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Abstract: This study provides evidence on the validity of Wagner's Law on the impact of government spending on economic growth in Sri Lanka. To test for stationarity, we use Narayan and Popp's (2010) new Perron-type innovational unit root test; and to test for the long-run relationship, the study uses Hatemi's (2008) Co-integration method. This study finds that a long-run relationship exists between GDP, consumption and investment expenditure. Various policy implications have also emerged from these findings. Studies on the impact of government spending on economic growth in the case of South Asian countries, and particularly for Sri Lanka, are very limited. The study disaggregates public expenditure into its two components and uses advanced methodologies which take into account structural breaks.

Keywords: government spending, economic growth, Wagner's Law, co-integration, structural breaks, Sri Lanka.

JEL classifications: C22, E62, H50, O23.

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1. Introduction

At the theoretical level, there are two schools of thought that exist with respect to the relationship between government expenditure and economic growth. Firstly, Wagner's (1883) law argues that as real income rises, there is a long-run propensity for the portion of public expenditure to rise relative to national income. The classical theory of Wagner postulates that this is due to administrative, social, and welfare concerns which surge in value and importance as an economy develops. The second theory, as postulated by Keynes (1936) argues that government spending is an exogenous variable and can contribute to economic growth. Examining the long-run relationship between government expenditure and economic growth is important as this provides policy makers with precise information about the effectiveness of fiscal policy. For example, an expansionary (recessionary) period will enhance (impede) the central bank's ability to stimulate the economy via monetary measures.

During the last few decades, many studies have focused on and examined both the above theories, but there have been limited studies on the South Asian region (Landau, 1983; Landau, 1985; Aschauer, 1990; Sinha, 1998; Ghali, 1998; Alexiou, 2009; Tang, 2009; Kalam and Aziz, 2009; Nketiah-Amponsah, Samudram et al. 2009; among others). However, overall findings from the empirical literature with respect to such s relationship are ambiguous. The mixed results could be due to different functional forms, various econometric techniques, the different time periods involved and the application of different data sets that apply to various countries.

Empirical studies that examined the relationship between economic growth and government spending which lend support to Wagner's Law include Park (1996), Abiszadeh and Yousefi (1998), Al-Faris (2002), Kalam and Aziz (2009) and Kumar et al. (2012). The study by Abizadeh and Yousefi (1998) applied Granger-causality tests to examine Wagner's Law in the case of South Korea. They supported the validity of Wagner's law, finding that the income of the private sector caused an increase in government expenditure in South Korea. In related research, Al-Faris (2002) investigated the relationship between public expenditure and economic growth in the Gulf region (Gulf Co-operation Council or GCC countries) during the period of 1970-1997. The study used Johansen co-integration and Granger causality tests to determine such a relationship. The study supported the validity of

Wagner's law but did not support the theory postulated by Keynes, which argues that government spending is an exogenous variable and can contribute to economic growth. Kalam and Aziz (2009) applied the Engle-Granger co-integration procedure to examine Wagner's Law in the case of Bangladesh during the period of 1976-2007. They found strong evidence to support Wagner's Law in the short-run as well as in the long-run. The validity of Wagner's law and Keynesian theory using data from Malaysia over the period of 1970-2000 was also examined by Samudram *et al.* (2009). They applied the Auto-Regression Distributed Lag (ARDL) procedure and the bound test to determine the relationship between economic growth and government expenditures. Their study provided further support for Wagner's law.

While the abovementioned empirical studies found support for Wagner's law, there are also a number of studies which found limited or no support for the hypothesis (Ram, 1986; Afxentiou and Serletis, 1991; Georgakopoulos and Loizides, 1994; Afxentiou and Serletis, 1996; Wahab, 2004; among others).

As indicated earlier, most of the existing studies mainly focused on Europe, Africa and South East Asia. Hence, studies examining the relationship between government expenditure and economic growth in the case of South Asian countries, and particularly in Sri Lanka, are very limited. Only the study by Dilrukshini (2004) has investigated the issue for Sri Lanka. Dilrukshini (2004) analysed the link between public expenditure and economic growth in Sri Lanka during 1952-2002. That study showed no empirical support either for Wagner's Law or the Keynesian hypothesis.

Moreover we found that there were four major/considerable limitations of the existing studies noted above.

Firstly, most of the studies use data from a cross-section of countries. Cross-sectional analysis determines that the coefficients are identical for all countries in the sample; it is not very appropriate to pool countries that have diverse social, political and institutional aspects. Time series analysis can address country-specific features.

