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# Wagner versus Keynesian Hypothesis: Role of aggregate and disaggregate expenditure in Pakistan

**Kashif MUNIR**
University of Central Punjab, Lahore, Pakistan
kashifmunirdr@gmail.com, kashif_ok@hotmail.com
**Wajid ALI**
University of Central Punjab, Lahore, Pakistan
wajideconomist@gmail.com

**Abstract.** *The objective of this study is to examine the long run as well as short run relationship between government expenditure at aggregate as well as disaggregate level and economic growth in Pakistan. The study uses six functional forms of Wagner's law and further classify these forms to incorporate disaggregate expenditure. Study uses annual time series data of Pakistan from 1976 to 2015 and applies Engle and Granger cointegration test for long run relationship, while Granger causality test is employed for short run analysis. The study found that no long run relationship exists between GDP and total expenditure as well as its sub-components i.e. expenditure on current subsidies, defence expenditure, current expenditure, and developmental expenditure, while long run relationship exists among GDP and expenditure on social, economic and education services. Unidirectional causality in favor of Wagener's hypothesis exists from GDP to expenditure on current subsidies, expenditure on social, economic and education services, defence expenditure, and current expenditure, while unidirectional causality in favor of Keynesian hypothesis flows from developmental expenditure to GDP in the short run. Government has to invest more on human resource development to achieve sustainable economic growth in the long run. Government has to reallocate more resources towards developmental projects to achieve higher economic growth in the short run.*

**Keywords:** government expenditure, economics growth, cointegration, causality, Pakistan.

**JEL Classification:** C32, E62, H51, H52.

## 1. Introduction

The relationship between public spending and economic growth has been an important subject of discussion among economists for decades (Peacock and Wiseman, 1961; Gupta, 1967). Government attempts to stimulate economic growth through various policy instruments and one of the important instrument of fiscal policy is public spending which is used to influence economic growth (Lahirushan and Gunasekara, 2015). The government expenditure policy has a crucial role in functioning of the economy whether developed or underdeveloped. Till twentieth century government revenues were considered more important than government expenditure, while functions and activities of the state were confined to specific limits (World Bank, 1988). The thinking about functions of state has been changed over the years, now the state is considered to be a welfare state for the economy. The state increases welfare of nation through spending on developmental projects as well as social, economic and education services i.e. employment, health, agricultural and industrial development, fresh and clean water (World Bank, 1988). The rapid economic growth is not possible without state interference, whereas private institutes are only curious to earn profit and to survive in the economy.

There are two approaches in the literature regarding pubic spending and economic growth i.e. "Wagner's law" or "Keynesian hypothesis". The fundamental argument of these two approaches relies on causal link between public spending and economic growth (Samudram et al., 2009). Wagner (1883) argued that government expenditure tends to expand with an increase in per capita income of a nation, which indicates causality flows from output to public spending. On the other hand, Keynes (1936) postulated that government expenditure is an exogenous policy instrument which is used to accelerate economic growth as well as to correct short run and long run cyclical fluctuations, hence causality flows from public spending to national output (Ansari et al., 1997).

Relationship between public spending and economic growth is one of the most controversial issue in the literature (Montiel, 2010). Wagner's and Keynesian hypothesis have been tested for both developed and developing countries (Ansari et al., 1997; Biswal et al., 1999; Samudram et al., 2009). The literature in favor of Wagner's or Keynesian hypothesis is divided into three strands. First strand is based on validity of Wagner's hypothesis, where unidirectional causality flows from economic growth to public spending (Ansari et al., 1997; Faris, 2002; Montiel, 2010; Abdullah and Mamoor, 2010; Kumar et al., 2012; Barra, 2015; Thabane and Lebina, 2016). Second strand favors Keynesian hypotheses, where unidirectional causality flows from public spending to economic growth (Halicioglu, 2003; Babatunde, 2011). Third strand is based on the existence of both Wagner's and Keynesian hypothesis, where causality is bidirectional between public spending and economic growth (Biswal et al., 1999; Dritsakis and Adamopoulos, 2004; Ziramba, 2008; Katrakilidis and Tsaliki, 2009; Samudram et al., 2009).

Literature provides existence of mix relationship between public spending and national income for developed and underdeveloped countries as well as applicability of Wagner's or Keynesian hypothesis. However, there is limited work on the relationship between economic growth and government expenditure at disaggregate level in Pakistan. This study aims to fill this gap by analyzing the relationship between total public spending at aggregate

as well as disaggregate level and economic growth by employing six mathematical formulations of Wagner's law. The objective of this study is to examine the long run as well as short run relationship between government expenditure at aggregate as well as disaggregate level and economic growth in Pakistan from 1976 to 2015. The findings of this study will help policy makers and government to design appropriate policies to accelerate the pace of economic growth in Pakistan.

The rest of the study is organized as follows. Literature review on relationship between public spending and economic growth is discussed in section 2. Model, methodology and data are explained in section 3. Section 4 presents results of the study. Section 5 consists of concluding remarks and policy recommendations.

## 2. Literature review

Ansari et al. (1997) analyzed the relationship between national income and government expenditure for three African countries i.e. Ghana, Kenya and South Africa from 1957 to 1990. They found that unidirectional causality flows from economic growth to spending for Ghana, while unidirectional causality exists in favor of Keynesian hypothesis for South Africa, and no causality exists in Kenya. Biswal et al. (1999) examined the relationship between national income and total public spending and its subcomponents in Canada from 1950 to 1995. The results showed absence of cointegration between components of public spending and GDP. They found that unidirectional causality exists in favor of Wagner's and Keynesian hypothesis for different components of public spending. Faris (2002) investigated the relationship between public spending and output for GCC countries from 1970 to 1997. Results showed that cointegration exists between total government spending and economic growth. The causality test showed that Wagner's hypothesis is applicable in GCC countries except Bahrain, whereas both Wagner and Keynesian hypothesis exists in Bahrain.

