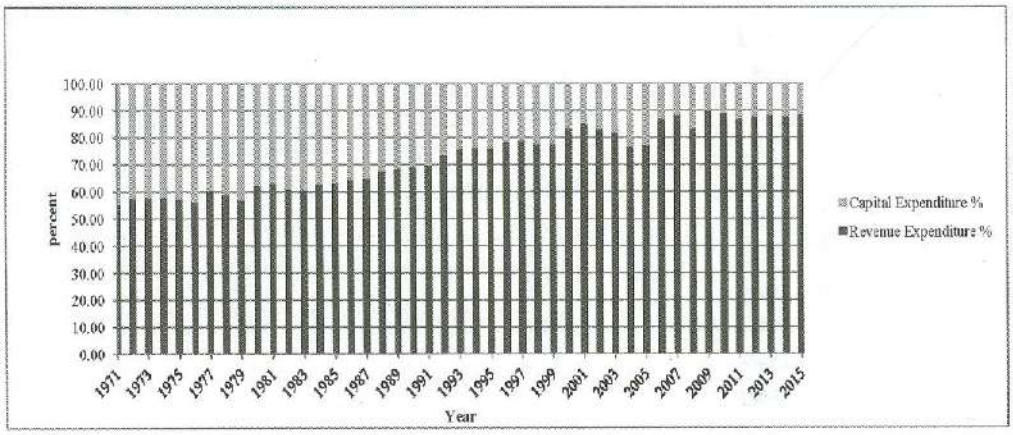
Table 2: Share of Capital and Revenue Expenditure as a share of Total Expenditure

Year	Revenue Expenditure (%)	Capital Expenditure (%)
1971	55.65	44.35
1972	57.57	42.43
1973	57.76	42.24
1974	58.13	41.87
1975	57.14	42.86
1976	56.37	43.63
1977	60.56	39.44
1978	58.74	41.26
1979	56.92	43.08
1980	62.25	37.75
1981	63.29	36.71
1982	60.99	39.01
1983	60.87	39.13
1984	62.62	37.38
1985	63.46	36.54
1986	64.41	35.59
1987	64.94	35.06
1988	67.64	32.36
1989	68.39	31.61
1990	69.11	30.89
1991	69.82	30.18
1992	73.86	26.14
1993	75.60	24.40
1994	76.25	23.75
1995	75.97	24.03
1996	78.45	21.55
1997	79.07	20.93
1998	77.71	22.29
1999	77.49	22.51
2000	83.57	16.43
2001	85.33	14.67
2002	83.21	16.79
2003	81.96	18.04
2004	76.84	23.16
2005	77.14	22.75

2006	86.88	13.12
2007	88.21	11.79
2008	83.41	16.59
2009	89.80	10.20
2010	89.00	11.00
2011	86.92	13.08
2012	87.84	12.16
2013	88.17	11.83
2014	87.97	12.03
2015	88.56	11.44

Source- RBI Website, Database on Indian Economy

Figure 2: Share of Capital and Revenue Expenditure as a share of Total Expenditures



Note: Constructed from Table No.2

In the pre-reform period (1970-71 to 1989-90) expenditures grew at a CAGR of 15.05%. Government has taken various steps in the post reform period to curtail its revenue expenditure such as the setting up of Expenditure Reforms Commission under the Chairmanship of Shri K.P.Geetha Krishnan in 2000 to begin the process of downsizing the government, zero base budgeting in which all expenses must be must be justified for each new period. It starts with 'zero base' and every department within an organization is analyzed for its needs and costs and the FRBM act (2013) to ensure inter-generational equity in fiscal management, long run macroeconomic stability, better coordination between fiscal and monetary policy, and transparency in fiscal operation of the Government. In spite of all these measures the expenditure of the government continued to increase. In the post reform period (1990-91 to 2014-15) the total expenditure of the

central government grew at a slower rate of 11.72%. The share of capital expenditure has continuously declined in the post-reform period touching 11.44% in 2015. Despite all the reforms capital expenditures have declined much more rapidly in the post reform period relative to the pre-reform period.

Table 3: Compound Annual Growth rate of Total, Revenue and Capital Expenditure

	Pre-Reform Period (1971-1990)	Post-Reform period (1991-2015)
Total Expenditure	15.05%	11.72%
Revenue Expenditure	16.31%	12.79%
Capital Expenditure	12.99%	7.47%

Source- Calculated from the data

On an average total expenditures as a share of GDP have continuously grown from 11.8% in 1971 to 18.5% in 1990. In the post-reform period expenditures have declined from 17.9% in 1991 to 13.7% in 2014. There has been a long term increase in the share of revenue expenditures in the pre-reform period from 6.6% in 1971 to 12.8% in 1990. In the post reform period they increased during the sub-prime crisis to around 14%, thereafter they have remained more or less constant at 12% of GDP. Capital expenditures increased from 5.2% in 1971 to 7% in 1979, in 1990 they accounted for 5.7% of GDP. In the post reform period the share of capital expenditures declined in most of the years and it stands at 1.65% in 2014.

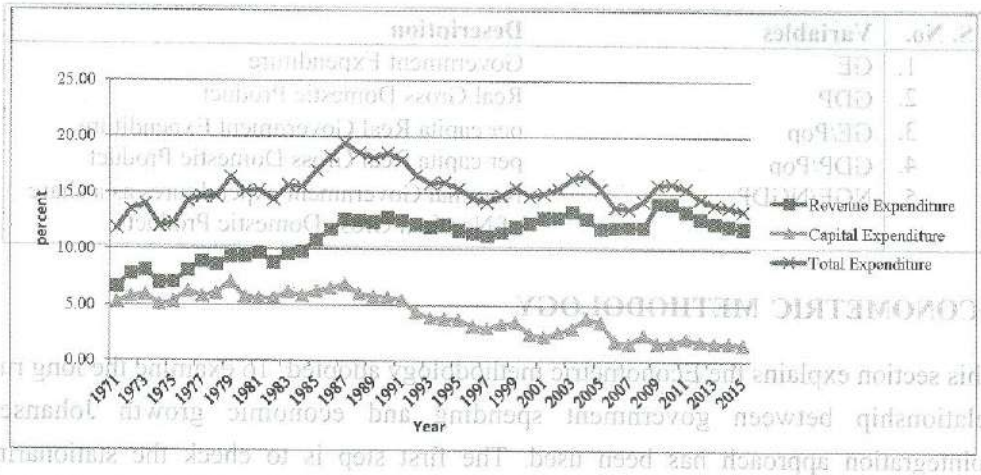
Table 4: Revenue, Capital and Total Expenditure as a percentage of GDP

Year	Revenue Expenditure	Capital Expenditure	Total Expenditure
1971	6.57	5.24	11.81
1972	7.78	5.73	13.51
1973	8.07	5.90	13.98
1974	6.98	5.03	12.01
1975	7.03	5.27	12.30
1976	8.05	6.23	14.28
1977	8.85	5.77	14.62
1978	8.60	6.04	14.65
1979	9.32	7.05	16.37
1980	9.39	5.69	15.08
1981	9.63	5.59	15.21

1982	8.76	5.61	14.37
1983	9.53	6.13	15.66
1984	9.72	5.80	15.52
1985	10.79	6.21	17.00
1986	11.72	6.47	18.19
1987	12.61	6.81	19.42
1988	12.54	6.00	18.54
1989	12.38	5.72	18.11
1990	12.79	5.72	18.51
1991	12.54	5.42	17.96
1992	12.21	4.32	16.53
1993	11.97	3.86	15.83
1994	12.14	3.78	15.91
1995	11.68	3.69	15.37
1996	11.40	3.13	14.53
1997	11.20	2.96	14.16
1998	11.47	3.29	14.76
1999	12.00	3.49	15.49
2000	12.31	2.42	14.73
2001	12.76	2.19	14.95
2002	12.80	2.58	15.38
2003	13.35	2.94	16.29
2004	12.74	3.84	16.58
2005	11.85	3.50	15.37
2006	11.90	1.80	13.69
2007	11.98	1.60	13.58
2008	11.92	2.37	14.29
2009	14.10	1.60	15.70
2010	14.08	1.74	15.82
2011	13.37	2.01	15.38
2012	12.72	1.76	14.48
2013	12.30	1.65	13.95
2014	12.08	1.65	13.73
2015	11.87	1.53	13.41

Source- RBI Website, Database on Indian Economy

Figure 3: Revenue, Capital and Total Expenditure as a percentage of GDP



Note: Constructed from Table No.4

DATA DESCRIPTION

The current study uses the annual data on India from 1971-2014. The data has been taken from "The Database on Indian Economy", provided by the Reserve Bank of India. All the variables have been converted into natural logarithmic form. One of the advantages of doing this is to make the variables stationary at lower orders of integration if the log of variables are non-stationary at levels. The objective of the study is to examine the relationship between government spending and economic growth. In order to estimate the size of the government different (4) versions of the Wagner's law have been considered.

S.No.	Different versions of Wagner's Law	Regression Equation
1.	Peacock and Wiseman (1961)	LnGE = c + d LnGDP
2.	Gupta (1967)	Ln(GE/Pop) =c + d Ln(GDP/Pop)
3.	Musgrave (1963)	Ln (NGE / NGDP) = c + d Ln (GDP/Pop)
4.	Mann (1980)	Ln (NGE / NGDP) = c + d Ln GDP

Ln is natural log

Description of Variables is given in Table No. 5.

Table 5: Description of Variables

S. No.	Variables	Description
1.	GE	Government Expenditure
2.	GDP	Real Gross Domestic Product
3.	GE/Pop	per capita Real Government Expenditure
4.	GDP/Pop	per capita Real Gross Domestic Product
5.	NGE/NGDP	Nominal Government expenditures as a share of Nominal Gross Domestic Product

ECONOMETRIC METHODOLOGY

This section explains the Econometric methodology adopted. To examine the long run relationship between government spending and economic growth Johansen cointegration approach has been used. The first step is to check the stationarity properties of the variables using the Augmented Dickey Fuller test and Phillips Perron test. If the variables are integrated of order one, next step is to estimate the rank of the cointegrating equation. And to analyze the short run relationship between government spending and economic growth Granger causality test is applied.

Unit Root Tests

In order to test for cointegration the first step is to check the stationarity properties of the variables. Stationarity is defines as "A stochastic process is said to be stationary if its mean and variance are constant over time and the value of covariance between two time periods depends only on the distance or gap or lag between the two time periods and not the actual time at which the covariance is computed" (Basic Econometrics, 4th Edition, DN Gujarati). Augmented Dickey-Fuller (ADF) test and Phillips Perron (PP) test have been used to check if the variables have a unit root. The null hypothesis is that the series is nonstationary and hence contains a unit root.

Cointegration Test

Two variables are said to be cointegrated if they have a long term or equilibrium relationship between them. There are two time series X and Y and both are I(1), that is they contain a unit root and are integrated of order 1. If we regress Y on X (equation 1)

$$Y_t = a + b X_t + u_t \ldots\ldots\ldots (1)$$

$$u_t = Y_t - a + b X_t \ldots\ldots\ldots (2)$$

Now if we find that u_t (Equation 2) is stationary that is integrated of order zero. So both X_t

and Y_t are nonstationary but their linear combination is stationary, that is 1(0). In this case X_t and Y_t are cointegrated.

ADF and PP test results indicate the all the variables are integrated of order one I(1), so we check if they have a long run relationship between them. Simple regression models assume that variables are covariance stationary, that is its mean and autocovariances are finite and time invariant. Cointegration analysis can be used when variables are not covariance stationary. Most of the economic time series are integrated of order I (1), that is they become stationary after first difference. Standard OLS procedure can't be applied if the variables are not stationary as it results in a spurious regression. In order to test for the cointegration we select the optimal number of lags by using the selection-order criteria such as the sequential likelihood-ratio test (LR), final prediction error (FPE), Akaike's information criterion (AIC), Hannan–Quinn information criterion (HQIC) and Schwarz Bayesian information criterion (SBIC) method. Johansen's test for cointegration begins with a maximum rank of zero, that is, zero or no cointegrating equations and then accepts the first null hypothesis that is not rejected. There are three methods of determining the number of cointegrating equations using the Johansen methodology. All three methods are based on estimating parameters using the Maximum Likelihood method. The first method is based on a trace statistic, it begins with zero cointegrating equations and then accepts the first value of rank (r) for which trace statistic doesn't reject the null hypothesis. Second method is the maximum-eigenvalue statistic. The null hypothesis assumes there are r cointegrating equations and the alternative hypothesis is there are r+1 cointegrating equations. The problem with this measure is that there is no solution to the multiple testing and hence it is used less than the trace statistic. And the third method is based on minimising the information criterion such as the Schwarz Bayesian information criterion (SBIC), the Hannan and Quinn information criterion (HQIC) and the Akaike's information Criterion (AIC).

Granger Causality Test

If two variables are cointegrated we can use the Granger causality test (1969) to measure the short run relationship between them. A variable "c" is said to Granger cause variable "d" if, given the past values of d, past values of c are helpful in predicting d. One of the ways to test Granger causality is to regress d on its own past values and past values of c. The null hypothesis is that there is no causality from variable c to d that is, we test that the estimated coefficients on the past values of c are jointly zero. If we fail to reject the null hypothesis this implies c does Granger cause d and hence past values of c are useful in

forecasting d. So there can be a unidirectional causality from variable c to d or from variable d to c, bilateral causality or feedback effects when variable c causes d and variable d also causes c and if neither c Granger causes d nor d Granger causes c, then the two variables are said to be independent or no causality exists between them.

EMPIRICAL RESULTS

In this section we discuss the empirical results obtained from the data. The first step in cointegration is to check if the variables are stationary. Augmented Dickey fuller test and Phillips Perron test are used to check for the presence of a unit root. Results from both the tests with intercept and intercept & time trend indicate that all the variables have a unit root and are integrated of order one I(1), that is after the variables are differenced once they become stationary.

Table 6: Unit Root Test Results after First Difference

Null Hypothesis: There is a unit root or nonstationarity

	ADF Test			PP Test		
Variables	c	c & t	Conclusion	c	c & t	Conclusion
LnGDP	-4.282***	-5.428***	I(1)	-5.91***	-7.486***	I(1)
LnGE	-4.69***	-4.791***	I(1)	-6.032***	-6.073***	I(1)
Ln(GE/Pop)	-4.975***	-4.994***	I(1)	-6.077***	-6.046***	I(1)
Ln(GDP/Pop)	-3.98***	-5.466***	I(1)	-5.435***	-7.299***	I(1)
Ln(NGE/NGDP)	-5.54***	-5.714***	I(1)	-5.953***	-5.989***	I(1)
Level of Significance	Critical Values					
1%	-3.641	-4.233		-3.634	-4.224	
5%	-2.955	-3.536		-2.952	-3.532	
10%	-2.611	-3.202		-2.61	-3.199	

Note: ADF is the Augmented Dickey Fuller Test and PP is the Phillips Perron Test. c is constant, c & t is constant and time trend; ***, ** and * indicate significance at 1, 5 and 10% respectively.

Next step is test for cointegration test to see if the variables have a long term or equilibrium relationship between them. Using the various criteria such as the sequential likelihood-ratio test (LR), final prediction error (FPE), Akaike's information criterion (AIC), Hannan–Quinn information criterion (HQIC) and Schwarz Bayesian information criterion (SBIC) method we select the the optimal number of lags. According to these criteria optimal lag length is estimated to be one. All three methods in the Johansen methodology have been used to estimate the parameters of the cointegrating equation. The first method is based on trace statistic, for all the versions of Wagner's law at r=0, the value of the trace statistic exceed the critical value at 5% level of

significance and hence we reject the null hypothesis of no cointegration. At r=1, the value of trace statistic is less than the critical value at 5% level of significance and hence we can't reject the null hypothesis of one or fewer cointegrating equations. So based on the empirical results we find that the two variables are cointegrated. On the basis of maximum-eigenvalue statistic, except for one of the versions of Wagner's law given by Mann, the variables are found to be cointegrated. According to the information criterion also, there is one cointegrating equation. Therefore, we can conclude that public expenditure and income are cointegrated or there is a long run relationship between the two variables. The Cointegration results are given in Table 7a, 7b and 7c.

Table 7a: Johansen Test for Cointegration using the Multiple-Trace test Method

Null Hypothesis: There are no more than r cointegration relations (starts with r=0)

	No. Of CE(s)	Eigenvalue	Trace Statistic
Peacock and Wiseman	r=0		17.6526*
	r=1	0.33585	0.0547
	r=2	0.00127	
Gupta	r=0		21.6006**
	r=1	0.39271	0.1541
	r=2	0.00358	
Musgrave	r=0		19.8905*
	r=1	0.31222	3.7963*
	r=2	0.0845	
Mann	r=0		16.9792*
	r=1	0.27311	3.2628
	r=2	0.07307	
	Rank	**5 % critical value**	**1% critical value**
	r=0	15.41	20.04
	r=1	3.76	6.65

Note: CE(s) is the number of cointegrating equations, ** and * indicate significance at 1 and 5% respectively.

Table 7b: Johansen Test for Cointegration using the Maximum-Eigenvalue statistic

Null Hypothesis: There are no more than r cointegration relations (starts by assuming a given value of r)

	No. Of CE(s)	Eigenvalue	Max Statistic
Peacock and Wiseman	r=0		17.5979*
	r=1	0.33585	0.0547
	r=2	0.00127	
Gupta	r=0		21.4465**
	r=1		0.1541
	r=2		
Musgrave	r=0		16.0942*
	r=1	0.31222	3.7963*
	r=2	0.0845	
Mann	r=0		13.7164
	r=1	0.27311	3.2628
	r=2	0.07307	
	Rank	**5 % critical value**	**1% critical value**
	r=0	14.07	18.63
	r=1	3.76	6.65

Note: CE(s) is the number of cointegrating relations, *** and ** indicate significance at 1 and 5% respectively.

Table 7c: Johansen Test for Cointegration by Minimizing an Information Criterion.

The number of cointegrating equation is determined in such a way that minimizes the information criterion.

	Maximum Rank	Eigenvalue	SBIC	HQIC	AIC
Peacock and Wiseman	0		-7.022846	-7.074554	-7.104763
	1	0.33585	-7.16969*	-7.29896*	-7.37448*
	2	0.00127	-7.083493	-7.238617	-7.329241
Gupta	0		-6.970071	-7.021779	-7.051987
	1	0.39271	-7.206418*	-7.335688*	-7.411209*
	2	0.00358	-7.122531	-7.277655	-7.36828
Musgrave	0		-6.552756	-6.604464	-6.634672
	1	0.31222	-6.66463	-6.7939	-6.869421
	2	0.0845	-6.665446*	-6.820571*	-6.911195*
Mann	0		-6.624652	-6.67636	-6.706568
	1	0.27311	-6.681228*	-6.810498*	-6.886019*
	2	0.07307	-6.669637	-6.824761	-6.815641

Note: SBIC is Schwarz Bayesian information criterion, HQIC is Hannan and Quinn information criterion and AIC is the Akaike information criterion.* indicates the minimum value of the information criterion

Granger Causality test is used to measure short run relationship between government expenditure and GDP. The results of the Granger causality test are highly sensitive to the lag length and hence, optimal lag length has been selected using various criteria- LR – sequential modified LR test statistic, FPE – Final prediction error, AIC – Akaike information criterion, SIC – Schwarz information criterion and HQIC – Hannah-Quinn information criterion. According to these criteria, the optimal lag length is estimated to be one. After estimating four different versions of the Wagner's law, empirical results indicate no causality between government expenditure and economic growth for all the versions at 5% level of significance. However, we fail to reject the Null hypothesis in the Mann (1980) version that the Government Expenditure as a share of GDP doesn't Granger cause Real GDP at 10% level of significance. Hence lagged values of government expenditure as a share of GDP are useful in predicting real GDP, consistent with the Keynesian hypothesis. The results are reported in Table no.8.

Table 8: Granger Causality Test Results

	Null Hypothesis	F-Value	p-value
Peacock and Wiseman	No causality from GE to GDP	1.6999	0.192
	No causality from GDP to GE	0.42664	0.514
Gupta	No causality from GE to GDP	1.1892	0.275
	No causality from GDP to GE	0.12976	0.719
Musgrave	No causality from GE to GDP	2.4624	0.117
	No causality from GDP to GE	0.0141	0.905
Mann	No causality from GE to GDP	3.0709*	0.08
	No causality from GDP to GE	0.00102	0.974

Note: GE is Government Expenditure and GDP is Gross Domestic Result; Optimal lag length is estimated to be one; *** and **, * indicate significance at 1, 5 and 10% respectively.

CONCLUSION

The objective of this paper is to examine the relationship between public spending and economic growth for India from 1971 to 2014. The relationship between public spending and economic growth is one of the most discussed topics in public economics literature. Economists are greatly divided on the role of government in economic activity. Classical economists were of the view that free markets would automatically lead to full employment and the role of the government should be limited to maintaining law and order in the economy and hence recommended laissez-faire policy. These views were widely accepted until the Great Depression, a very high unemployment rate

and for extended periods couldn't be rectified through self correcting internal mechanism. The classical model was severely criticised by Keynes, according to him, free market mechanism couldn't be relied upon to maintain full employment and low inflation; it was the responsibility of the government to manage aggregate demand in the economy through fiscal and monetary policy. In the 1970's Keynesian economics lost its significance as it was unable to explain coexistence of unemployment and inflation. However, during the subprime crisis, developing countries experienced very high rates of economic growth and the opposite was happening in developed countries. This lead to the revival of government policy to amend all types of market failure, especially in developed countries.

The empirical findings give mixed results. Initially, the Augmented Dickey Fuller test and the Phillips Perron tests have been used to check the presence of a unit root. All the variables are found to be integrated of order one I(1). To analyse the relationship between government expenditure and economic growth four versions of Wagner's law, both the absolute (Peacock & Wiseman and Gupta) and relative versions (Mann and Musgrave) have been estimated. Johansen's Cointegration technique has been utilized to measure the long run relationship between the variables. For all the four versions of Wagner's Law, empirical results indicate that there is long run relationship between government expenditure and economic growth in India. To investigate the short run relationship between government spending and economic growth, Granger causality test has been applied. However, there is no evidence to support the existence of short run relationship between government spending and economic growth using the Granger causality test. And hence, the two variables are independent of each other. Only for one of the versions of Wagner's law given by Mann (1980), results weakly support unidirectional causality from government spending to economic growth (significant at 10% level of significance) consistent with the Keynesian hypothesis. Results of the current study strongly support that there is a long run relationship between government spending and economic growth in India.

The study can be further analysed to examine how different components of government expenditure (education, health, defence, agriculture, infrastructure and social security) affect economic growth. There are various theories that explain determinants of economic growth. In the Neo Classical growth model, the long-run rate of growth is exogenously determined by the rate of technological progress. Endogenous growth theory or new growth theory was developed in the 1980's as a response to criticism of the

neo-classical growth model. In models of endogenous growth, government policies can improve the factor allocation of the market due to market failure. Market failure restricts growth of innovation by creating a gap between private and societal returns. Government can play a role in this respect, thereby endogenising technological progress and hence policy measures can have an impact on the long-run growth rate of an economy. Barro, Robert. J. (1996) in his seminal paper "Determinants of Economic Growth: A cross country empirical study" examined a panel of 100 countries from 1960 to 1990. His results indicate that given the level of real GDP, high initial schooling and life expectancy, better maintenance of law and order, lower government consumption, low inflation, increase in terms of trade, democracy and political rights positively affect economic growth. And, given the values of other variables, the initial level of real per capita income has a negative influence on economic growth. A more comprehensive study requires investigating all the variables that determine economic growth.

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