Secondly, the studies undertook traditional unit root and co-integration tests. That is, these studies did not take into account structural breaks in their estimations. It is known that if prospective structural breaks are not permitted in the testing for unit roots in time series, the tests could be biased towards a mistaken non-rejection of the non-stationarity hypothesis (Perron 1989, 1997).

Thirdly, the majority of the studies employ Granger-causality tests which can be questionable, given that Wagner's Law focuses on the long-term relationship between government expenditure and economic growth. Lastly, Tang (2009) argues that it is important

to disaggregate the components of government expenditure in order to understand the role each one of them plays in affecting economic growth. He also argues that disaggregated data may provide specific information on the effectiveness of fiscal policy.

Given the mixed nature of the results found in the current literature, the objective of this paper is to test the validity of Wagner's Law in the case of Sri Lanka. By doing so, this study contributes to the existing literature by empirically investigating the link between government expenditure and economic growth in Sri Lanka using annual time series data. The scope of this study covers the period from 1959-2010, nearly a half century. More importantly, this period covers the post-independent era of Sri Lanka, where two major parties with two different policies towards government expenditure ruled the country. This period is long enough to provide enough evidence as to whether a long-term relationship between government expenditure and economic growth exists. This paper also conducts advanced econometric techniques taking into account two endogenous structural breaks in both unit root and co-integration tests. Moreover, the validity of Wagner's Law is tested by disaggregating government expenditure into its two components of government consumption expenditure and government investment expenditure, given that each component has a different impact on economic growth. Additionally, Sri Lanka is also a motivating case, given that its economy has been suffering both current account and budget deficits since the fifties. It is worth noting that high budget and current account deficits have received much attention from the IMF and World Bank (they have conducted several studies on this issue (Saleh *et al.*, 2005)).

The rest of the study is organised as follows. Section 2 delivers an overview of the Sri Lankan economy. Section 3 provides a discussion of the methodology. Section 4 debates data and empirical findings and Section 5 reports policy implications and conclusions.

2. An Overview of the Sri Lankan Economy

Since gaining independence from the British, the economy of Sri Lanka has been characterised as a developing, slow growing economy with a strong agricultural focus. For example, in 1960 the agricultural sector accounted for 38 per cent of GDP whilst the industry and services sectors accounted for 17 and 45 per cent respectively (Saleh *et al*., 2005). Owing to macroeconomic reforms and policies introduced by successive governments, the economy has reduced its reliance on the former and has achieved a reasonable economic growth amidst a wave of internal as well as external challenges. For example, by 2009, the importance of the agricultural sector to GDP declined to 13 per cent whilst that of the industry and services

sector increased to 30 and 58 per cent respectively; showing remarkable progress towards much needed economic development for the island nation (Saleh *et al*., 2005).