Halicioglu (2003) examined the relationship between public spending and output in Turkey from 1960 to 2000. Results suggested that long run relationship exists between public spending and economic growth. The results of causality suggested that neither unidirectional nor bidirectional causality exists in favor of Wagner's or Keynesian hypothesis. Iyare and Lorde (2004) analyzed the association between public spending and national income for nine Caribbean countries from 1950 to 2000. Results indicated the absence of cointegration between public spending and output in Caribbean countries except Grenada, Guyana and Jamaica. Results of the causality were mixed, but in most of the countries, Wagner's hypothesis was applicable. Chang et al. (2004) examined the applicability of Wagner's hypothesis in seven industrialized and three emerging countries of Asia from 1951 to 1996. Cointegration results suggested that public spending and output have long run relationship in Japan, South Korea, Taiwan, UK and US. However, causality test showed that Wagner's hypothesis is applicable in Japan, US, UK, South Korea and Taiwan, while for remaining five countries neither Wagner's nor Keynesian hypothesis holds.

Dritsakis and Adamopoulos (2004) analyzed the relationship between public spending and output in Greece from 1960 to 2001. They found that unidirectional causality runs from output to government expenditure in the long run, while both Wagner's and Keynesian hypothesis holds in the short run in the Greek economy. Loizides and Vamvoukas (2005) examined the link between public spending, government size and output for UK, Ireland and Greece from 1960 to 1990. They found that causality flows from public spending to economic growth in favor of Keynesian hypothesis in UK and Ireland, while Wagner's hypothesis holds in Greece in short run. Ziramba (2008) analyzed the relationships between public spending and output in South Africa from 1960 to 2006. Results of the short-run causality indicated that both Wagner's and Keynesian hypothesis are valid, while long-run causality does not follow any direction.

Katrakilidis and Tsaliki (2009) analyzed the association between public expenditure and output in Greece from 1968 to 2004. They found that bidirectional causality exists between the variables, which support both Wagner's and Keynesian hypothesis in Greek economy. Samudram et al. (2009) examined the existence of Keynesian or Wagner's hypothesis in Malaysia from 1970 to 2004. Results indicated the existence of cointegration between GDP and spending on education, agriculture, defense, and development. They concluded that long run causality is bidirectional in favor of both Keynes and Wagner's hypothesis in case of Malaysia. Abdullah and Mamoor (2010) examined the existence of Wagner's hypothesis in Malaysia from 1970 to 2007. They found that long run relationship exists between government expenditure and economic growth, while Wagner's hypothesis holds true in four out of five version of Wagner's law.

Afzal and Abbas (2010) examined the existence of Wagner's hypothesis in Pakistan from 1960 to 2007. They found that unidirectional causality exists in favor of Wagner's law for total public spending, defense spending, interest payments and fiscal deficit. Montiel (2010) examined the relationship between public spending and output in Mexico from 1950 to 1990. Result showed that cointegration exists between public spending and output, while unidirectional causality exists in support of Wagner's hypothesis. Babatunde (2011) analyzed the existence of Wagner's hypothesis in Nigeria from 1970 to 2007. Result showed that there is no long run relationship between government expenditure and output, while causality test shows weak existence of Keynesian hypothesis in Nigeria.

Kumar et al. (2012) examined the Wagner's hypothesis in New Zealand by using ARDL bounds test from 1960 to 2007. They found that Wagner's hypothesis holds in long run, while Keynesian hypothesis holds in short run. Magazzino (2012) analyzed the relationship between disaggregate public spending and aggregate income for Italy from 1960 to 2008. Study found that Wagner's hypothesis holds for passive interest spending in the long run, and for dependent labor income in the short run. Rauf et al. (2012) analyzed the relationship between government spending and output in Pakistan from 1970 to 2009. They found that there is no long-run relationship between government spending and output, while no causal link exists between public spending and output in the short run. Mahmoodi and Mahmoodi (2014) examined the relationship between government expenditure and economic growth for twenty Asian countries from 1970 to 2010. They found that long run relationship exists

in developing countries, while bidirectional causality exists in advanced and newly industrialized countries in short run.

Barra et al. (2015) analyzed the relationship between government expenditure and economic growth in Italy from 1951 to 2009. They found that long run relationship exists between the variables, while unidirectional causality holds in favor of Wagner's hypothesis in short run. Lahirushan and Gunasekara (2015) examined the impact of government spending on economic growth of Asian countries from 1973 to 2013. They found that long run relationship exists between government expenditure and output in Asian countries, while unidirectional causality holds in favor of both Keynesian and Wagner's hypothesis in short run. Muhammad et al. (2015) analyzed the relationship between government expenditure and economic growth in Pakistan from 1972 to 2013. Thy found that neither long run relationship exists nor causality exists in the short run between government expenditure and economic growth in Pakistan. Thabane and Lebina (2016) analyzed the relationship between government expenditure and economic growth in Lesotho from 1980 to 2012. Results showed that long run relationship exists between government expenditure and economic growth, while long-run and short causality confirms Wagner's hypothesis in Lesotho.

## 3. Model, methodology and data

### 3.1. Model

There are mainly two approaches regarding relationship between government expenditure and economic growth i.e. "Wagner's law" or "Keynesian hypothesis". Wagner (1883) did not present his ideas in the form of a law, later on his views called as Wagner's hypothesis or Wagner's law (Henrekson, 1993; Halicioglu, 2003). The law argues that government expenditure increases faster than economic growth and it is an endogenous policy variable. The government expenditure plays no role in generating economic growth, because government spending is a consequence rather than cause of economic growth. Therefore, causality flows from economic growth to public spending. On the other hand, Keynes (1936) views are opposite to Wagner's hypothesis. Keyens (1936) argued that government expenditure is treated as exogenous policy instrument which is considered to influence economic growth and correct short term as well as long term cyclical fluctuations. Public spending is a cause rather than effect of economic growth, hence casualty runs from government expenditure to national income. Keynesian analysis concludes that economic performance may improve by demand management policies. However, inefficiencies of market failure can also improve by government intervention.

