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WAGNER'S LAW AND DISPLACEMENT EFFECT IN INDIA WITH SPECIAL REFERENCE TO COVID-19

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ABSTRACT

The twin objectives of this paper have been to empirically investigate the validity of Wagner's law of increasing government activities (or public expenditure) in case of India over the period 1980-2019, and logically moving ahead to configure Displacement effect of Covid -19 pandemic in it as coined by Wiseman Peacock hypothesis. Hence it was to necessary to estimate trend growth of public expenditure for using it as baseline scenario of 'No Covid' and to use it further to check displacement effect towards the end of the public expenditure series. The general increase in public expenditure overtime is best explained by Wagner's law which states that government activities increase intensively and extensively with economic development, hence the need for testing empirical relationship from GDP to public expenditure. The inverse relationship from public expenditure to GDP was simultaneously hypothesised to test Keynesian multiplier effect of government expenditure on national income. For testing the mutual dependence, ADF test for stationarity was applied first followed by testing long run and short run bi-directional causality between economic growth and central public expenditure using co-integration and Error Correction Model. Both the variables were observed to be cointegrating thereby signifying equilibrium relationship between them. The ECM test brought out the fact that the short-run changes in GDP have a positive impact on the short-run changes in total expenditure of central government of India. The direction of relationship between the two was tested using Grangers Causality test which depicted positive and significant relationship overtime with unidirectional causality from GDP to total expenditure thus validating Wagner's Law. Next displacement effect was analysed. Actually Wiseman-Peacock made an improvisation over the Wagner's law by establishing that public expenditure does increase in the long run but it does not increase continuously rather undergoes structural shifts at intervals due to social and economic upheavals. For deciding whether displacement in public expenditure due to Covid-19 occurred or not first trend growth in the central government public expenditure was estimated (CAGR 12.7 percent per annum) for the period 1980-2019. Considering this trend growth as the baseline scenario (had Covid not been there), the figure was compared with the Covid time increased public expenditure due to relief package using graphical analysis. As the breakpoint of year 2020 was known a- priori, the classical test for structural break developed by Chow (1960) was applied on central government expenditure. Though the empirical results substantiated the applicability of Wagner's law in India till 2019, no significant displacement effect was found in Public expenditure due to Covid-19.

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Keywords: Covid-19, Wagner's Law in India, Wiseman-Peacock hypothesis and India

I INTRODUCTION:

The recent exogenous shock of COVID-19 pandemic led to serious economic implications across the globe and as a consequence of this, the nations across the world have spent huge amounts in stimulus packages involving fiscal and monetary measures to mitigate the human and economic impact and to save their economies and livelihoods. Like most of the affected nations of the world, in India also the economic impact of COVID-19 has been substantial and broad-based. It has adversely affected the growth rate because of unavoidable nationwide shutdown. In the first quarter of financial year 2020-21, the GDP of India contracted sharply, a massive decline of 23.9 percent on year on year basis. Like many other nations, India also announced fiscal concessions and relaxations measures to support economic activities to the tune of 9 percent of its GDP. The measures included direct transfers in-kind and cash, wage support, enhanced spending under MNREGA and investment in healthcare infrastructure all leading to increase in public expenditure.

Public expenditure is an important instrument of fiscal policy. It influences aggregate demand, savings and investment in the economy apart from income distribution. Moreover, as suggested by Keynes (1936), fiscal policy can also be used to generate effective demand and stabilize an economy during the period of business cycles. If we take a look at economic theory, as per the Classical' free market ideology market mechanism is the best and government need not interfere in the functioning of an economy rather government should limit itself to only three functions namely protecting the country from foreign aggression, maintaining internal peace and order and accomplishing public development works. Expect these three functions all works performed by state were considered wasteful and unproductive. The economic depression of 1930s brought a change in economic thinking. The followers of Keynes (1936) strongly supported the role of government in reviving an economy by spending and helping generate effective demand. Keynesians even supported deficit budgeting, giving the argument that it would help in creating effective demand in the economy and believe that an increase in autonomous government expenditure, whether investment or consumption, even if it was financed by borrowing would cause output to expand through a multiplier process.