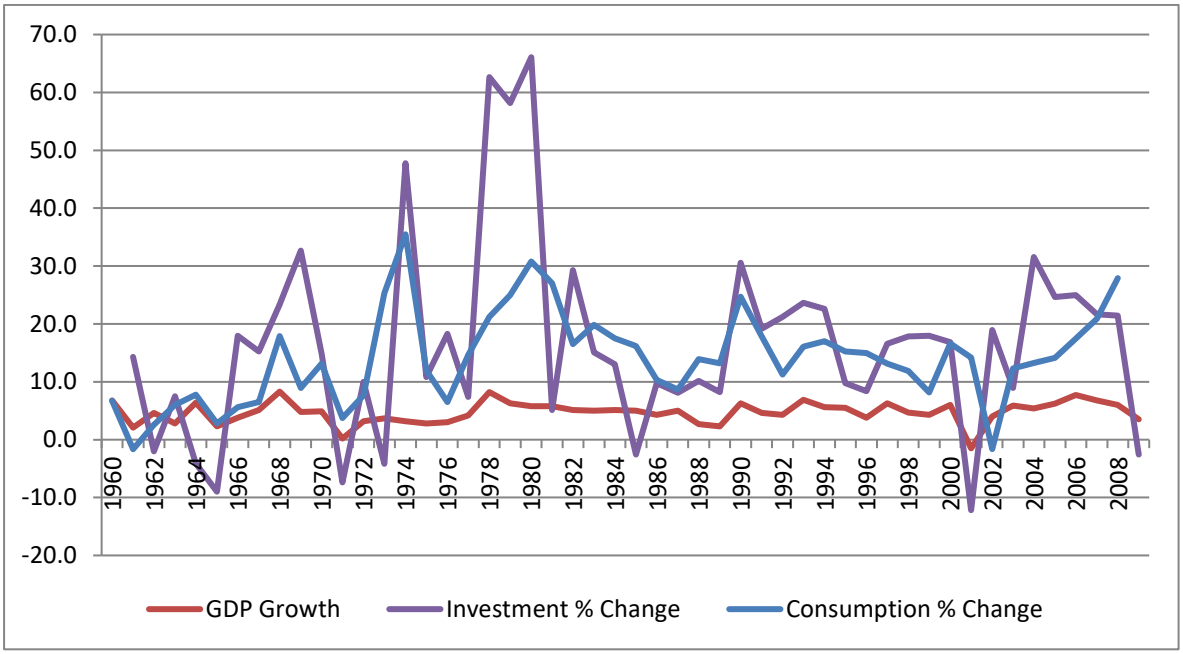
As reflected in Table 1 and Figure 1, during the last five decades Sri Lanka's economic growth has been fairly erratic. This can be mainly explained by frequent changes in governments, the 30 year long civil war and political instability, all prevailing during the same period. Since independence, two major parties governed Sri Lanka: the United National Party (UNP), a centre-right party and Sri Lanka Freedom Party (SLFP) and its coalitions, a centre-left party. The economy was sluggish when the SLFP was in power (i.e. 1965-70 & 1970-77) mainly due to the closed economic policies which had been implemented. This was very clear during 1970-77 where the average annual economic growth fell down to three per cent. On the other hand, market friendly economic policies of the UNP governments have helped to achieve a higher growth rate and stabilise the economy. The UNP government, soon after coming into power in 1977, introduced the open market economic policy and implemented various macroeconomic reforms, including deregulation of the foreign exchange market, the introduction of free trade zones and the privatisation of government ventures. Sri Lanka was the first South Asian country to liberalise its economy. These reforms resulted in achieving a remarkable economic growth until 1983. During this period the economy experienced an annual average growth well over five per cent. The greater growth rates after 1977 can be accredited to the improved performance in investment and exports in the economy under the unrestricted economic environment (See Table 1 and Figure 1).

However, during 1983-89, the economy witnessed a severe setback in terms of growth during which economic growth plunged well below three per cent. For example in 1989 economic growth was merely 2.3 per cent. One major contributor to the downturn was the eruption of the civil riots in 1983. This was further fuelled by the youth uprising, occurring mainly in the South of the country and commonly known as the JVP insurrection, and other external disturbances[1]. Although normalcy was restored in the South by 1990, the North and the Eastern provinces were constantly struggling due to the civil war. In spite of the negative effects of the civil war on the Sri Lankan economy, the nation averaged a GDP growth rate of well over four percent until 2004. The 2006-09 period saw the country at the height of potential disturbance where the civil war escalated into a full scale war, only ending in mid-2009. Amidst, the full scale war, Sri Lanka was able to manage an annual average growth

rate of six per cent, an all-time high. The end of the civil war provided Sri Lanka many opportunities for growth, with the expectation that the economy would grow even faster during the medium term. According to the manifesto of the present government, Sri Lanka has a very ambitious target of doubling its per capita income to US$ 4000 over the next six years and transforming the country into the "Wonder of Asia" (according to the Central Bank Annual Report 2009, the per capita income was US$2053 in 2009). Given this background, the World Bank Managing Director, Okonjo-Iweala (2010) noted recently in Colombo that "Sri Lanka is in transition from a low income country in conflict to a middle income country in peace".