A number of researchers have argued that it is not clear whether Wagner's law relates to absolute size of the government or relative size of the government in an economy. Peacock and Wiseman (1961) brought up with displacement effect idea by using political theory to elaborate consequences of political events on government expenditure. Musgrave and Musgrave (1984) argued that association between public and private goods is complementary instead of substitute in nature. Dutt and Ghosh (1997) argued that Wagner was neither explicit in hypothesis formulation nor presented his law in mathematical form.

Several mathematical specifications have been developed over time by researchers to prove Wagner's or Keynesian hypothesis since 1960s.

## 3.2. Methodology

### *3.2.1. Econometric model*

There are different mathematical formulations of Wagner's law presented by different researchers. This study uses six functional forms of Wagner's law and further classify these forms to incorporate disaggregate expenditure.

#### *3.2.1.1. Model I*

The functional form of Model I is presented by Peacock and Wiseman (1961). In this model, total government expenditure (GE) is a function of national output (GDP). The econometric model of the Peacock and Wiseman (1961) can be written as:

$$\ln(GE_t) = \alpha_o + \alpha_1 \ln(GDP_t) + u_{1t} \quad (1)$$

Where, $GE_t$ is total government expenditure, $GDP_t$ is gross domestic product, and $u_{1t}$ is error term.

If elasticity of GE with respect to GDP exceeds unity, Wagner's hypothesis is supported and reveals public spending grow at a faster rate than national output. The econometric model of Peacock and Wiseman (1961) can be extended through disaggregate government expenditure as:

$$\ln(ECS_t) = \beta_o + \beta_1 \ln(GDP_t) + u_{2t} \quad (1a)$$

$$\ln(ESEES_t) = \gamma_o + \gamma_1 \ln(GDP_t) + u_{3t} \quad (1b)$$

$$\ln(ED_t) = \delta_o + \delta_1 \ln(GDP_t) + u_{4t} \quad (1c)$$

$$\ln(CE_t) = \rho_o + \rho_1 \ln(GDP_t) + u_{5t} \quad (1c)$$

$$\ln(DE) = \Theta_o + \Theta_1 \ln(GDP_t) + u_{6t} \quad (1e)$$

Where, $ECS_t$ is expenditure on current subsidies, $ESEES_t$ is expenditure on social, economic and education services, $ED_t$ is expenditure on defense, $CE_t$ is current expenditure, $DE_t$ is developmental expenditure, $GDP_t$ is gross domestic product, and $u_{it}$ is error term. Wagner's hypothesis is supported if $\alpha_1$, $\beta_1$, $\gamma_1$, $\delta_1$, $\rho_1$ and $\Theta_1$ exceed unity (> 1).

#### *3.2.1.2. Model II*

The functional form of Model II is proposed by Pryor (1968). In this model, government consumption expenditure (GCE) is a function of national output (GDP). Wagner's hypothesis is valid if elasticity of GCE with respect to GDP exceeds unity. The econometric model of Pryor (1968) can be written as:

$$\ln(GCE_t) = \alpha_o + \alpha_1 \ln(GDP_t) + u_{1t} \quad (2)$$

Where, $GCE_t$ is government consumption expenditure, $GDP_t$ is gross domestic product, and $u_{1t}$ is error term. Wagner's hypothesis is supported if $\alpha_1$ exceed unity (>1).

*3.2.1.3. Model III*

The functional form of Model III is presented by Goffman (1968). In this model, the total government expenditure (GE) is as a function of per capita output (GDP/N). If elasticity of GE with respect to GDP/N exceeds unity, Wagner's hypothesis is supported. The econometric model of Goffman (1968) can be written as:

$$\ln(GE_t) = \alpha_0 + \alpha_1 \ln(GDP_t/N_t) + u_{1t} \quad (3)$$

Where, $GE_t$ is total government expenditure, $GDP_t$ is gross domestic product, $N_t$ is population, and $u_{1t}$ is error term.

The econometric model of Goffman (1968) can be extended through disaggregate government expenditure as:

$$\ln(ECS_t) = \beta_0 + \beta_1 \ln(GDP_t/N_t) + u_{2t} \quad (3a)$$

$$\ln(ESEES_t) = \gamma_0 + \gamma_1 \ln(GDP_t/N_t) + u_{3t} \quad (3b)$$

$$\ln(ED_t) = \delta_0 + \delta_1 \ln(GDP_t/N_t) + u_{4t} \quad (3c)$$

$$\ln(CE_t) = \rho_0 + \rho_1 \ln(GDP_t/N_t) + u_{5t} \quad (3d)$$

$$\ln(DE_t) = \Theta_0 + \Theta_1 \ln(GDP_t/N_t) + u_{6t} \quad (3e)$$

Where, $ECS_t$ is expenditure on current subsidies, $ESEES_t$ is expenditure on social, economic and education services, $ED_t$ is expenditure on defence, $CE_t$ is current expenditure, $DE_t$ is developmental expenditure, $GDP_t$ is gross domestic product, $N_t$ is population, and $u_t$ is error term. Wagner's hypothesis is supported if $\alpha_1$, $\beta_1$, $\gamma_1$, $\delta_1$, $\rho_1$ and $\Theta_1$ exceed unity (> 1).

*3.2.1.4. Model IV*

The functional form of Model IV is introduced by Michas (1975) a modified version of Gupta (1967). The applicability of Wagner's hypothesis requires elasticity of GE/N with respect to GDP/N exceed unity. The econometric model of Michas (1975) can be written as:

$$\ln(GE_t/N_t) = \alpha_o + \alpha_1 \ln(GDP_t/N_t) + u_{1t} \quad (4)$$

Where, $GE_t$ is total government expenditure, $N_t$ is population, $GDP_t$ is gross domestic product, and $u_{1t}$ is error term.