Public expenditure is needed to promote rapid economic growth, to maximise social welfare, for equitable distribution of income, balanced regional growth and to build social economic overheads. The theories of public expenditure provide deeper insight. Wagner (1835-1917) in his study on historical experience of Germany proved that as an economy grows, public expenditure on different economic activities increases intensively and extensively also known as Law of increasing state activities. Traditionally government activities were limited to only social overhead, defence, justice, law and order later with the rise of Welfare economics, governments started taking up welfare measures also e.g. redistribution of income, old age pension, enrichment of cultural life etc. Moreover, social and economic complexities also force expenditure to increase overtime. Most of other developed and even developing countries observed the similar pattern of growth. Wagner's study, basically a historical experience, does not explain *what would be extent of increase in public expenditure and the*

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time that it would take. Wagner focussed on long term trend growth and ignored short term financial difficulties in its way. An insightful study by Peacock and Wiseman on public expenditure in UK for the period 1890 to 1955 improvised Wagner's law by proving that public expenditure does not increase continuously and smoothly rather it experiences structural breaks due to unforeseen circumstances (e.g. social or other disturbances like war) and corresponding adjustments; and named them Displacement effect, Inspection effect and Concentration effect. In case of such emergencies, the governments generally raise tax rates to meet increased public expenditure (which is not cut down even after it is dealt with) and hence undergoes displacement effect i.e. shift from older level to new higher level of expenditure and taxation. Actually inadequate level of revenue at war time compels the government and public to review the situation called inspection effect and inadequacy of revenue convincing the public to tolerate the higher level of taxes is known as concentration effect. Such disturbances and corresponding adjustments or effects are captured by kinky nature of public expenditure curve. Moreover, the central government expenditure on economic activities often grows faster than local and regional public authorities. The recent Covid-19 shock has triggered public expenditure on account of stimulus packages including fiscal and monetary measures. Trillions of dollars have been spent for example, European countries offered large proportion of GDP as stimulus package (i.e. Italy 49 pc, Germany 40 pc, France 28 pc, UK 26 pc, Spain 17 pc while US granted 14 pc of GDP by the way of immediate fiscal impulse, deferrals and other liquidity guarantees (www.statista.com). The Government of India also announced relaxation measures worth 9 pc of GDP to support economic activities which involves in-kind and cash transfers for social protection and healthcare (1 pc of GDP); wage support, employment provision to low wagers & insurance coverage to health workers (0.5 pc of GDP); and healthcare infrastructure (0.1 pc of GDP). The economic stimulus responses to the COVID-19 crisis outsize even those to the 2008 financial crisis-among European nations in case of Germany it was 3.5 pc, Japan 2.2pc, France 1.4 pc, UK 1.5 pc while for US 4.9 pc, Canada2.8 pc, India 1.2 pc, South Africa 2.9 pc and Brazil 0.6 pc of their respective GDP (Cassim, Handjiski, Schubert and Zouaui,2010).This change in government spending is an illustration of the displacement effect in Central government expenditure of India, hnce needs to be investigated. An attempt has been made to empirically investigate the pattern of growth of public expenditure and gross domestic product, interrelationship and causation between the two and structural shift or displacement effect in public expenditure due to Covid 19 using appropriate techniques.

II. REVIEW OF RELATED LITERATURE:

The review of similar studies regarding the relationship between public expenditure and economic growth on India or Indian states do not give clear cut picture rather reveal mixed results. Sahoo(2001) examined the Peacock-Wiseman hypothesis for India over the period 1970-71 to 1998-99. This study focused on structural break in variables and on the possibility of a trend break in public expenditure and GDP occurring due to macro-economic fluctuations and policy changes. BLS unit root test statistics was used which showed 1995 and 1994 as trend breaks in levels and in first difference respectively. The study of Verma and Kumar (2010) observed continuous increase in public expenditure of India over the period 1950-51 to 2007-2008 incurred to achieve the goals of economic and social well-being

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of the people. Further, breaking up into capital and revenue expenditure, it was noticed that capital expenditure increased at a very fast rate during the period 1950-70 but after it the share of revenue expenditure started rising continuously. To test the validity of the Wiseman-Peacock hypothesis, two structural breaks of mild liberalization and intensive liberalization were considered. The co-integration analysis confirmed the existence of Wagner's law in the pre reforms and post reforms periods in India but the immediate impact of increasing GDP on government expenditure was found to be absent. Another study by Bansal et al. (2012) explored empirical relationship between public expenditure and economic growth in the context of Indian states using cross-sectional data (2001-02) and applying regression analysis. Peacock-Wiseman 'traditional' version was found to be the best fit, which also explained 'Total Expenditure' and 'Social Expenditure' as functions of state domestic product (SDP). Moreover, the slope coefficient (elasticity) of expenditure was estimated to be less than one. All of the studied versions measured the elasticity of government expenditure with respect to growth variable to be less than one while the condition necessary for the applicability of Wagner's law was elasticity coefficient greater than one. Therefore, (elasticity coefficient less than one explained that) government expenditure increased at a relatively slower rate in comparison to the economic growth, and could not validate applicability of Wagner's Law for Indian states. Ray et al. (2012) used a dataset for a period of 1961-62 to 2009-2010 for the country of India. To identify the long run relationship between development expenditure (inclusive of Economic services and social services) and economic growth Granger causality and cointegration techniques were employed and to examine the short run dynamics ECM was used. In the long run, the economic growth and development expenditure of government were found to be co-integrated thereby indicating the existence of a long run relationship between two, though no short run causality was found to exist between economic growth and development expenditure. Thus the study concluded that neither Keynesian hypothesis nor Wagner's law worked in India. Another study by Srinivasan (2013) tested causality between public expenditure and economic growth over the period 1973 to 2012 in case of India. The causality was proved using Johansen's cointegration and vector error correction model. He showed that national income triggers public expenditure which basically indicated application of Wagner's law against Keynesian proposition i.e. causality from public expenditure to national income. The results of these tests found one-way causality from national income to public expenditure and long run relationship between two for Indian economy for the period 1973-2012, and suggesting that Indian government must increase development expenditure rather than non-development expenditure. In another study on the state of Gujarat (India) for the period 1990-91 to 2004-2005, Saiyed(2013) examined the relationship between per capita income and government expenditure using two variable regression model. The analysis confirmed the causal relationship between per capita income and government expenditure in Gujarat, hence validating Wagner's law was for Gujarat. Medhi(2014) analysed the relationship between government spending and economic growth in India with the help of time series data for the period 1974 - 2010. He stressed that for developing countries like India expenditure policy is considered an effective and strong instrument for economic growth. It observed that central government expenditure continued to increase in the post-reforms era. Stressing on the necessity to know whether these expenditures were productive by nature or not, the study applied Augmented Dickey Fuller test and Johansen Full

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Information Maximum likelihood method. The results established bi-directional causality between public expenditure and economic growth for India in long run while in short run it found only one-way causality from economic growth to government spending. Ahmed's study (2014) also attempted to test the applicability of Wagner's law in Indian context using time series data for the period 1980-81 to 2012-13. To establish results two versions of the law viz., Wiseman-Peacock (1961) and Goffman (1968) were made use of. After testing for the stationarity of variables, Augmented Fuller Test was applied, and a long run relationship was observed to exist on the basis of co-integration techniques. The study used an improved method given by Engel and Yoo which included one additional step as compared to Engel-Granger method. Inclusion of the third step made its estimates asymptotical equal to full information maximum likelihood method; and the standard error allowed Gaussian inferences. The results supported unidirectional causality from GDP to public expenditure but not from public expenditure to GDP meaning thereby, public expenditure increased at higher rate with the increase in GDP but increase in public expenditure didn't raise national output. This showed inefficiency of public expenditure and depicted fiscal policy to be a weak policy instrument in India.

The analysis of available literature in Indian context reveal that most of the studies are conducted on the theme of validation of Wagner's law and few of them found causality running from gross domestic product to public expenditure. Interestingly very little work seems to have been done on the Wiseman Peacock hypothesis and displacement effects especially during the last one decade and hence the research gap. Further the very recent Covid factor and fiscal measures undertaken in response provide justification for checking displacement effect of public expenditure, hence provides rationale for undertaking this study. Also the debate on public expenditure and economic growth is important for economic policy related issues, for sustainability of public finances and fiscal policy adjustment plans.

III. OBJECTIVES OF THE PRESENT STUDY, DATABASE AND METHODOLOGY:

Given the backdrop, the study mainly focuses on the growth of public expenditure of central government of India from 1981 till Covid-19 pandemic. Covid-19 is an exogenous shock which affected the economy and also led to huge fiscal spending and role of Government became very significant. The analysis is divided into two parts- first to analyse nature and direction of relationship between economic development and public expenditure (indicator of increasing state activities) in India i.e. whether Wagner's law is applicable in India or not. Two, using graphical analysis, the points/years of structural break in Public expenditure are identified, for testing displacement effect of the Wiseman-Peacock hypothesis with special reference to the covid-19 point of time i.e., for the year 2021. A baseline scenario was created i.e., trend level of public expenditure and projecting 2020-21 i.e.*had Covid not been there*, then compared with *actual public expenditure of 2020-21* and also projected the displaced series. As the breakpoint was known a- priori, Chow test, the classical test for structural break, (Chow,1960) was applied to see the effect of Covid-19 pandemic on Public expenditure. The Chow test splits time series into two sub periods, estimates parameters for both series and using F- statistic tests equality of sets of parameters was tested. The data for Gross Domestic Product and Total public expenditure of central government for the period

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1980-2021was taken from the Handbook of Statistics on Indian Economy the latest volume published by Reserve Bank of India (RBI), September 2020.

IV. HISTORICAL TRENDS IN PUBLIC EXPENDITURE IN INDIA AND EMPIRICAL INVESTIGATION OF WAGNER'S LAW:

There are two data series which are considered in the analysis of the present study. First is Gross Domestic Product (GDP) factor cost at constant prices; and the second is Total Expenditure series of Central Government. The time period taken for present study is from year 1981-82 to 2019-20, i.e.39 years. The analysis focuses on the long run relationship between 'total expenditure of central government' (te) and 'gross domestic product' (gdp) and this is examined by using the concept of cointegration. If two variables have a long-term or equilibrium relationship between them, then they are said to be cointegrated even though they may be drift apart in short-run. The concept of cointegration has become an important fundamental to analyse the time series.

As the study wants to analyse the impact of gross domestic product on total expenditure, thus the basic static model for analysis is formulated in such a way that gross domestic product (gdp) is independent variable and total expenditure of central government (te) is a dependent variable. The regression model is as follows:

$$te_t = \alpha_1 + \alpha_2\, gdp + \mu_t \qquad \text{----------(1)}$$

Where $\alpha_1$is intercept term (i.e. constant term), α_2 is a slope parameter and μ_t is stochastic disturbance or stochastic error term. The above equation postulates, the total expenditure of central government is linearly related to gross domestic product plus stochastic disturbance term. The presence of error term μ_t is for all those variable that may be omitted from the model but collectively affect Total Expenditure (te).

The basic underlying assumption of regression analysis is that all the time series used in the regression analysis are stationary. A time series to be stationary when its statistical properties like mean, variance, autocorrelation, etc., are constant over time that is they are time invariant and the covariance between two time periods depend only on the lag between those two time periods and not on the actual time when the covariance was computed. Many times in practical situations we encounter time series which are not stationary. In case the time series is not stationary it is possible to study the behaviour of that series only for that particular time period only and it is not feasible to generalize the results for other time periods. The non-stationary series may display spurious results, i.e. it may exhibit relationship between two variables even when there exists one. Thus it is clear that non-stationary time series cannot be forecasted or modelled and to get consistent and reliable results it is important to transform the non-stationary time series to stationary time series. Hence testing the stationary of time series is important requirement before doing regression analysis.

The results of ADF test for unit root test for stationarity shown herein Table 1 illustrate that the 'te' series is found to be stationary at first difference without taking time trend and constant (Results on which decision is made are shown in bold figures).

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Table 1: ADF Test Results for Total Expenditure of the Central Government (te)

H_0: te has unit root/ is not stationary.

H_1: te does not have a unit root/ is stationary.

te (Total Expenditure by Central Government at constant prices)	Calculated With constant and time trend	Calculated With constant only	Calculated Without constant and time trend	Results
At level (without Difference)	(Trend was found to be insignificant)	(Constant was found to be insignificant)	Series was non-stationary	Accept the Null Hypothesis i.e. series has a unit root
At first difference	-4.477336 * (-3.192902) {0.0003) (Trend was found to be significant)	-	-	Reject the Null Hypothesis i.e. series was stationary at first difference

*significance at 10% level

Notes:

1. Augmented Dickey- Fuller Ƭ (tau) statistics are shown in ( ) brackets.
2. Mackinnon (1996) one-sided p-values are shown in { } brackets.

The ADF test of te series was found to be non-stationary in all the three cases, i.e. with time trend and constant only (in this case trend was found to be insignificant), and with constant only (in this case trend was found to be insignificant), with constant only (in this case the constant was found to be significant) and without time trend and constant. Though, the series was found to be stationary at 10 percent level of significance when both time trend and constant was taken at first difference, but in this case the trend term was not significant. Again the series was non-stationary at constant and the constant term was found to be insignificant. Thus, the te series was found to be stationary at first difference when no time trend and constant was taken. T-statistics value > critical value, hence the null hypothesis was rejected and the te series was stationary at first difference i.e. at I(1) (i.e. integrated of order 1).

Though the te series was found to be stationary, it is equally important to test the stationarity of gross domestic product series. This is because, the long-term relationship between two variables can only be analysed when both the series under consideration are at same level of differencing (i.e. either at level or at first difference). The gdp series was also found to be stationary at first difference with time trend and constant; the results of the same are shown in Table 2.

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Table 2: ADF Test Results for gdp of the central government (gdp)

H_0: gdp has unit root/ is not stationary.

H_1: gdp does not have a unit root/is stationary.

gdp(gross domestic product at constant prices)	Calculated with constant and time trend	Calculated with constant only	Calculated without constant and time trend	Results
At level (without difference)	(Trend was found to be insignificant)	(Constant was found to be insignificant)		Accept the null hypothesis
At first difference	-3.376575 * (-3.192902) {0.000} (Trend was found to be significant)	-	-	Reject the Null Hypothesis

*significance at 10 % level

Notes: 1.Augmented Dickey-Fuller Ƭ (tau) statistics are shown in ( ) brackets.
2. Mackinnon (1996) one-sided p-values are shown in { } brackets.

Thus both the time series in consideration i.e. the total Expenditure of the central government (te series) and gross domestic product (gdp series) are stationary at same level of differencing that is at first difference. Thus, it can be said that both the time series are integrated of order 1 denoted as I(1).

In Engle-Granger (EG) or Augmented Engle Granger (AEG) test it was proposed that two variables are said to be cointegrated when they have a long-term equilibrium relationship between them. Nonetheless, it is not desired that this long –run equilibrium relationship is achieved through market forces or the behavioural rules of individuals. According to Engle and Granger the equilibrium relationship can occur because of casual relationship among similarly trending variables. The ADF unit root results had shown that both the series are stationary at first difference, thus integrated of order 1 [i.e. I(1)]. Though there is a problem that when a non-stationary time series is regressed on another non-stationary time series it may produce spurious or nonsensical results. As both the time series are of I (1), then we can estimate the parameter of cointegrating regression in Equation (1). The residual of the estimated regression in Equation (1) is to be obtained and saved. When 'te' is regressed on gdp we obtained the following regression results:

$\widehat{te}_t = 133.417 + 13.236 gdp_t$ ----------(2)

t= (1.710) (42.127)

þ = (0.006) (0.000)

R^2= 0.968

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Since te and gdp time series are individually non-stationary, there is a possibility that this regression is spurious. For this we subject μ_t to unit root analysis and find its stationarity. Suppose it comes stationarity at level i.e. without differencing, thus it is integrated of order zero and hence denoted by $\mu_t \sim I(0)$, and then we can say that the regression of total expenditure of central government (te) on gross domestic product (gdp) is meaningful as their linear combination is stationary. This is because, even though the two series (i.e. te_t and gdp_t) are individually I (1), that is, they have stochastic trend, and if their linear combination is I (0), then the linear combination cancels out the stochastic trends in the two series. According to Granger, "A test of cointegration can be thought of a pre-test to avoid 'spurious regression' situation". Thus the unit root test of the residual term (urt) is performed using ADF, the results of which are given in Table 3 which show that the series is stationary at level (i.e. without differencing) without taking both time trend and the constant. Though the series was tested for stationarity with time trend and constant but the series was non-stationary and the trend was found to be insignificant. Even with constant only the series was non-stationary and constant was insignificant. In case when both time trend and constant was not taken then the series was stationarity at 10% level of significance as it computed test statistic was greater than the critical value. Hence the null hypothesis was rejected and thus the urt series was stationary at I (0) (i.e. integrated of order zero).

Table 3: ADF Test Results for Unstandardized Residual Term (urt)

H_0: urt has unit root/is not stationary.

H_1: urt does not have a unit root/ is stationary.

urt (Unstandardized Residual Term)	Calculated with constant and time trend	Calculated with constant only	Calculated without constant and time trend	Results
At level (without difference)	Trend was found to be insignificant)	(Constant was found to be insignificant)	-2.153489 (-1.611593) {0.008}	Reject the Null Hypothesis

*significance at 10% level

Notes:

1. Augmented Dickey Fuller Ƭ (tau) statistics are shown in ( ) brackets.
2. Mackinnon (1996) one sided p-values are shown in { } brackets.

Thus it can be concluded that even though te_t and gdp_t are individually stationary at I(1), their linear combination is stationary at I (0). Hence, Equation (2) is cointegrating regression and this regression is not spurious, even though individually two variables are non-stationary.

Further, though te_t and gdp_t is cointegrating and there is long–term or equilibrium relationship among them, but there may be disequilibrium in short run. Therefore, one can treat the error term as "the equilibrium error". This error term can be used to tie the short-run behaviour of te to its long-run value. Error Correction Mechanism (ECM) is a dynamical system with notion that the deviations in current state from its long-run relationship will be fed into its

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short-run dynamics. The ECM is more extensive test in comparison with the standard Granger Causality test, as it allows for another casual linkage between integrated variables. One of the important theorem known as Granger representation theorem, states that if two variables are cointegrated then the likeness that there is no causality in either direction in the case of standard Granger causality is ruled out, that is the causality must exist in at least one direction as long as variables share a common trend. For variables that are not cointegrated the equilibrium concept has no impact in ECM approach to Granger Causality.

As both the variables, i.e. te and gdp in Equation (1) are cointegrated (as shown in previous section), the relationship between these variable can be expressed through ECM by considering following model:

$$\Delta te_t = \beta_0 + \beta_1 \Delta gdp_t + \beta_2 \mu_{t-1} + \varepsilon_t \quad \text{---------- (3)}$$

Where Δ is as usual the first-difference operator and ε_t is the random error-term.

Here $\mu_{t-1} = te_{t-1} - \alpha_1 - \alpha_2 gdp_{t-1}$, that is one-period lagged value of error from the cointegrating regress in Equation (1). The ECM Equation (3) states that Δ te depends on Δ gdp and also an equilibrium error-term. If the error term is non- zero (i.e. $\neq 0$) then the model is out of equilibrium. Suppose Δ gdp is Zero and u_{t-1} is positive, thus this means te_{t-1} is too high to be in equilibrium, that is te_{t-1} is above its equilibrium value of ($\beta_0 + \beta_1 \Delta gdp_t$). The β_2 (in Equation 3) is expected to be in equilibrium. That is, if te_t is above its equilibrium value, it will start falling in the next period to correct the equilibrium error; hence the name ECM. Similarly, if μ_{t-1} is negative (i.e. te is below its equilibrium value), β_2 μ_t-1will be positive, which will cause Δ te_t to be positive, leading te_t to rise in period t. thus, the absolute value of β_2 decides how quickly the equilibrium is restored .

$$\widehat{\Delta te} = 18.143 + 15.472 \Delta gdp_t - .312 \ \widehat{u}_{t-1} \quad \text{----------} \quad (4)$$

t= (.395) (3.461) (-2.115)

þ = (.588) (.000) (.040)

R^2 =.395

Statistically, the equilibrium error-term is zero, suggesting that 'te' adjust to the changes in gdp in the same period. As Equation (4) show the short-run changes in gdp have a positive impact on the short-run changes in total expenditure of central government of India, it can be concluded that public expenditure does depend upon gross domestic product in the long run as observed by most of the studies conducted on India. This proves the validity of Wagner's law in Indian context.

Table 4: Pair-wise Granger Causality Tests (at Lag 2)

Sample: 1 38			
Lags: 2			
	Observations	F-Statistic	Prob.
Null Hypothesis:			
'gdp' does not Granger Cause 'te'		8.79063	0.0010*

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'te' does not Granger Cause 'gdp'	0.62964	0.5397

Note-*Null hypothesis rejected. Source: computed by authors

Next Granger causality test was employed to check the direction of causality between total expenditure (te) and gross domestic product (gdp) and the results are given in Table 4. F-Statistic reveals unidirectional causality from gdp to total expenditure. The probable explanation for the unidirectional causality from GDP to total expenditure could be due to larger share of non-development expenditure in the total expenditure of the central government.

V Public Expenditure and Wiseman-Peacock hypothesis:

After validating Wagner's Law, our second objective is to see the displacement (i.e. sudden upward shift) in Public expenditure data due to Covid-19. Table 5 shows the effect of Covid-19 on Indian economy in terms of growth rate.

Table 5: Effect of Covid-19 on Indian Economy (Year on Year Percent per annum)

Item	2019-20		2020-21	
	Q1	Q2	Q1	Q2
GVA at Basic Prices	4.8	4.3	-22.8	-7.0
Agriculture	3.0	3.5	3.4	3.4
Industry	3.8	-0.2	-33.8	0.1
Services	5.5	6.1	-24.3	-11.1
Final Consumption Expenditure	5.6	7.8	-19.2	-13.3
Gross Fixed Capital Formation	4.6	-3.9	-47.1	-7.3

Source: RBI, Handbook of Statistics of Indian Economy, Various issues.

As GDP growth declined rather recorded negative numbers in all activities due to lockdowns except for the agriculture sector (see table) and faced further setback by delay in resumption of non-essential activities back to near normal, the Government announced relief package including Atmanirbhar package. Given that the package was a policy response to exogenous shock of Covid-19, displacement effect was expected to exist. So, a plot of Total expenditure of central government of India (inclusive of both revenue and capital expenditure) for the period 1981 to 2020-21 is drawn, see Graph 1. A visual analysis of the graph reveals two structural shifts. First visible structural shift is in year 2007-08 which was mainly because of change in expenditure accounting (RBI, 2020) because the total expenditure for 2007-08 included transactions relating to transfer of RBI's stake in SBI to the central government, hence displacing the future data. Similarly, second visible structural shift can be observed in 2018-19, which was a pre-election year.

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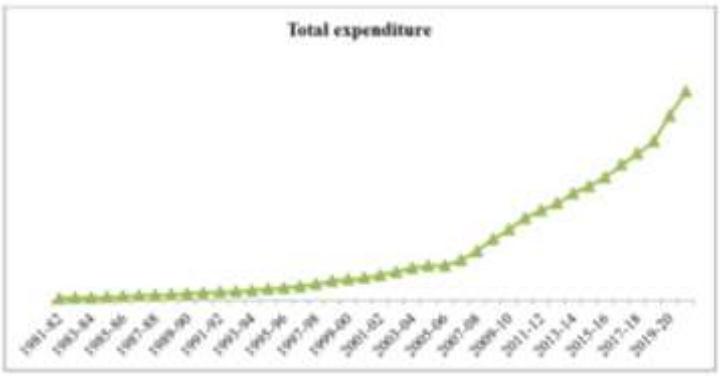
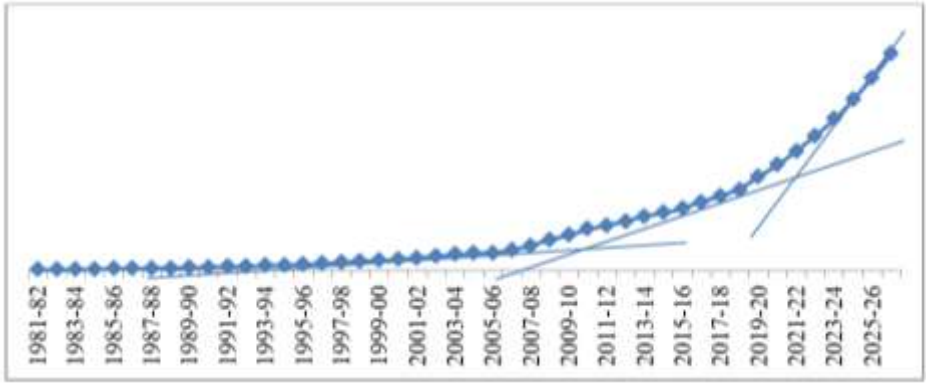
Graph 1: Public Expenditure in India (Total expenditure)



Source: RBI, Handbook of Statistics of Indian Economy, Various issues.

Statistically, the presence and statistical significance of these structural breaks can be tested using Chow test. As we need a time series for post 2020-21 period also, first we calculated the Compound Annual Growth Rate of Total expenditure for period 1981-82 to 2019-20 assuming that public expenditure continues to grow at trend rate of growth 12.7 percent in the absence of any major internal or external shock. We call this as baseline scenario. Further, we forecast the values for next five years, taking the annual growth rate in public expenditure for 2019-20 to 2020-21 as the post Covid-19 scenario. Calculation of compound annual growth rate for 39-year period from 1981-82 till 2019-20 gives a CAGR value of 12.7 percent. Interestingly the budgetary estimates data for public expenditure in 2020-21 also gave estimated total expenditure to be growing at 12.73 percent. The total stimulus announced by the Government of India and Reserve Bank of India till date, to help the nation tide over the COVID-19 pandemic is worth 29.87 lakh crore, which is 15 pc of national GDP. Out of this stimulus, only 9 percent of GDP i.e. ₹ 17.92 lakh crore was provided by the Government of India. Assuming that government does not make any major change and total expenditure continues to grow at 12.7pc per annum in the next five years also, the projections for public expenditure series are made as depicted in the graph 2.

Graph 2: Projected Total Expenditure in India (post 2020-21)



Source: Projections done by authors.

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Table 6: Result of Chow-Breakpoint test

Null Hypothesis: No breaks at specified breakpoints

Varying regressors: All equation variables

Break year	F-statistic	Prob.F
2007-08	11.62319*	0.0001
2018-19	8.401636*	0.0009
2020-21	3.799327	0.0304

Computed by authors

Wiseman-Peacock hypothesis strongly advocates displacement effect and concentration effect. In simple words, not only increased level of public expenditure remains permanently increased, during crises the role of central government becomes extremely important as the economic responsibility and decision making gets concentrated. To test it the graphical presentation of public expenditure series is shown for structural break using Chow breakpoint test in table 6.

The results of Chow breakpoint test for structural breaks in 2007-08 and 2018-19 and 2020-21 are given in Table 4. The F statistic was highly significant for the year 2007-08. On separate testing it came out to be significant for 2018-19 also, but for 2020-21 we could not find any significant structural break in total expenditure. A closer analysis of fiscal stimulus for Covid-19 reveals that most of fiscal stimulus is through non-budgetary measures rather than through increase in expenditure.

VI. DISCUSSION OF THE RESULTS AND CONCLUSION OF THE STUDY

The major objectives of the paper were to investigate the validity of Wagner's law in case of India and also to configure the Displacement effect due to Covid 19 using Wiseman-Peacock hypothesis. As Wagner's law states that government activities increase intensively and extensively with increase in economic activity, so causality from economic growth to public expenditure was tested for India. The inverse relationship from public expenditure to economic growth was also tested simultaneously using Grangers causality thereby checking the application of Keynsian theory of Effective Demand. Prior to that ADF test was applied to both the time series i.e. Total Expenditure of the central government (te)and Economic Growth (i.e. gross domestic product or gdp) and both were made stationary at first difference I(1). Both the variables te and gdp were observed to be cointegrating thereby signifying long–term or equilibrium relationship between them. The ECM test brought out the fact that the short-run changes in gdp have a positive impact on the short-run changes in total expenditure of central government of India. The direction of relationship between the two was tested using Grangers Causality test which depicted unidirectional causality from GDP to total expenditure. The result of study also corroborates the conclusion of most of the studies conducted on India that public expenditure in India does depend upon gross domestic product in the long run and not vice-versa. The non- significant causal relationship from total expenditure to Gross domestic product in India may suggest absence of Keynesian relationship i.e public expenditure raises Effective demand which in turn gives push to economic growth of the nation. But at the same time it calls for further investigation i.e.

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relationship between economic growth and development expenditure/investment expenditure. The share of non-development expenditure in total central government expenditure (40 percent in 2019 and 2020) of India seems to have diluted the expected push to economic growth in the country(www.rbi.com). Hence it can be concluded that Indian government should keep in consideration the relative shares of development and non-development expenditures to achieve the goal of economic growth through fiscal policy.

A serious setback to economic growth occured due to Covid 19 in Jan 2020 clearly visible in negative sectoral growth rates except for agriculture and fiscal stimulus was given by the central government. The graphical analysis and the Chows test ascertained two displacement effects - first in the year 2007-08 because of change in expenditure accounting i.e. inclusion of transactions relating to transfer of RBI's stake in SBI to the central government, hence displacing the future data, while second displacement effect occurred in the year 2018-19 probably due to this being the pre-election year. The relief package announced by Central Government of India to mitigate adversities caused by Covid-19 did not show any displacement effect in central public expenditure. A closer analysis of the fiscal stimulus for Covid-19 reveals that most of it was granted through non-budgetary measures rather than through increase in expenditure. No doubt increase in NREGA allocations, cash assistance, free food distribution and additional expenditure on health all fall in the domain of budgetary allocation but loan guarantees, interest exemptions and other tax cuts mainly constitute the revenue foregone and not the increase in expenditure. The Reserve Bank did respond through a series of measures to alleviate stress in various segments of the economy and the financial sector, including the stress encountered by market players and financial entities, all outside the ambit of public expenditure.

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