While maintaining a moderate economic growth rate as noted above, Sri Lanka experienced a high budget deficit during the 1970-77 period as a result of decreased government revenues and increased public expenditure. The average portion of budget deficit as a percentage of GDP during the 1970-77 period accounted for 6.8 per cent. This accelerated extensively after the economic reforms introduced from 1977. For example, the budget deficit, which registered 5.8 per cent of GDP in 1977, accelerated to a peak of 23.1 per cent in 1980, within a mere three years of economic reforms, and remained at 14.2 per cent during the 1978-1988 period, more than double the figure recorded during the previous period (1970-77) (Saleh *et al*, 2005). Though, this deficit rate saw fluctuations between 7 per cent and 11 per cent with an average of around 9.4 percent since 1989, it is still significantly higher than the rates in the pre-1977 period. The remarkable increase of the deficit after 1977 can be explained mainly by massive increases in government expenditure. Soon after the UNP came into power in 1977, it undertook a massive expansion of infrastructure facilities in the island nation in order to facilitate the targeted economic growth. Two of such major projects were the construction of several large hydro power plants and a large housing construction project that targeted to build a million houses for low income families around the country. Although hydro power projects were funded by foreign donors, the government budget took a considerable burden of the cost. This was further fuelled by the decline in government revenue. Furthermore, the collection of income taxes has been traditionally a problem and the tax base has been consistently very limited. The increased budget deficit has been a main reason behind macroeconomic disparity in the Sri Lankan economy since the year 1978. On the other hand, it is worthy to note that the deficit has been financed primarily via inflationary sources. The Sri Lankan government has relied heavily on domestic market borrowings as well as overseas loans to finance its deficits (Saleh *et al.*, 2005).

Figure 1: Average Growth Rates (%) of GDP, Consumption and Investment in Sri Lanka (1960-2010)



Source: Central Bank of Sri Lanka, online database.

Furthermore, Table 1 below confirms the conventional wisdom that economic growth is largely influenced by aggregate expenditures; namely investment, consumption and government expenditures. For example, Table 1 clearly shows that from 1970-75, a relatively lower growth rate of 3 per cent corresponded with relatively lower levels of expenditure, that accounts for around 12 per cent growth in investment and consumption expenditure. However, economic growth surpassed 5 per cent during the period 1980-85 and this has come with a higher growth in investment expenditure. During this period, investment expenditure grew around 25 per cent, more than double the growth in the previous period.

Table 1: Average Growth Rates (%) of GDP, Government Expenditure and Investment in Sri Lanka (1960-2010)

Period	GDP Growth	Consumption	Investment	Government Expenditure
1960-1964	4.5	3.8	3.9	4.1
1965-1969	4.9	8.1	16.1	6.9
1970-1974	3.0	11.8	12.2	6.8
1975-1979	4.9	18.0	31.5	22.7
1980-1984	5.4	23.8	25.7	19.5
1985-1989	3.9	13.3	6.7	17.4
1990-1994	5.5	16.6	23.4	13.9
1995-1999	4.9	14.4	14.1	15.5
2000-2004	4.0	9.9	12.8	16.0
2005-2010	6.0	18.7	18.0	29.8

Source: Central Bank of Sri Lanka, online database.

3. Methodology

3.1 Data and Unit Root Tests

This study uses annual data on GDP, consumption expenditure and investment expenditure for the period 1959 to 2010. Data was collected for the specified variables from the Central Bank of Sri Lanka online database (available at http://www.cbsl.lk/htm).

The analysis of the stationarity of macroeconomic time series data, together with the presence of structural breaks, has attracted a remarkable amount of academic interest in recent years. The view of traditional unit root tests (the ADF and the Philip Perron's tests) is that present shocks merely have a temporary effect, and that the long-run movement in the series is unchanged by such shocks. This view was questioned by Nelson and Plosser (1982) who argued, using the ADF technique, that present shocks have a lasting effect on the long-run levels of most macroeconomic and financial variables. They found evidence in favour of the unit root hypothesis (non-stationary). However, Perron (1989) questioned this interpretation, suggesting that the observed unit root behaviour may have resulted from failure to account for a structural break in the Nelson and Plosser data. He argued that "Our conclusion is that most macro-economic time series are not characterised by the presence of the unit root and that fluctuations are indeed transitory" (Perron 1989, p.1362).

Thus, Perron pointed out that as a consequence, ignoring such events or structural changes in the trend function results in significant power reduction of traditional unit root tests. However, Perron's (1989) assumption of a known exogenous break point was critiqued

because of its tendency to favour the alternative hypothesis. Subsequent studies, most notably by Christiano (1992), Zivot and Andrews (1992), Perron and Vogelsang (1992), and Perron (1997) among others, incorporated an endogenous single break into the model specifications.

The debate concerning the relationship between the unit root hypothesis and structural breaks was resumed by several studies including those of Lumsdaine and Papell (1997) and Lee and Strazicich (2003), among others. Once again, the assumption of an unknown or endogenous break point was criticized because of a perceived loss of information as a result of ignoring two breaks in the one break test. In the words of Lee and Strazicich (2003, p.1082), "…given a loss of power from ignoring one break, it is logical to accept a similar loss of power from ignoring two, or more, breaks in the one-break test".