The econometric model of Michas (1975) can be extended through disaggregate government expenditure as:

$$\ln(ECS_t/N_t) = \beta_o + \beta_1 \ln(GDP_t/N_t) + u_{2t} \quad (4a)$$

$$\ln(ESEES_t/N_t) = \gamma_0 + \gamma_1 \ln(GDP_t/N_t) + u_{3t} \quad (4b)$$

$$\ln(ED_t/N_t) = \delta_o + \delta_1 \ln(GDP_t/N_t) + u_{4t} \quad (4c)$$

$$\ln(CE_t/N_t) = \rho_o + \rho_1 \ln(GDP_t/N_t) + u_{5t} \quad (4d)$$

$$\ln(DE_t/N_t) = \Theta_o + \Theta_1 \ln(GDP_t/N_t) + u_{6t} \quad (4e)$$

Where, $ECS_t$ is expenditure on current subsidies, $ESEES_t$ is expenditure on social, economic and education services, $ED_t$ is expenditure on defence, $CE_t$ is current expenditure, $DE_t$ is developmental expenditure, $N_t$ is population, $GDP_t$ is gross domestic product, and $u_t$ is error term. Wagner's hypothesis is supported if $\alpha_1$, $\beta_1$, $\gamma_1$, $\delta_1$, $\rho_1$ and $\Theta_1$ exceed unity (> 1).

*3.2.1.5. Model V*

The functional form of Model V is developed by Mann (1980) a modified version of Peacock and Wiseman (1961). In this model, total government expenditure to national output (GE/GDP) is a function of national output (GDP). If the elasticity of government share in total output with respect to national output exceed zero, Wagner's hypothesis is validated. The econometric model of Mann (1980) can be written as:

$$\ln(GE_t/GDP_t) = \alpha_o + \alpha_1 \ln(GDP_t) + u_{1t} \quad (5)$$

Where, $GE_t$ is government expenditure, $GDP_t$ is gross domestic product, and $u_{1t}$ is error term.

The econometric model of Mann (1980) can be extended through disaggregate government expenditure as:

$$\ln(ECS_t/GDP_t) = \beta_o + \beta_1 \ln(GDP_t) + u_{2t} \quad (5a)$$

$$\ln(ESEES_t/GDP_t) = \gamma_o + \gamma_1 \ln(GDP_t) + u_{3t} \quad (5b)$$

$$\ln(ED_t/GDP_t) = \delta_o + \delta_1 \ln(GDP_t) + u_{4t} \quad (5c)$$

$$\ln(CE_t/GDP_t) = \rho_o + \rho_1 \ln(GDP_t) + u_{5t} \quad (5d)$$

$$\ln(DE_t/GDP_t) = \Theta_o + \Theta_1 \ln(GDP_t) + u_{6t} \quad (5e)$$

Where, $ECS_t$ is expenditure on current subsidies, $ESEES_t$ is expenditure on social, economic and education services, $ED_t$ is expenditure on defence, $CE_t$ is current expenditure, $DE_t$ is developmental expenditure, $GDP_t$ is gross domestic product, and $u_{6t}$ is error term. Wagner's hypothesis is supported if $\alpha_1$, $\beta_1$, $\gamma_1$, $\delta_1$, $\rho_1$ and $\Theta_1$ exceed zero (> 0).

3.2.1.6. Model VI

The functional form of Model VI is proposed by Musgrave (1969), later on modified by Ram (1986), Murthy (1993), and Henrekson (1993). In this model, total government expenditure to national output (GE/GDP) is a function of per capita output (GDP/N). Wagner's hypothesis is valid if elasticity of GE/GDP with respect to GDP/N exceed zero. The econometric model of Musgrave (1969) can be written as:

$$\ln(GE_t/GDP_t) = \alpha_o + \alpha_1 \ln(GDP_t/N_t) + u_{1t} \quad (6)$$

Where, $GE_t$ is government expenditure, $GDP_t$ is gross domestic product, $N_t$ is population, and $u_{1t}$ is error term.

The econometric model of Musgrave (1969) can be extended through disaggregate government expenditure as:

$$\ln(ECS_t/GDP_t) = \beta_o + \beta_1 \ln(GDP_t/N_t) + u_{2t} \quad (6a)$$

$$\ln(ESEES_t/GDP_t) = \gamma_o + \gamma_1 \ln(GDP_t/N_t) + u_{3t} \quad (6b)$$

$$\ln(ED_t/GDP_t) = \delta_o + \delta_1 \ln(GDP_t/N_t) + u_{4t} \quad (6c)$$

$$\ln(CE_t/GDP_t) = \rho_o + \rho_1 \ln(GDP_t/N_t) + u_{5t} \quad (6d)$$

$$\ln(DE_t/GDP_t) = \Theta_o + \Theta_1 \ln(GDP_t/N_t) + u_{6t} \quad (6e)$$

Where, $ECS_t$ is expenditure on current subsidies, $ESEES_t$ is expenditure on social, economic and education services, $ED_t$ is expenditure on defence, $CE_t$ is current expenditure, $DE_t$ is developmental expenditure, $GDP_t$ is gross domestic product, $N_t$ is population, and $u_t$ is error term. Wagner's hypothesis is supported if $\alpha_1$, $\beta_1$, $\gamma_1$, $\delta_1$, $\rho_1$ and $\Theta_1$ exceed zero (> 0).

### 3.2.2. Unit root test

The study conducts time series analysis in which the most important step is to check stationarity of the series to avoid spurious regression and misleading results. The study uses Augmented Dickey Fuller (ADF) and Phillips-Perron (PP) unit root tests. Dickey and Fuller (1981) presented the Dickey-Fuller unit root test in which they assume that the error term are uncorrelated. But in order to address the situation when error terms are correlated, they presented ADF test by adding the lags of the dependent variable on the right hand side. Phillips and Perron (1988) dealt with serial correlation problem by proposing nonparametric statistical methods without adding the lag of the dependent variable.

### 3.2.3. Cointegration test

Engle and Granger (1987) two step procedure requires that order of integration of variables must be I(1). This test explores whether series under consideration has long run equilibrium relationship or not. The first step investigates long run association between two variables through employing ordinary least square (OLS) estimates. The general form of regression equation is as follow:

$$lnY_t = \alpha_0 + \alpha_1 lnX_t + \varepsilon_t \quad (7)$$

The residuals obtained from regression equation (7) are tested for stationarity through employing ADF unit root tests. If estimated residuals ($\varepsilon_t$) are stationary at level, then variables are cointegrated and moving together in the long run. After assessing long run association between variables, the second step analyzed the short run relationship by estimating ECM or dynamic model. If variables possessed a long-run relationship, the residuals ($\varepsilon_t$) obtained from estimated regression equation can be employed to estimate the ECM. Granger representation theorem states that association between X and Y can be expressed as ECM, if these variables are moving together in long run. The dynamic model (ECM) is estimated by the following equation:

$$\Delta lnY_t = \alpha_0 + \sum_{i=1}^{n} \alpha_i \, \Delta lnY_{t-i} + \sum_{j=1}^{n} \alpha_j \, \Delta lnX_{t-j} + \alpha ECT_{t-1} + u_t \quad (8)$$

Where, $ECT_{t-1}$ is the lagged estimated residual from equation (7). The speed of adjustment of short run equilibrium depends on the absolute value of the coefficient of ECT.

### 3.2.4. Causality test

The cointegration test confirms the existence or absence of long run relationship among the variables but it does not provide the direction of causality. For this purpose Granger causality test is used to determine the direction of causality. Granger (1988) stated that within the framework of ECM, causal relations among variables can be examined. The individual coefficients of the lagged terms captured the short run dynamics, while the error correction term contains the information of long run causality. So, to examine the relationship between variables, the study used VAR framework as follows:

$$\Delta lnY_t = \alpha_0 + \sum_{i=1}^{p} \alpha_{1i} \Delta lnY_{t-i} + \sum_{i=1}^{p} \alpha_{2i} \Delta lnX_{t-i} + \varepsilon_{1t} \quad (9)$$

$$\Delta lnX_t = \beta_0 + \sum_{i=1}^{p} \beta_{1i} \Delta lnX_{t-i} + \sum_{i=1}^{p} \beta_{2i} \Delta lnY_{t-i} + \varepsilon_{2t} \quad (10)$$

### 3.3. Data

The study utilizes the annual time series data of Pakistan from 1976 to 2015. The data for total government expenditure (GE), expenditure on current subsidies (ECS), expenditure on social, economic and education services (ESEES), expenditure on defence (ED), current expenditure (CE), developmental expenditure (DE), government consumption expenditure (GCE) and GDP in is collected from Pakistan Economic Survey (various issues). The data for population (N) is also taken Pakistan Economic Survey (various issues).

## 4. Results

Augmented Dickey Fuller (ADF) and Phillips-Perron (PP) unit root tests are applied to check the order of integration of the variables. Schwarz Information Criterion (SC) and Akaike Information Criterion (AIC) are used for determination of appropriate lag selection for each test. The results of unit root tests indicate that all the variables are integrated of order I(1). Results of ADF and PP tests are reported in Table 1.

**Table 1.** *Results of ADF and PP Unit Root Tests*

| Variables | Augmented Dickey Fuller (ADF) | | Phillips-Perron (PP) | | Order of Integration | |
|---|---|---|---|---|---|---|
| | At Level | At 1st difference | At Level | At 1st difference | ADF | PP |
| ln(GE) | -0.1875 | -5.2303*** | -0.1918 | -5.2303*** | I(1) | I(1) |
| ln(GDP) | -0.3207 | -5.9141*** | -0.3209 | -5.9141*** | I(1) | I(1) |
| ln(ECS) | 0.4706 | -7.7140*** | -0.6834 | -8.3410*** | I(1) | I(1) |
| ln(ESEES) | -0.2589 | -8.1814*** | -0.1786 | -8.2561*** | I(1) | I(1) |
| ln(ED) | -1.3863 | -5.2651*** | -1.2026 | -5.4714*** | I(1) | I(1) |
| ln(CE) | -0.9336 | -5.5032*** | -0.9096 | -5.6256*** | I(1) | I(1) |
| ln(DE) | 0.4232 | -7.3820*** | 0.6650 | -7.3820*** | I(1) | I(1) |
| ln(GCE) | -0.3245 | -6.5627*** | -0.3245 | -6.5497*** | I(1) | I(1) |
| ln(GDP/N) | 0.1923 | -5.8259*** | 0.1895 | -5.8273*** | I(1) | I(1) |
| ln(GE/N) | 0.1705 | -5.0244*** | 0.1315 | -5.0340*** | I(1) | I(1) |
| ln(ECS/N) | 1.4638 | -7.3778*** | -0.7756 | -8.3270*** | I(1) | I(1) |
| ln(ESEES/N) | -0.1248 | -8.0810*** | 0.1690 | -8.2652*** | I(1) | I(1) |
| ln(ED/N) | -1.0532 | -5.4084*** | -0.9480 | -5.5209*** | I(1) | I(1) |
| ln(CE/N) | -0.6411 | -5.6263*** | -0.6276 | -5.6263*** | I(1) | I(1) |
| ln(DE/N) | 0.4381 | -7.1910*** | 0.7267 | -7.1910*** | I(1) | I(1) |

| Variables | Augmented Dickey Fuller (ADF) | | Phillips-Perron (PP) | | Order of Integration | |
|---|---|---|---|---|---|---|
| | At Level | At 1st difference | At Level | At 1st difference | ADF | PP |
| ln(GE/GDP) | 0.3646 | -6.3003*** | 0.5507 | -6.4504*** | I(1) | I(1) |
| ln(ECS/GDP) | -2.5038 | -7.6862*** | -2.5038 | -8.2869*** | I(1) | I(1) |
| ln(ESEES/GDP) | -2.5898 | 8.5435*** | -2.4241 | -15.755*** | I(1) | I(1) |
| ln(ED/GDP) | 0.0935 | -5.0249*** | -0.1337 | -5.0897*** | I(1) | I(1) |
| ln(CE/GDP) | -1.9322 | -6.1397*** | -03704 | -6.2103*** | I(1) | I(1) |
| ln(DE/GDP) | 0.6139 | -7.3348*** | 0.7373 | -7.3348*** | I(1) | I(1) |

**Note:** ***, **, * shows significance at 1%, 5% and 10%, respectively.

The results of cointegrating of Model I are reported in Table 2a. Total government expenditure has no long-run relationship with GDP in model 1. In model 1a expenditure on current subsidies and GDP have no long-run association. Expenditure on social, economic and education services in model 1b have long run and positive relationship with GDP. An increase in economic growth will increase the expenditure on social, economic and education services because more educated and healthy people would take active participation in labor markets. No long-run association exists between expenditure on defense and output in model 1c. Model 1d indicates absence of cointegration between current expenditure and output. Developmental expenditure and output shows no long run association in model 1e. The results of cointegration of Model II are also reported in Table 2a. Results show that null hypothesis of no cointegration in model 2 is accepted. No long run relationship exists between government consumption expenditure and GDP in Pakistan.

The results of cointegration of Model III are reported in in Table 2a as well. In model 3, total government expenditure has no long run relationship with GDP per capita. In model 3a, expenditure on current subsidies and GDP per capita shows no long-run association. Expenditure on social, economic and education services and GDP per capita have positive relationship and long run relationship in model 3b. No long run relationship exists between expenditure on defence and GDP per capita in model 3c. Results of model 3d showed that current expenditure and GDP per capita are not moving together in the long run. No long run relationship exists between developmental expenditure and output per capita in model 3e.

**Table 2a.** *Results of Engle-Granger Cointegration for Model I, Model II, and Model III*

| Model | Dependent Variable | Constant | Coefficient of Explanatory Variable | Adjusted R-squared | CRDW | Calculated ADF Residuals Test |
|---|---|---|---|---|---|---|
| 1 | ln(GE) | -0.6438<br>(0.1424) | 0.9402***<br>(0.0098) | 0.9958 | 0.4395 | -2.1140 |
| 1a | ln(ECS) | -3.8943<br>(0.8531) | 0.9526***<br>(0.0586) | 0.8743 | 0.5873 | -2.5242 |
| 1b | ln(ESEES) | -3.5646<br>(0.1978) | 1.0556***<br>(0.0136) | 0.9937 | 0.8763** | -3.2156* |
| 1c | ln(ED) | -0.0736<br>(0.2784) | 0.7902***<br>(0.0191) | 0.9777 | 0.1213 | -1.4457 |
| 1d | ln(CE) | -1.8019<br>(0.1968) | 1.0004***<br>(0.0135) | 0.9931 | 0.3145 | -1.9290 |
| 1e | ln(DE) | 0.2393<br>(0.3696) | 0.7774***<br>(0.0254) | 0.9611 | 0.4374 | -1.9134 |
| 2 | ln(GCE) | -1.6021 | 0.9583<br>(58.8839) | 0.9889 | 0.3107 | -1.7839 |

| Model | Dependent Variable | Constant | Coefficient of Explanatory Variable | Adjusted R-squared | CRDW | Calculated ADF Residuals Test |
|---|---|---|---|---|---|---|
| 3 | ln(GE) | 1.8960 | 1.1439<br>(87.7827) | 0.9950 | 0.4187 | -2.20399 |
| 3a | ln(ECS) | -1.3439 | 1.6139<br>(16.4718) | 0.8739 | 0.6085 | -2.5756 |
| 3b | ln(ESEES) | -0.7138 | 1.2843<br>(73.63648) | 0.9929 | 0.8002** | -3.1136* |
| 3c | ln(ED) | 2.0751 | 0.9599<br>(38.1109) | 0.9738 | 0.1132 | -1.5260 |
| 3d | ln(CE) | 0.9076 | 1.2165<br>(65.1183) | 0.9909 | 0.2789 | -1.9289 |
| 3e | ln(DE) | 2.3232 | 0.9475<br>(31.7432) | 0.9627 | 0.4721 | -2.0191 |

**Note:** The ln represents logarithm. ***, **, * shows significance at 1%, 5%, and 10% level, respectively. CRDW stands for Cointegration Regression Durbin-Watson. The 1%, 5% and 10% critical value for the CDRW is 1.00, 0.78 and 0.69, respectively (Engle and Yoo, 1987). The 1%, 5% and 10% critical value for the ADF residual test is -3.9001, -3.3377 and -3.0462, respectively (MacKinnon, 1991). Standard errors are in parenthesis.

The results of cointegration of Model IV are reported in Table 2b. Per capita total government expenditure has no long run association with per capita GDP in model 4. Per capita expenditure on current subsidies and per capita GDP have no long run association in model 4a. Per capita expenditure on social, economic and education services and per capita GDP have long run and positive relationship in model 4b. No long run relationship exists between per capita expenditure on defence and per capita GDP in model 4c. Model 4d shows that per capita current expenditure and per capita GDP have no long run relationship. Per capita developmental expenditure and per capita GDP have no long run relationship in model 4e

Results of cointegration of Model V are presented in Table 2b. Model 5 shows that no cointegration exists among total government expenditure as a percentage of GDP and output. Expenditure on current subsidies as a percentage of GDP and output do not have any long run relationship in model 5a. Model 5b shows that expenditure on social, economic and education services as a percentage of GDP and output have long run and positive relationship. Results of model 5c indicate that no cointegration exists among expenditure on defence as a percentage of GDP and output. Model 5d shows no long run association between current expenditure as a percentage of GDP and output. No long run relationship exists between developmental expenditure as a percentage of GDP and output in model 5e.

Results of cointegration of Model VI are reported in Table 2b as well. In model 6, total government expenditure as percentage of GDP has no long run relationship with per capita GDP. Model 6a shows that no long run relationship exists between expenditure on current subsidies as percentage of GDP and per capita output. Expenditure on social, economic and education services as percentage of GDP and per capita output have long run and positive relationship in model 6b. Model 6c suggests that no cointegration exists between expenditure on defence as percentage of GDP and per capita output. No long run relationship exists between current expenditure as percentage of GDP and per capita output

in model 6d. Model 6e represents that no long run relationship exists between developmental expenditure as percentage of GDP and per capita output.

**Table 2b.** *Results of Engle-Granger Cointegration for Model IV, Model V, and Model VI*

| Model | Dependent Variable | Constant | Coefficient of Explanatory Variable | Adjusted R-squared | CRDW | Calculated ADF Residuals Test |
|---|---|---|---|---|---|---|
| 4 | ln(GE/N) | -0.8026 | 0.92691 (78.1484) | 0.9936 | 0.4397 | -2.1063 |
| 4a | ln(ECS/N) | -4.0424 | 0.94444 (13.2331) | 0.8170 | 0.5863 | -2.5218 |
| 4b | ln(ESEES/N) | -3.4124 | 1.06737 (64.4350) | 0.99070 | 0.8736** | -3.2125* |
| 4c | ln(ED/N) | -0.6235 | 0.74304 (32.5869) | 0.9645 | 0.1243 | -1.4407 |
| 4d | ln(CE/N) | -1.7909 | 0.99949 (60.7408) | 0.9895 | 0.3144 | -1.9353 |
| 4e | ln(DE/N) | -0.3754 | 0.73050 (23.3858) | 0.9333 | 0.4277 | -2.8927 |
| 5 | ln(GE/GDP) | -0.6438 | -0.0598 (-6.1182) | 0.4830 | 0.4395 | -2.1140 |
| 5a | ln(ECS/GDP) | -3.8943 | -0.0474 (-0.8085) | -0.0090 | 0.5873 | -2.5242 |
| 5b | ln(ESEES/GDP) | -3.5656 | 0.0556 (4.0889) | 0.2873 | 0.8763** | -3.2156* |
| 5c | ln(ED/GDP) | -0.0736 | -0.2098 (-10.968) | 0.7536 | 0.1213 | -1.4457 |
| 5d | ln(CE/GDP) | -1.8019 | 0.0004 (0.0313) | -0.0263 | 0.3145 | -1.9291 |
| 5e | ln(DE/GDP) | 0.2393 | -0.2226 (-8.7703) | 0.6693 | 0.4374 | -1.9134 |
| 6 | ln(GE/GDP) | -0.8026 | -0.0731 (-6.1624) | 0.4867 | 0.4397 | -2.1062 |
| 6a | ln(ECS/GDP) | -4.0424 | -0.0556 (-0.7785) | -0.0102 | 0.5863 | -2.5218 |
| 6b | ln(ESEES/GDP) | -3.4124 | 0.0674 (4.0672) | 0.2850 | 0.8736** | -3.2125* |
| 6c | ln(ED/GDP) | -0.6235 | -0.2570 (-11.2690) | 0.7636 | 0.1243 | -1.4407 |
| 6d | ln(CE/GDP) | -1.7909 | 0.0005 (-0.0305) | -0.0263 | 0.3145 | -1.9353 |
| 6e | ln(DE/GDP) | -0.3754 | -0.2695 (-8.6275) | 0.6531 | 0.4277 | -1.8927 |

**Note:** The ln represents logarithm. ***, **, * shows significance at 1%, 5%, and 10% level, respectively**.** CRDW stands for Cointegration Regression Durbin-Watson. The 1%, 5% and 10% critical value for the CDRW is 1.00, 0.78 and 0.69, respectively (Engle and Yoo, 1987). The 1%, 5% and 10% critical value for the ADF residual test is -3.9001, -3.3377 and -3.0462, respectively (MacKinnon, 1991). Standard errors are in parenthesis.

The next step after establishing the cointegration relationship between variables in model 1b, 3b, 4b, 5b, and 6b is to develop error correction model (ECM), which captures the speed of short run adjustments towards the long run equilibrium. Results of ECM of model 1b, 3b, 4b, 5b, and 6b are presented in Table 3. The estimated coefficient of ECT is negative and significant in all the models.

**Table 3.** *Results of ECM for Model I, Model III, Model IV, Model V, and Model VI*

| Model | Dependent Variable | Constant | Coefficient of Explanatory Variable | ECT (-1) |
|---|---|---|---|---|
| 1b | ln(ESEES) | 0.1116 | 0.2583<br>(0.4216) | -0.4568***<br>(0.1324) |
| 3b | ln(ESEES) | 0.1024 | 0.4022<br>(0.4156) | -0.4186***<br>(0.1253) |
| 4b | ln(ESEES/N) | 0.0805 | 0.3697<br>(0.4200) | -0.4566***<br>(0.1337) |
| 5b | ln(ESEES/GDP) | 0.1116 | -0.7417<br>(0.4216) | -0.4568***<br>(0.1324) |
| 6b | ln(ESEES/GDP) | 0.0805 | -0.6303<br>(0.4200) | -0.4566***<br>(0.1337) |

**Note:** *** shows significance at 1% level**.** Standard errors are in parenthesis.

The study analyzes the short run causality for validity of Wagner's or Keynesian hypothesis. Results of Granger causality test for Model I, Model II, and Model III are reported in Table 4a. Result shows that neither unidirectional nor bidirectional causality exists in model 1. Wagnerian hypothesis is applicable in model 1a, 1b, 1c and 1d indicating that an increase in GDP will increase expenditure on current subsidies, social economic and education services, defence, and current expenditure. However, causality flows from developmental expenditure to GDP in favor of Keynesian hypothesis in model 1e. An increase in developmental expenditure is a prerequisite to boost economic growth. Neither unidirectional nor bidirectional causality exists between government consumption expenditure and GDP in model 2. Model 3 shows that no causality exists between GDP per capita and total government expenditure. Unidirectional causality in favor of Wagner hypothesis flows from GDP per capita to expenditure on current subsidies, social, economic and education services, and current expenditure in model 3a, 3b, and 3d, respectively. Unidirectional causality in favor of Keynesian hypothesis flows from developmental expenditure to GDP per capita in model 3e.

**Table 4a.** *Results of Granger Causality Test for Model I, Model II, and Model III*

| Model | Null Hypothesis | F-Statistics | Causality |
|---|---|---|---|
| 1 | ∆ln(GDP) does not cause dln(GE) | 1.8997 | No |
| | ∆ln(GE) does not cause ∆ln(GDP) | 0.5151 | No |
| 1a | ∆ln(GDP) does not cause ∆ln(ECS) | 4.6510** | Yes (WH holds) |
| | ∆ln(ECS) does not cause ∆ln(GDP) | 1.6897 | No |
| 1b | ∆ln(GDP) does not cause ∆ln(ESEES) | 5.3076*** | Yes (WH holds) |
| | ∆ln(ESEES) does not cause ∆ln(GDP) | 0.3417 | No |
| 1c | ∆ln(GDP) does not cause ∆ln(ED) | 2.6638* | Yes (WH holds) |
| | ∆ln(ED) does not cause ∆ln(GDP) | 0.0606 | No |
| 1d | ∆ln(GDP) does not cause ∆ln(CE) | 3.0045* | Yes (WH holds) |
| | ∆ln(CE) does not cause ∆ln(GDP) | 0.0490 | No |
| 1e | ∆ln(GDP) does not cause ∆ln(DE) | 2.1335 | No |
| | ∆ln(DE) does not cause ∆ln(GDP) | 4.3446** | Yes (KH holds) |
| 2 | ∆ln(GDP) does not cause ∆ln(GCE) | 1.1845 | No |
| | ∆ln(GCE) does not cause ∆ln(GDP) | 0.3642 | No |
| 3 | ∆ln(GDP/N) does not cause ∆ln(GE) | 2.1426 | No |
| | ∆ln(GE) does not cause ∆ln(GDP/N) | 0.6333 | No |
| 3a | ∆ln(GDP/N) does not cause ∆ln(ECS) | 4.8046** | Yes (WH holds) |
| | ∆ln(ECS) does not cause ∆ln(GDP/N) | 1.8617 | No causality exists |

| Model | Null Hypothesis | F-Statistics | Causality |
|---|---|---|---|
| 3b | ∆ln(GDP/N) does not cause dln ESEES) | 5.9135*** | Yes (WH holds) |
| | ∆ln(ESEES) does not cause ∆ln(GDP/N) | 0.3612 | No |
| 3c | ∆ln(GDP/N) does not cause ∆ln(ED) | 2.4471 | No |
| | ∆ln(ED) does not cause ∆ln(GDP/N) | 0.0219 | No |
| 3d | ∆ln(GDP/N) does not cause ∆ln(CE) | 2.9954* | Yes (WH holds) |
| | ∆ln(CE) does not cause ∆ln(GDP/N) | 0.0242 | No |
| 3e | ∆ln(GDP/N) does not cause ∆ln(DE) | 2.1894 | No |
| | ∆ln(DE) does not cause ∆ln(GDP/N) | 4.7262** | Yes (KH holds) |

**Note:** ***, **, * shows significance at 1%, 5%, and 10% level, respectively. WH, KH denotes Wagner's hypothesis and Keynesian hypothesis, respectively.

Table 4b reports the results of Granger causality test for Model IV, Model V, and Model VI. Unidirectional causality in favor of Wagner hypothesis flows from GDP per capita to total government expenditure per capita, expenditure on current subsidies per capita, social, economic and education services per capita, and current expenditure per capita in model 4, 4a, 4b and 4d, respectively. Unidirectional causality in favor of Keynesian hypothesis flows from developmental expenditure per capita to GDP per capita in model 4e. Neither unidirectional nor bidirectional causality exists in model 5, 5a, 5b, and 5d. Wagner hypothesis holds in model 5c, while Keynesian hypothesis holds in model 5e. Unidirectional causality in favor of Wagner hypothesis flows from GDP per capita to total government expenditure, expenditure on social, economic and education services, and defence expenditure as percentage of GDP in model 6, 6b, and 6c, respectively. However, unidirectional causality in favor of Keynesian hypothesis flows from developmental expenditure as percentage of GDP to GDP per capita in model 6e.

**Table 4b.** *Results of Granger Causality Test for Model I, Model II, and Model III*

| Model | Null Hypothesis | F-Statistics | Causality |
|---|---|---|---|
| 4 | ∆ln(GDP/N) does not cause ∆ln(GE/N) | 2.6013* | Yes (WH holds) |
| | ∆ln(GE/N) does not cause ∆ln(GDP/N) | 0.4667 | No |
| 4a | ∆ln(GDP/N) does not cause ∆ln(ECS/N) | 4.5290** | Yes (WH holds) |
| | ∆ln(ECS/N) does not cause ∆ln(GDP/N) | 1.6890 | No |
| 4b | ∆ln(GDP/N) does not cause ∆ln(ESEES/N) | 6.0474*** | Yes (WH holds) |
| | ∆ln(ESEES/N) does not cause ∆ln(GDP/N) | 0.3812 | No |
| 4c | ∆ln(GDP/N) does not cause ∆ln(ED/N) | 2.1376 | No |
| | ∆ln(ED/N) does not cause ∆ln(GDP/N) | 0.0212 | No |
| 4d | ∆ln(GDP/N) does not cause ∆ln(CE/N) | 3.2304** | Yes (WH holds) |
| | ∆ln(CE/N) does not cause ∆ln(GDP/N) | 0.0050 | No |
| 4e | ∆ln(GDP/N) does not cause ∆ln(DE/N) | 2.3533 | No |
| | ∆ln(DE/N) does not cause ∆ln(GDP/N) | 3.7982** | Yes (KH holds) |
| 5 | ∆ln(GDP) does not cause ∆ln(GE/GDP) | 1.7900 | No |
| | ∆ln(GE/GDP) does not cause ∆ln(GDP) | 0.5152 | No |
| 5a | ