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Wagner's Hypothesis In India: An Empirical Investigation Using Bivariate Framework

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ABSTRACT

Over the course of many decades, economists have focused their attention on the link between public expenditure and economic growth. Public expenditure plays an important role in an economy because, without government support and backing, a poor country will be unable to make large investments that will result in a positive shift in the country's economic base. That is why the government makes such large investments. One of the prominent and earliest economists named Adolf Wagner, who had given a concept regarding public expenditure and economic growth, later became a law, which is known as "Wagner's Law" or "Wagner's hypothesis." According to Wagner's hypothesis, as the economy develops, it will lead to an increase in government expenditure. To verify Wagner's hypothesis in India by using annual time series data from 1980–2019. Therefore, the long data set validates the consistency of our statistical and economic conclusions. We apply the unit root test, the Autoregressive Distributed Lag Model (ARDL), cointegration, and the Granger causality test. Our results indicate the presence of a long-run relationship between GDP and public expenditure, while the causality is uni-directional from GDP to public expenditure. Thus, we find support for Wagner's hypothesis. The attempt of this paper is to re-examine Wagner's hypothesis in India because it is rarely examined in the case of developing countries.

Keywords: Wagner's hypothesis, Long time series, Bound test, Cointegration, Error correction, Public expenditure, economic growth, Applied econometrics

1. INTRODUCTION

As an economics professor in Germany, Adolph Wagner (1835–1917) supported state welfare systems over socialism. Since 1910, Wagner has been a member of Prussia's House of Lords after serving in the Prussian parliament from 1882 to 1885. A staunch monarchist, Wagner was opposed to all forms of social democracy. To put it another way, Wagner supported a state socialism distinct from communist and socialist state socialism. Not to topple the monarchy, but to preserve it that way. Due to his role as the first economist to suggest active government intervention in the economy, even prior to Keynes, Wagner's impact on economics is still notable and significant today. To stabilise the political system rather than the economy, Wagner opposed Keynes' demand for government intervention. Increasing government expenditure is something that both Wagner and Keynes advocate, but for very different reasons. Consequently, Wagner might be seen as an inspiration for Keynes(Paparas et al., 2019). At least in terms of the welfare state, Wagner saw and predicted an over-proportional growth in government spending.

According to (Musgrave RA, 1989), there are three primary reasons why government expenditure should increase: One might point to an increase in governmental operations like retirement, insurance, and disaster relief as a socio-political basis. The second factor is economic in nature, such as a rise in government financing for research and technology, and the third is historical, such as repaying debts that have already been accrued. 1893 was the year Adolph Wagner developed the well-known idea that public expenditure rises as a natural result of economic prosperity. He steered clear of definite statements and didn't present his thoughts as a set of rules. His ideas became known as "Wagner's law" or "Wagner's hypothesis" once they were formalized into a statute (Halicioğlu, 2003; Henrekson, 1993).

According to the law, as the country's economy grows, the public sector will increase at a faster rate than the private sector. There are several reasons for this observation. Firstly, as the economy grows, industrialization and urbanization will increase government spending. As economies develop, legal ties between economic agents become more complicated, necessitating the government's administrative, regulatory, and protective functions. Secondly, rising real incomes will lead to an increase in demand for basic infrastructure. In this circumstance, it would be necessary to provide more cultural and social goods and services. This means that public expenditures on areas like education and healthcare rise in tandem with economic growth. Third, the government must intervene in the market to ensure that natural monopolies function properly and to improve economic efficiency(Bird, 1971).According to Wagner, "there are underlying trends for the functions of various government levels (like central and state) to increase both intensively and extensively." The expansion of an economy and the growth of government activity have a significant functional relationship (Bhatia, 2011).Wagner was among the few to identify the positive relationship between economic growth and the government's sector size. Though he was not the earliest to establish the relationship but to illustrate it through empirical evidence, he was among the earliest(Chang et al., 2004).

As(Singh & Sahni, 1984) stated, Wagner and Keynes have different points of view regarding the link between government spending and national income. In Wagner's view, arise in government spending is accepted to be induced by the growth in national income, but in the Keynesian view, a rise in government spending is used to determine an increase in national income. Since the 1960s, in the literature on public finance, Wagner's has received a lot of attention.

Wagnerian and Keynesian approaches, then, reflect two different ways of interpreting the link between government spending and national income. In the Wagnerian framework, cause and effect run from national income to government spending, whereas cause and effect go in the opposite directions under a Keynesian framework.

However, the present study focuses only on Wagner's Hypothesis.

Empirical evidence based on Wagner's Hypothesis includes, (Courakis et al., 1993) for Greece and Portugal, (Gyles, 1991) for the United Kingdom, (Abizadeh & Yousefi, 1998) for South Korea, (Ahsan et al., 1996) for Canada, (Dritsakis & Adamopoulos, 2004) for Greece, and (Legrenzi & Milas, 2002) for Italy. The elasticity of spending to income is used to analyze the empirical data on the link between public income and expenditure. Wagner's theory can only be regarded as legitimate if the coefficient sign is positive and the elasticity is greater than the unit. On the contrary, (Ghate & Zak, 2002)found no evidence for Wagner's Hypothesis in the USA, while (Henrekson, 1993)found no support for it in Sweden. Similarly, (Chletsos & Kollias, 1997) found no support for Greece, as did(Dependra, 2007) for Thailand.

As assessment of the literature shows that studies using Wagner's theory have shown conflicting results. To test Wagner's theory in India, the current study uses the ARDL cointegration technique. Sections of the study are broken down into five. After an introduction in Section 1, a review of the current literature on Wagner's theory follows in Section 2, followed by a discussion of data sources and methods in Section 3, examples of empirical work in Section 4, and sums up the work with concluding remarks in Section 5.

1.1. OBJECTIVES OF THE STUDY

The study's primary goal is to examine the validity of Wagner's hypothesis in India. Besides, the study also has other aims, which are as follows:

i. To study the trends and patterns of government expenditure in India from 1980-81 to 2019-20.

ii. To examine the relationship between government expenditure and economic growth in India.

iii. To examine the direction of causality between the two variables.

1.2. Hypotheses of the Study

On the basis of the objectives, the study has formulated the hypotheses of the study:

i. H_0 : Non-Existence of Wagner's hypothesis.

H_1 : Existence of Wagner's hypothesis.

ii. H_0 : GDP does not granger causes GE in India.

H_1 : GDP granger causes GE in India.

2. REVIEW OF LITERATURE

Ahsanet. al (1996) examined Wagner's theory in Canada using yearly time series data from 1992 to 1998. Wagner's theory is true in Canada during the time period under consideration, according to the Z-A Unit Root Test and Engel-Granger Cointegration Test findings.

John Thornton (1999) investigated the Wagner's hypothesis by using data from the mid 19th century (from 1850 to 1913) in Denmark, Germany, Italy, Norway, Sweden and theUK. He came to the conclusion that Wagner's theory is statistically confirmed by using the Unit root test, the Cointegration test, and the Granger Causality test.

Islam (2001) annual time series data were used to investigate the Wagner hypothesis in the United States for the years 1929-1996. Using the Johansen-Juselius Cointegration Test and Exogeneity Test, he found considerable evidence for Wagner's Hypothesis throughout this research period.

Chow et. al (2002) examined the Wagner hypothesis in the U.K. between the periods of 1948 to 1997. By applying theZ-A Unit Root Test, the Johansen Cointegration Test and the Granger Causality Test, they found Wagner's hypothesis is empirically supported.

Chang, Liuy and Caudill (2004) to examine the link between government spending and income in 10 countries from (1951-1996). The Unit root test, KPSS Test, Cointegration Test, Granger Causality Test, ECM, and theVAR model were all employed. South Korea and Taiwan, as well as Japan, the United Kingdom, and the United States, embrace Wagner's idea, whilst the remaining five countries, Australia, Canada, New Zealand, South Africa, and Thailand, do not.

Dritsakis and Adamopoulos (2004) investigated the causal link between government spending and economic development in Greece by using time series data from 1960-2001. They used the Error Correction Model and the Granger Causality Test. The result of ECM support for Wagner's Hypothesis and Granger-causality tests on Wagner's Hypothesis shows a bidirectional relationship between the variables.

Huang (2006) examined the relationship between government expenditure and output in China and Taiwan between the periodsof1979 to 2002. The results of a bound test reveal that there is no long-term correlation between government spending in China and Taiwan. Granger non causality test findings from Toda Yamamoto revealed no evidence to support Wagner's theory in China or Taiwan either.

Sinha and Dipendra (2007) found that Wagner's theory was tested in Thailand using data from 1950 to 2003. Toda Yamamoto's Granger Causality Test and Ng-Perron Unit Root Test did not support Wagner's theory.

Narayan et. al(2008) investigated Wagner's theory in China's provinces during the years 1952-2003. According to their findings, Wagner's theory is supported by mixed evidence in China's central and western provinces, but less so for China as a whole, based on Panel unit root, Panel Cointegration Test, and Granger Causality Test.

Kalam and Aziz (2009) empirically tested Wagner's hypothesis in Bangladesh over the period (1976-2007). Wagner's hypothesis is supported by the findings of several tests, including the (ADF) test, the KPSS test, the Engle-Granger two-step technique, the Johansen maximum likelihood estimation system, and the Granger Causality Test.

Afzal and Abbas (2010) analyzed the Wagner's hypothesis in Pakistan over the period 1960-2007. Using disaggregated data, they found that Wagner's hypothesis is only supported for the period 1981 to 1991.

Verma and Arora (2010) analysed Wagner's hypotheses in India between 1950 and 2008. The results of an ECM test using unit root, cointegration, provided substantial empirical support for Wagner's theory both before and after the reform.

Pahlavani, Abed and Pourshabi (2011) used yearly time series data from 1960 to 2008 to examine the Wagner and Keynesian hypotheses in Iran. Toda-Yamamoto's technique and the ECM's Granger causality test results show that unidirectional causality runs from economic growth to the size of the government, hence Wagner's hypothesis was verified in Iran during this research period.

Kumar et. al (2012) time series data from 1960 to 2007 was used to investigate Wagner's theory in New Zealand and its effect on the economy. According to their findings, Wagner's theory was supported by the use of the ARDL Bounds Test, Engle & Granger Fully Modified Ordinary Least Squares and time series approaches.

Sahoo (2013) from 1970-71 through 1998-99, the application of Wagner's idea to India was examined. Wagner and Keynesian hypotheses were found to be well supported by the use of cointegration, ECM, and the study's findings.

Ranjan and Chintu (2013) test Wagner's theory in the Indian economy by using data from 1970-71 to 2010-11. They used a Granger Causality Test and an error correction model in their investigation. The findings demonstrated a strong correlation between economic growth and government size, as well as the unidirectional causality through economic growth to government size, which was established using the granger causality test. This strongly validates Wagner's theory.

Oktayer and Oktayer (2013) examined the relationship between government expenditure and economic growth in Turkey during the period 1950-2010. Through the use of the ARDL in the bivariate system, the trivariate causality test revealed no evidence to support Wagner's Hypothesis, and by including inflation in the trivariate model, the Wagner Hypothesis is supported.

Thabane and Lebina (2016) found a long-term, steady association between government expenditure and economic development in Lesotho from1980 to 2012 in Southern Africa (Lesotho) by using the ARDL model. The Granger causality test confirms Wagner's theory since it reveals the link between economic growth and government spending.

Adil et al. (2017) tested the validity of Wagner's theory for India from (1970-2013). The findings of the ARDL, bound test, and error correction model demonstrated that P.E. and GDP have cointegration, but the hypothesis had only limited support.

Paparas, Richter, and Kostakis (2019) used yearly time series data from 1850 to 2010 to test Wagner's theory in the United Kingdom. It was found that the Wagner and Keynesian theories were supported by unit root tests, cointegration, and the Granger Causality Test (GCT).

Sharma and Singh (2019) use annual time series data for the post-liberalization period to investigate Wagner's theory in India (1988 to 2017). Wagner's theory was supported by the ADF and PP tests, the Johansen cointegration test, the VECM, and the Granger Causality Test.

2.1 RESEARCH GAP

i. There is no consensus regarding the existence of Wagner's Hypothesis.
ii. Most of the studies reported in the literature have been conducted indeveloped countries. However in developing countries, Wagner's Hypothesis is rarely examined.

Therefore, against this backdrop, the present study has made an attempt to re-investigate the existence of Wagner's Hypothesis in India by employing ARDL approaches.

2.2 India's Government Expenditure: A Few Idealized Facts

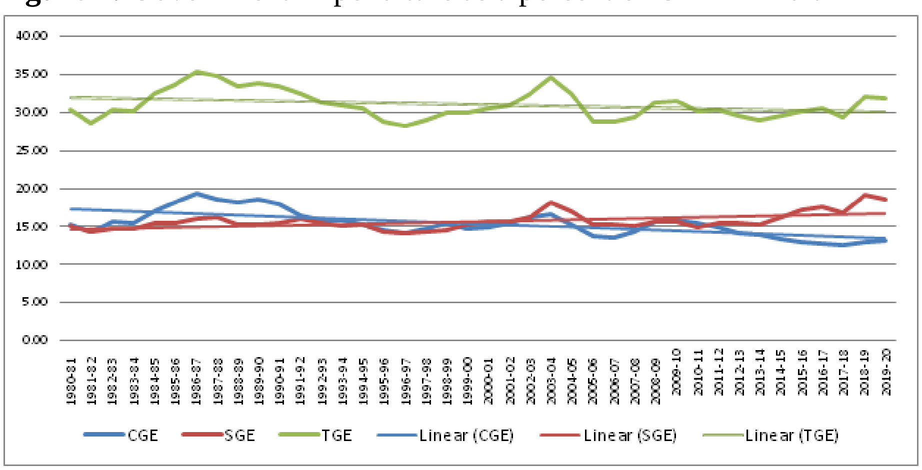
Absolute expenditure data is less effective for measuring the rise in government spending. Increases in the absolute amount of government expenditure are inevitable in developing economies like India, where GDP has been consistently expanding. As a result, to understand the trends and patterns, we used government spending as a percentage of GDP.

After 1980-81, India's government spending grew at a rapid speed. Deficit financing patterns (debt and interest payments) and the necessity for fiscal consolidation have all affected the structure of government spending since the 1980s, when the government's role in growth changed. In the1980s, the primary goal of the government was to improve rural infrastructure and development.

Based on economic anomalies, the study's period time frame is separated into four phases:

i. Phase 1: 1980-81 to 1989-90
ii. Phase 2: 1990-91 to 2002-03
iii. Phase 3: 2003-04 to 2008-09
iv. Phase 4: 2009-10 to 2019-20

Figure 1: Government Expenditure as a percent of GDP in India



Source: RBI, 2020

Note: CGE, SGE & TGE stands for Government Expenditure of Central, State & Combined Government respectively.

Phase 1: 1980-81 to 1989-90

It is apparent from the figure that the overall size of government expenditures grew at a very rapid pace in the early eighties. Between 1980 and 1990, the average expenditure of the central government was

17.05% of GDP, whereas the average expenditure of the state government is was 15.26% of GDP separately. The average expenditure of combined government is 32.32% of GDP. During first phase, the central government's expenditure was greater than the state government's expenditure.

When a general election was held in 1984-85, the growth rate of public expenditure was at its highest. The state government spends more money to keep the peace and order during elections. Defense, interest payments, increased salaries (fourth pay commission), and subsidies accounted for the majority of the increases in revenue expenditures, which averaged 63.29 percent of total expenditures in 1980-81 and climbed to 69.11 percent in 1989-90. In 1986-87, measures were put in place to execute the recommendations of the fourth pay commission, resulting in an almost 1% increase in revenue expenditures as a percentage of GDP, from 11.72 percent in 1985-86 to 12.61 percent in 1986-87. In fact, revenue expenditures increased far more than capital expenditures in the 1980s and 1990s.

Phase 2: 1990-91 to 2002-03

Between 1990-91 and 2002-03, the average expenditure of the central government was 15.53% of GDP, whereas the average expenditure of the state government was 15.14% of GDP separately. The average expenditure of the combined government is 30.67% of GDP. During the second phase, the expenditure of the central and state governments is more or less similar.

In 1990-91, the government's finances had reached a breaking point. After steadily increasing throughout the 1980s, government spending reached 17.96 percent of GDP in 1990-91.After the reforms, this percentage began to decline in the 1990s, owing mostly to the macroeconomic stabilization effort that followed the 1991 BOP crisis. In 1992-93, it was 15.83 percent, and in 1996-97, it was 14.16 percent. Total expenditures were primarily expected to be reduced due to a decrease in capital expenditures as a percentage of GDP. However, once the Fifth Pay Commission report was adopted in 1996-97, a significant increase in wages and pensions pushed up revenue expenditures as a percentage of GDP. Until the FRBM Act was announced in 2002-03, this percentage had been steadily increasing.

After the reform, the share of capital account expenditures decreased more than the share of capital account expenditures decreased before the reform, indicating a greater drop in the post-reform period. This was largely due to the termination of central government loans to states that were classed as capital expenditures (Reserve Bank of India Bulletin, December 2008).

Phase 3: 2003-04 to 2008-09

The composition of expenditures improved in 2003-04, with revenue expenditures falling to 77.14 percent of total expenditures in 2004-05 and capital expenditures rising to 22.86 percent, respectively. The fall in major subsidies, the lower increase in interest and non-plan spending, and pension reform all contributed to this. The central government's overall expenditures declined from 16.60 percent of GDP in 2003-04 to 15.37 percent and then to 13.69 percent of GDP over the next two years after the FRBM Act was passed. However, this spending restraint was achieved by drastically reducing capital expenditures while revenue expenditures only decreased marginally. Increased revenue expenditure was also facilitated by debt reduction on farm loans and increased spending on subsidies (mostly food subsidies).

The government's actions to combat the effects of the global financial crisis on the Indian economy resulted in a revenue deficit and significant increases in government spending, causing a temporary deviation from the FRBM Act's fiscal consolidation path in the years 2008-09 and 2009-10.

Between 2003 and 2008, the average expenditure of the central government was 14.87, whereas the average expenditure of the state government was 16.07 separately. The average expenditure of the combined government is 15.47. During the third phase, state expenditure is greater than that of the central government.

Phase 4: 2009-10 to 2019-20

After the partial withdrawal of stimulus packages and the reduction of fuel subsidies, total expenditures began to fall, falling to 14.73 percent in 2011–12. It's worth noting that state government spending exceeded that of the central government throughout this time period. The rationale for this is that, on average, states spent more on capital outlays than the central government during the period 2010–20. For example, in 2019–20, states' aggregate capital outlay and the center's capital outlay are expected to be 2.8 percent of GDP and 1.8 percent of GDP, respectively. For example, in 2019-20, states' aggregate capital outlay and the center's capital outlay are expected to be 2.8 percent of GDP and 1.8 percent of GDP, respectively. States' expenditure budgets have grown throughout time as a result of greater revenue generation by the states and increased devolution from the centre. States had greater funding for capital outlay than the central government since they were able to keep their revenue shortfall under control from 2015 to 2018. States are predicted to spend 64% more than the central government in 2019-20, a considerable increase from 46% in 2014-15.As a result, states are taking on more responsibility for the country's government spending. Since the adoption of GST in 2017, states' own resources have shifted dramatically, with states transferring a large portion of their taxation powers to the GST Council.

State governments are progressively implementing income assistance programmes, which have been given a large share of the sectoral budget. The central government announced the Pradhan Mantri Kisan Samman Nidhi (PM-KISAN) scheme in 2019. Under this scheme, all farmer households receive a yearly financial supplement of Rs 6,000. This scheme has a budget allocation of Rs 75,000 crore for 2019-20. Various state administrations have proposed similar income support plans that provide direct cash transfers to participants. The majority of these programmes have been announced for the agricultural industry. For example, in Andhra Pradesh, the income support scheme for farmers received 43 percent of the agriculture budget in 2019–20. State spending on farm loan exemptions has risen dramatically in recent years. It was less than one lakh crore rupees in 2017-18 and 2018-19. Loan waivers could have a variety of effects, depending on the quantity of debts waived, how they are implemented, and the state's budgetary situation. Farm loan exemptions may be easier to finance for states that are in better financial health.

3. DATA SOURCES AND METHODOLOGY

For investigating the nexus between GDP and Government Expenditure, the study considered total expenditure (T.E) as a proxy for G.E. and GDP (market prices) at constant prices as a proxy for economic growth. The used an annual dataset spanning from1980-81 to 2018-19.The data has been extracted from a handbook of Indian statistics published by the RBI. Both the variables are transformed into log values in order to remove the problem of heteroskedasticity.

The study used a log linear model to estimate the Wagner's Hypothesis:

$$\mathbf{lnGE = \beta_0 + \beta_1 lnGDP + U_t}$$

where,

ln GDP= log of GDP at market prices (base year 2004-05)

ln GE= log of nominal Government Expenditure

β_0 = Intercept, β_1= Slope

U_t= Error term

Before proceeding with the time series econometrics estimation, a quick statistical analysis is required. Thirty-nine years of normal observation are included in our data collection, from 1980 to 2019. Table 2 shows the descriptive data, which reveals that the average GDP growth is 14.75454 with a standard deviation of 0.704900. The average government expenditure growth is 13.10789, with a standard deviation of 1.463042. One variable, i.e., GDP, is positively (right) skewed and another variable, i.e., government expenditure, is negatively (left) skewed. The variables' kurtosis statistics reveal that they are both platykurtic (short-tailed or lower peak). The residuals (errors) of GDP and government expenditure are normally distributed according to the Jarque-Bera test.

Table 2. Descriptive Statistics

	LNGDP	**LNGE**
Mean	14.75454	13.10789
Median	14.71771	13.20011
Std. Dev.	0.704900	1.463042
Skewness	0.182180	-0.051018
Kurtosis	1.799302	1.853380
Jarque-Bera	2.558454	2.153366
Probability	0.278252	0.340724
Observations	39	39

Source: Author's Compilation

3.1 Methodology And Model Specification

To evaluate the presence of Wagner's Hypothesis in India, this study employed the Autoregressive Distributed Lag – ARDL – cointegration approach (also known as the bounds testing procedure) established by (Pesaran et al., 2001) in a bivariate system. In addition, to identify the direction of causation between the variables, the Granger Causality approach was applied. It is required to examine the stationarity of the variables prior to adopting the ARDL model.

3.2Unit Root Tests

The existence of a unit root invalidates the regression results and thus impairs the estimation accuracy of the parameters. The very first step involves determining the stationarity of the time series data through the use of unit root tests. Even though unit root tests are not necessary for the ARDL testing approach, it is crucial to execute the unit root test to make sure that no variable is integrated of two or higher. For this reason, all variables are assumed to be I(0) or I by the ARDL procedure (1). Once an I(2) variable is noticed in the model, the F-statistics calculated by (Pesaran et al., 2001)and (Narayan, 2005) are invalid. Hence , Augmented Dickey Fuller and Phillips Perron tests have been used to ensure that the data is stationary.

3.3 ARDL Specification

The Auto Regressive Distributed Lag model (ARDL) is superior to other methods of cointegration like(Engle, R. F., and Granger, 1987) and (Johansen & Juselius, 1990) in a number of ways. Firstly, If the variables are integrated of order zero i.e., I(0), integrated of order one i.e., I(1), or a combination of both, it can still be used(Pesaran and Pesaran, 1997). Secondly, It's also statistically more reliable than Johansen and Juselius cointegration method for determining cointegration relations in small samples(M Hashem Pesaran, 1999). The bounds testing approach, in the third instance, provides unbiased long-run estimates and valid t-statistics even in the presence of endogenous regressors in the model (Narayan, 2005). Fourthly, the model incorporates enough lag length to adequately represent the data generation process in general to specific modelling frameworks (James Laurenceson, 2003). Lastly, Error Correction Model can be made from ARDL with a simple linear transformation. This means that short-run adjustments can be combined with long-run equilibrium without losing any information about long-run (M Hashem Pesaran, 1999). Primarily, it consists of two steps to determine the long-run relationship in the ARDL approach to cointegration. All the variables in the equation under consideration should be examined to see if there is any long-term relationship between them, is the first step. The second step is to obtain long- and short-run models if there is enough evidence of cointegration among variables. F-statistics are calculated to conduct the bounds test. Long-run relationships can be determined by evaluating the null hypothesis of no cointegration to the alternative hypothesis of cointegration. Then, the value of the F-statistic will be compared to the critical values that have been set. If the calculated F-statistic is less than the lower bound I(0), the null hypothesis of no cointegration between the variables is accepted. If, on the other hand, the F-statistic exceeds the upper bound I(1), we reject the null hypothesis and accept the cointegration alternative. Additionally, if the F-statistic is uncertain between the lower and upper bounds, the opinion regarding cointegration is indeterminate.

Because a cointegration relationship has been established, we can now estimate long- and short-run dynamics. Long-run coefficients are calculated using the ARDL model, which can be written as follows:

$$\mathbf{lnGE_t = a_0 + \sum_{i=1}^{p} a_1 \ln GE_{t-1} + \sum_{i=0}^{q} a_2 \ln GDP_{t-1} + u_t \ldots\ldots (1)}$$

where a_0 is the intercept; a_1 and a_2 are the long-run coefficients; p and q are the lags of dependent and independent variable, respectively; and u_t is the error term.

Furthermore, the error correction representation of the estimated long-run equations is as follows:

$$\mathbf{\Delta lnGE_t = b_0 + \sum_{i=1}^{p} b_1 \Delta lnGE_{t-1} + \sum_{i=0}^{q} b_2 \Delta lnGDP_{t-1} + \varphi ECT_{t-1} + \omega_t \dots\dots (2)}$$

where Δ is the first difference; b_1 and b_2 are the short-run coefficients; ECM_{t-1} is the error correction term; φ is the speed of adjustment; and ω_t is the error term.

3.4Granger Causality Approach

The ARDL approach determines whether or not two variables are cointegrated, but not their causality direction. The Granger causality test specification will be a vector autoregression (VAR) in first difference form if there is no indication of cointegration between the variables. If evidence of cointegration is observed, a one-period lagged error correction term (ECTt-1) must be added to the Granger-type causality test model. Because (Engle, R. F., and Granger, 1987) warn that if the series are integrated to order one, VAR estimation in first differences will be misleading in the presence of cointegration. The Granger causality test helps in determining the strength of causation between variables. The Granger Causality approach involves estimating the following pairs of regressions to determine the direction of causality among the specified variables:

$$\mathbf{lnGE_t = \sum_{i=1}^{p} \alpha_i lnGDP_{t-1} + \sum_{j=1}^{p} \beta_j lnGE_{t-j} + u_{1t} \dots.. (3)}$$

$$\mathbf{lnGDP_t = \sum_{i=1}^{q} \gamma_i lnGE_{t-1} + \sum_{j=1}^{q} \rho_j lnGDP_{t-j} + u_{2t} \dots.. (4)}$$

4. Empirical Analysis

4.1 Unit Root Test

As shown in Table 3, the results of the ADF test failed to reject the null hypothesis of unit root in the initial stage, indicating that variables are non-stationary at levels. However, the null hypothesis is rejected at the first difference, indicating that variables become stationary at the first difference. In order to support the ADF results, we also conducted a PP test. The results of the PP test are consistent with those of the ADF test.

Table 3. Augmented Dickey–Fuller (ADF) and Phillips–Perron (PP) unit root tests

Variables	**ADF Test (at the level)**		**ADF Test (at the first difference)**		**PP Test (at the level)**		**PP Test (at the first difference)**	
	t-value	**p-value**	**t-value**	**p-value**	**t-value**	**p-value**	**t-value**	**p-value**
With Constant								
Ln GDP_t	2.26	0.99	-4.98***	0.00	3.57	1.00	-4.95***	0.00

Ln PE_t	-1.23	0.64	-6.12***	0.00	-1.31	0.61	-6.14***	0.00

Source: Author's Compilation

These results demonstrate the validation of ARDL's cointegration bounds testing approach.

4.2 ARDL Bound Test

The following step was performing an ARDL bounds test to determine whether or not cointegration existed. The results of the bounds test are presented in Table 4. The computed value of F-statistics for the period 1980 to 2018 is 171.88, which is more than the upper bound critical value (4.16) at the 5 percent level of significance and (3.51) at the 10 percent level of significance. As a result, the null hypothesis of no cointegration is rejected by F-statistics. Hence, the ARDL bounds test is used to establish whether or not there is a long-run relationship for this model. The fact that the bounds test has shown that the variables are cointegrated leads to the estimation of the long-run coefficients and error correction term using Eqs. (1) and (2), respectively.

Table 4: Bound Test

ARDL Model	**MODEL: lnGE = f (ln GDP)**		**Remarks**
Model	**F-Statistics**	**K**	
Ln GE	**171.88**	1	Cointegration exists
Critical Values	**Lower Bound I(0)**	**Upper Bound I(1)**	
10% Level	3.02	3.51	
5% Level	3.62	4.16	

Source: Author's Compilation

4.3 Long Run Estimates and Error Correction Term

To ensure that the ARDL model's long-run coefficients are accurate, it is necessary to conduct a diagnostic test. The lower panel of table 5 shows the diagnostic tests. Jarque-Bera's probability value is 0.23, which is greater than 0.05, indicating that the error term in the model is normally distributed, as shown by the probability value. The probability value of the Chi-square test is 0.49, which is more than 0.05, indicating that there is no evidence of autocorrelation between the variables. As a result, there is no autocorrelation in the model. Since the probability value of chi-square is 0.54, which is higher than 0.05, the model is free of heteroskedasticity, which means that the size of the error term does not vary across different values of independent variables.

Table 5. Long-Run Result of ARDL Model

Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
Ln GDP	1.97	0.08	23.59	0.00
C	-14.91	1.47	-10.14	0.00
ECT(-1)	-0.11	0.01	-23.34	0.00
Diagnostic Tests				
Jarque-Berra Test	2.88			0.23

Breusch-Godfrey serial correlation LM Test	0.71			0.49
Breusch-Pagan-Godfrey test for heteroscedasticity	0.62			0.54

Source: Author's Compilation

All the assumptions have been met. Therefore, the ARDL model is the most optimal approach for estimating long-run and short-run dynamics among the variables.

The long run results of the ARDL model are incorporated in table 5 (see upper panel). It is evident from table 5 that the coefficient of GDP is positive, i.e., 1.97 and has a significant impact on government expenditure in the long run in India. It is reasonable to conclude that for every one percent increase in GDP on an average, government expenditure will increases by 1.97 percent. This result is similar to previous studies like(Dritsakis & Adamopoulos, 2004), (Yay & Tastan, 2009), (Ahsan et al., 1996),and (Adil et al., 2017), which argue that GDP has a positive impact on Government Expenditure. This result supports the Wagner's Hypothesis in India. It is interesting to note that the coefficient is 1.97 which is greater than unity, which shows the strong evidence of Wagner's hypothesis in India in the long run.

Further, the coefficient of the error correction term (ECT) has a negative sign and is statistically significant at the 5% level of significance. The presence of co-integration among the variables is shown by the negative sign and statistically significant value of the correlation coefficient. In this case, the coefficient of the ECT is -0.11, which indicates that the speed of adjustment towards long-run equilibrium is 11 percent per annum.

4.4 Stability Test

Traditionally, it has been believed that the parameter stability or coefficient stability of a model is important. Figures 2a and 2b show plots of CUSUM and CUSUM squares, which are used to test the coefficient stability. The straight lines in both graphs show critical bounds at the 5% level of significance because the plot of these two tests does not pass the critical value line, showing that the relationship between government expenditure and GDP is fairly stable over the long run. In general, we can say that coefficients are stable over the long run.

Figure 2a: CUSUM Test

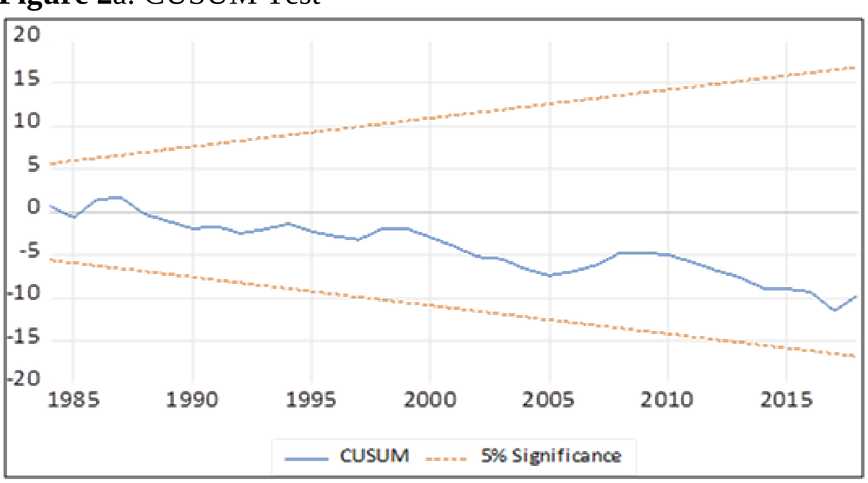
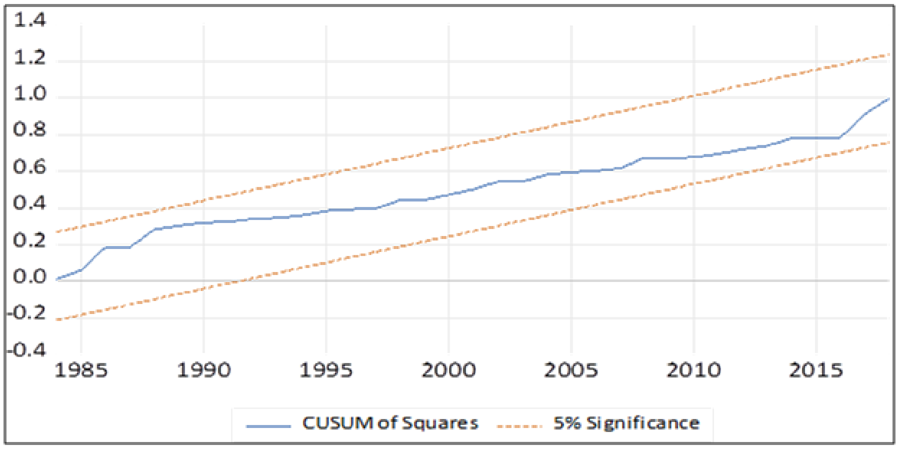


Figure 2b: CUSUMSQ Test



4.5 Granger Causality Approach

Table 6 represents the results of pairwise granger causality among GDP and GE. The results show that the null hypothesis that **LNGDP does not Granger Cause LNPE** is rejected at 5% level of significance. Whereas, the null hypothesis that **LNGE does not Granger Cause LNGDP** is failed to reject at 5% level of significance. Therefore, there is unidirectional causality running from GDP to GE, thus supporting the Wagner's Hypothesis in India.

Table 6: Granger Causality Approach

Null Hypothesis:	**Obs**	**F-Statistic**	**Prob.**	**Remark**
LNGDP does not Granger Cause LNGE	37	3.25116	0.0518	**Unidirectional Causality**
LNGE does not Granger Cause LNGDP		0.45188	0.6404	

Source: Author's Compilation

5. Conclusion and Suggestion

Over the period of decades, economists have focused their attention on the relationship between government expenditure and economic growth. Specifically, the Wagner and Keynes Hypotheses are two paradigms that hold opposing perspectives on the relationship between government expenditure and Gross Domestic Product (GDP), respectively. A positive relationship between economic growth and government expenditure, according to Wagner, is established. Taking a Keynesian perspective, it is assumed that increasing government expenditure will result in a higher level of aggregate demand, which will in turn stimulate economic growth. **The present investigation, on the other hand, is limited to Wagner's Hypothesis**. The study of the literature, states that studies conducted in accordance with Wagner's hypothesis have produced mixed outcomes. The purpose of the present study is to re-examine the validity of Wagner's hypothesis by employing the ARDL cointegration approach in India. The study has used an annual dataset spanning between 1980-81 to 2018-19.

The results of the study are summarized as

First, ADF and PP tests show that both the variables are integrated of order one i.e. I (1). Second, bound test determines the existence of long-run relationship among the variables. Third, some diagnostic tests are performed which shows that model is free from the problem of autocorrelation and heteroscedasticity. Fourth, long-run results of ARDL shows that the coefficient of GDP is positive i.e. 1.97 and has significant impact on Government Expenditure in the long run in India. This result supports the Wagner's Hypothesis in India. Fifth, the coefficient of ECT is -0.11, which depicts that the speed of adjustment towards long-run equilibrium is 11 percent annually. Sixth, CUSUM and CUSUMQ graphs shows that coefficients are stable in long-run. At last, there is unidirectional causality running from GDP to GE, thus supporting the Wagner's Hypothesis in India.

The findings of the present imply that government expenditure is increasing at a faster rate than the economy's income, which supports Wagner's Hypothesis in the case of India. This is mostly due to an increase in revenue expenditure, which is primarily devoted to non-developmental activities such as subsidies, interest payments, administrative and defense services. Consequently, the Indian government must scrutinize non-developmental expenditure and place greater focus on expenditure that is conducive to development.

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