Even though Lee and Strazicich (2003) introduced a minimum LM unit root test which does not suffer from spurious rejections, Popp (2008) has indicated that these spurious rejections are not a general aspect of the ADF-type test. According to Popp (2008) the critical problem of spurious rejections is that the parameters of the test regression have diverse explanations under both the null and the alternative hypotheses. This is a fundamental problem, as the parameters have implications for the structural break time selection. Although the test proposed by Lee and Strazicich enables accurate break points estimation, the test distribution is determined by the break magnitude. In line with Schmidt and Phillips (1992), Popp (2008) deals with the problem of spurious rejections by expressing the data-generating process (DGP) as an unobserved component model, which allows for the generation of a new Perron-type innovational unit root test procedure for a number of model specifications with one endogenous structural break.

Narayan and Popp (2010) extend a new innovational unit root model by Popp, by including two endogenous structural breaks. Following on from the studies of Schmidt and Phillips (1992) and Popp (2008), Narayan and Popp (2010) also handle the problem of spurious rejections by formulating the DGP as an unobserved component model. The new innovational unit root test of Popp (2008) and Narayan and Popp (2010) have many advantages, as follows:

- The tests do not show spurious rejections in finite samples when a break arises under the null hypothesis.
- The critical values of the tests, assuming endogenous break times converge with increasing sample size to the critical values when the break times are exogenous. That is, the distribution of the tests is identical with that of Perron (1989).

- The new Perron-type IO test is almost invariant to a structural break, even for the case of a break in level and slope for trending data.
- Unlike the studies of Lee and Strazicich (2003), the distribution of new Perron IO tests do not depend on the break magnitude.
- Additionally, the new test has the capacity to recognize the true break very precisely, even for small breaks.

Two different specifications for trending data are considered by Narayan and Popp (2010). One specification allows for two unknown breaks in level (M1 model), and the other permits for two unknown breaks in level and slope (M2 model). Both M1 and M2 vary in how the deterministic component is described. This study only considers the M2 model. The IO-type test regression, which allows for two breaks in both the intercept and the slope (M2 model) is derived by the following formula:

$$y_t^{M2} = \rho y_{t-1} + \alpha^* + \beta^* t + \kappa_1 D(T_B')_{1,t} + \kappa_2 D(T_B')_{2,t} + \delta_1^* DU'_{1,t-1} + \delta_2^* DU'_{2,t-1} + \gamma_1^* DT'_{1,t-1} + \gamma_2^* DT'_{2,t-1} + \sum_{j=1}^{k} \beta_J \Delta y_{t-j} + e_t \quad (1)$$

where $\kappa_i = (\theta_i + \gamma_i)$; $\delta_i^* = (\gamma_i - \phi\theta_i)$; $\gamma_i^* = -\phi\gamma_i, i = 1,2$; and the coefficients θ_i and γ_i are the magnitude of the level and slope structural breaks, correspondingly.

The unit root null hypothesis in the Narayan and Popp (2010) model is $(\rho = 1)$, while the alternative hypothesis is $(\rho < 1)$. The $t-$statistics of $\hat{\rho}$, denoted $t_{\hat{\rho}}$, are used to test the unit root null hypothesis in equation (1). In contrast to the previous unit root tests, in particular, the Perron-type test, the dummy variables $DU'_{i,t}$ and $DT'_{i,t}$ are lagged in (1). $T'_{B,i}$ in the above equations has to be substituted by their estimates for $\hat{T}'_{B,i}$, $i = 1,2$ so as to perform the unit root test, as Narayan and Popp assume that the true breaks are endogenous.

To select or estimate $T_{B,i}$ endogenously, Narayan and Popp utilize a sequential procedure. The first step is to search for a single break point which is chosen according to the maximum absolute t-statistic of dummy parameter k_1 under the constraint $\kappa_2 = \delta_2^* = \gamma_2^* = 0$:

$$\hat{T}_{B,1} = \begin{cases} \arg\max_{T_{B,1}} \left| t_{\hat{\partial}1}(T_{B,1}) \right| \text{ for M1} \\ \arg\max_{T_{B,1}} \left| t_{\hat{k}1}(T_{B,1}) \right| \text{ for M2} \end{cases}$$

and under the restriction that the first break point $\hat{T}_{B,1}$ and the second break are estimated endogenously to the first break.

The unit root findings in Table 2 show that all variables are non-stationary, with two endogenously determined breaks at the five percent significance level. The two break points in the level and trend for the three variables are also significant. The first break date of 1973 for consumption and investment coincides with the oil crash. This resulted in a decrease in various government expenditures, specifically capital expenditure (Rankaduwa *et al.,* 1995). The second break date of 1998 for consumption corresponds with the slowdown in the global economy following the 1997 Asian financial crisis which had negatively affected the Sri Lankan economy (especially in terms of export revenues). The second break date of 1980 for investment corresponds to deregulation of the Sri Lankan economy in 1979. The break dates of 1984 and 2001 for GDP coincide with the civil riots which occurred in 1983, followed by a series of terrorist attacks in 1984. In 2001 a terrorist attack at the international airport destroyed a number of aircraft and crippled the economy in the short run.

Table 2: Results of Narayan and Popp's (2010) Unit Root Test with Two Breaks M2: Two Breaks in an Intercept and a Slope

Variable	Test statistic	k	$T_{B,1}$	$T_{B,2}$
Consumption	-4.723	0	1973	1998
Investment	0.1601	1	1973	1980
GDP	-1.731	4	1984	2001

Critical values at 1, 5 and 10 percent with sample size of 50 = -5.949, -5.181, -4.789.
Critical values taken from Narayan and Popp (2010) were derived with a sample size of T = 50. The critical values at 1% (***), 5% (**), and 10% (*) significance levels are -5.949, -5.181, and -4.789 for M2. A maximum of 4 lags was specified in Gauss.

3.2 *Co-integration*

Once the order of integration of each variable is determined, the next stage is to test for the long-run relationship (co-integration). The standard model for testing of co-integration is as follows:

$$y_t = \alpha + \beta' x_t + u_t$$
$$t = 1, 2, \ldots, n \qquad (2)$$

where y_t is the dependent variable; x_t is an *m*-dimensional vector of independent variables, α is the intercept term, β is a *m*-dimensional vector of slopes and *t* signifies the time index. The residual based test statistics of the ADF test and Z_t test are commonly used to test for co-integration. However, as indicated earlier, discounting the problem of prospective structural breaks can reduce unacceptable statistical results not only for unit roots tests, but as well as with respect to co-integration tests. Kunitomo (1996) argued that in the case of the existence of structural change, traditional co-integration tests which do not permit for a structural break could produce "spurious co-integration results".

Hatemi (2008) extends the tests for co-integration to incorporate the effect of two structural breaks on both the intercept and the slopes. Hatemi generalises equation (2) to the following equation:

$$y_t = \alpha_o + \alpha_1 D_{1t} + \alpha_2 D_{2t} + \beta_0' x_t + \beta_1' D_{1t} x_t + \beta_2' D_{2t} x_t + u_t \qquad (3)$$

where D_{1t} and D_{2t} are dummy variables denoted as:

$$D_{1t} = \begin{cases} 0 \text{ if } t \leq [n\tau_1] \\ 1 \text{ if } t \leq [n\tau_1] \end{cases}$$

and

$$D_{2t} = \begin{cases} 0 \text{ if } t \leq [n\tau_2] \\ 1 \text{ if } t \leq [n\tau_2] \end{cases}$$

with the unknown parameters $\tau_1 \in (0, 1)$ and $\tau_2 \in (0, 1)$ suggesting the relative timing of the system change point and the bracket signifies the integer part. To test the null hypothesis of no co-integration, the ADF test is calculated by the corresponding *t*-test for the slope of $\hat{u}_{t-1}$

in the regression of $\hat{u}_t$ on $\hat{u}_{t-1}, \ldots \hat{u}_{t-k}$, where $\hat{u}_t$ signifies the estimated error term from regression (3). The critical values are obtained from Hatemi (2008).

As shown from the findings of the co-integration test reported in Table 3, the estimated test value is greater than the critical value at the one percent level of significance in absolute terms. Both the ADF and Z_t tests reject the null of no co-integration, indicating a long-run link exists between GDP, consumption expenditure and investment expenditure at the one percent significance level. The first unknown break date of 1990 coincides with the breakdown of ceasefire dialogues between the Sri Lankan authority and the separatist Liberation Tigers of Tamil Ellam (LTTE) that led to the second phase of armed conflict in the country. The second break date of 1993 corresponds with the assassination of the Sri Lankan President Premadasa by an LTTE suicide bomber in May 1993. This led to the deterioration of political stability in the country followed by the dissolution of parliament in the following year. In August 1994 a new government was sworn in. 1994 also coincided with the government approaches of the acceleration of defence expenditure and the deceleration of other expenditures such as social expenditure. It is important to note here that stimulating defence expenditure during a time of civil war for any country usually has a negative impact on economic growth. Hence GDP growth, which slowed down in the year 1994, continued to slow for a few more years as a result of a drought, excessive government spending and security instability in the country.

Table 3: The Results of Tests for Co-integration between GDP Cons, Inv 1959-2010

Test Statistic	Estimated Test Value	1% Critical Value	5% Critical Value
ADF	-6.938	-6.928	-6.458
Z_t	-7.010	-6.928	-6.458

The parameters were also estimated by running the regression presented in equation (3) where the independent variable is the log of GDP. The estimated values are reported in Table 4. The estimated parameter values for both the break dates are not significant, implying that either the effects of the structural change are common for all the variables or that the variable is not enough to estimate the range of identified changes.

Table 4: The Estimated Values of the Parameters

	α_0	α_1	α_2	β_0	β_1	β_2
Estimated parameter values	3.231	5.168	-2.289	0.963	-0.492	0.275
t values	19.504	0.958	-0.422	43.695	-0.886	0.493

Given that we were not able to reject the null hypothesis of no co-integration between the three variables of GDP, investment and consumption (Table 3), we then estimated the long and short-run elasticities using the Autoregressive Distributive Lag (ARDL) framework, in order to determine whether government expenditures are positively linked with economic growth (Wagner's law).

As neither of the break dates coefficients were significant, and to maintain robustness, we conducted a Pesaran and Pesaran (2009) ARDL bounds testing approach to co-integration, to test for the long-run relationship between GDP, consumption expenditure and investment expenditure. The approach of the model is firstly, to investigate evidence of a long-run link by using the F-test; and secondly to estimate the long-run and short-run elasticities by using the ARDL model as recommended by Pesaran and Pesaran (2009). The subsequent unrestricted error correction regression is estimated by:

$$\Delta LGDP = \alpha_O + \sum_{j=1}^{n} b_j \Delta LGDP_{t-j} + \sum_{j=0}^{n} c_j \Delta CONS_{t-j} + \sum_{j=0}^{n} d_j \Delta INV_{t-j} + \delta_1 LGDP_{t-1} + \delta_2 LCONS_{t-1} + \delta_3 LINV_{t-1} + \varepsilon_{1t} \quad (4)$$

The F test is applied to find out whether a long-run link exists among the variables via testing the significance of the lagged level of the variables. The parameters δ_i where i = 1, 2, 3 are the equivalent long-run multipliers, while the parameters b_j, c_j, d_j are the short-run dynamic coefficients of the underlying ARDL model. The null hypothesis of no co-integration between the variables is $H_0 : \delta_1 = \delta_2 = \delta_3 = 0$ which is tested against the alternate $H_1 : \delta_1 \neq \delta_2 \neq \delta_3 \neq 0$.

The F-statistic for the model is 8.122 which is above the upper bound critical value at five percent level of significance (5.263, 6.284). Thus, we can conclude that a long-run relationship exists between GDP and consumption and investment expenditure. In other words, government expenditures are positively linked with economic growth. Hence, our

empirical findings clearly provide further evidence to support Wagner's law. This is in line with the earlier results of Hatemi's (2008) co-integration procedure**.** Our findings are also in line with the findings of the case study of Bangladesh by Kalam and Aziz (2009), who also provided evidence to support the validity of Wagner's law in both the short and long-run. Following the confirmation of the existence of co-integration, this study estimates the long and short-run coefficients of the ARDL model, which are presented in Table 5.

Table 5 indicates that only investment expenditure (LINV) has both a long and short- run effect on economic growth (LGDP). A one percent rise on LINV results in a 0.55 percent increase, and a much smaller 0.09 percent increase, in both the long and short-run respectively, at the five and one percent significance level. Our results are in line with Rose and Osborn (2007) who found that a positive and significant relationship existed between government capital expenditure and economic growth for a panel of 30 developing countries. Hence, this further supports our findings that investment expenditure is an important part of the total government expenditure and positively contributes to economic growth. Clearly, the Sri Lankan government needs to take this into account when it comes to formulating its fiscal policies.

The error correction model, ecm(-1) is significant at the one percent level with the expected negative sign. The ecm(-1) signifies the speed of adjustment of ΔLINV to its long-run equilibrium subsequent to a shock. The ecm(-1) of -0.17 indicates that a deviation from the long-run equilibrium level of GDP growth in any one year is modified by about 17 percent in the following year. Additionally, a significant error correction endorses the presence of a stable long-run link between the significant regressors and the dependent variable, LGDP.

Table 5: Estimated Long-Run Coefficients and Short-Run Error Correction Model (ECM)

LGDP, LINV, LCONS

The long-run coefficients estimates based on ARDL (1, 0, 0) selected lags, based on SBC			ECM-ARDL: dependent variable: ΔLGDP based on ARDL (1, 0, 0) selected lags, based on SBC		
Regressor	**Coefficient**	**St Error**	**Regressor**	**Coefficient**	**St Error**
LCONS	-.28083	-.29468	$\Delta LCONS_t$	-.047573	.038746
LINV	.55355	.21697**	$\Delta LINV_t$	.093770	.026693***
Constant	7.1525	1.4273 ***			
Trend	.11991	.036537 ***	Trend	.020312	.0072886***
			ecm(-1)	-.16940	.059050***

Note: *** significant at 1% level, ** significant at 5% level, * significant at 10% level.

4. Conclusion and Policy Implications

Given that there has not been much focus in the recent literature on the impact of urbanization on nonrenewable energy consumption. Most of the recent literature have focused only on a specific region or an individual country such as OECD countries (Salim and Shafiei, 2014), emerging economies (Rafiq et al. 2016), G7 countries (Sadorsky, 2009), East Asia countries (Sheng, 2013), China (Ma, 2016), and India (Shahbaz et al. 2016). **This research is trying to fill this important gap by** divided the whole word into three regions…….this classification is in line with the recent report by……this reports has classified the whole world into three regions……..public expenditure into two components, government consumption expenditure and government investment expenditure.The major objective of this study was to provide further evidence on the validity of Wagner's Law on the effect of government spending on economic growth in Sri Lanka. This study examined such impacts over the period of 1959 to 2010 from the point of view of disaggregated government expenditure. We In order to proceed further, we used the advanced

Narayan and Popp's (2010) new Perron-type innovational unit root test and Hatemi's (2008) co-integration method to test for the long-run relationship between government expenditure and economic growth. The results from the new Perron-type innovational unit root test indicated that all variables are non-stationary with two endogenously determined breaks at the five percent significance level. Additionally, the results from the Hatemi (2008) and ARDL co-integration procedures indicated that there is a long-run relationship between the three variables where the consumption and investment variables are the long-run forcing variables of GDP. However, the empirical findings indicated that only investment expenditure (LINV) has both long and short-run effects on economic growth (LGDP). This finding is also supported by Rose *et al*. (2007) who found that there was a positive and significant relationship between government capital expenditure and economic growth.

The results of this research can be useful to the Sri Lankan Government and its policy makers in formulating and implementing various fiscal policy measures. At the moment the island nation is at a historical juncture. It has defeated a 30 year old separatist war that took all possible economic resources away from productive developmental activities. Against this background, the country is currently facing a number of challenges that require careful planning and leadership at the top level.

Firstly, it requires a large amount of investment to develop the infrastructure in war ravaged areas of the North and the East. Secondly, the improved security situation has opened up a range of new economic and social opportunities around the country that demand considerable leadership from the government in the form of investment. Finally, Sri Lanka has been struggling over the last few decades with declining government revenue mainly due to a relatively small income tax base. Against this background, the government of Sri Lanka needs to be careful in its economic management and should prioritise its government expenditures.

Based on our results, the government in Sri Lanka should be thinking seriously about allocating its limited resources towards investment expenditure. Perhaps the economy could benefit if the Sri Lankan government allocated its limited resources towards the development of and improvement in infrastructure, and in particular in the development of human capital, which would include improvements in health and education. Additionally, if the Sri Lankan government is thinking to reduce its government expenditure in order to improve its budgetary financial position, it needs to be careful, as this might have an adverse effect on economic growth in the country.

This study has few limitations given that it has not incorporated other potential factors or policies that may affect the growth of government expenditures (such as trade and tax policies, political factors etc.). Additionally, it is suggested that any future study might also focus on extending the study period to take into account any new changes related to government policies which may lead to new findings. Any future study could also focus on including more additional countries from South Asia, and conducting a comparative study with other regions using more advanced panel data estimation techniques.

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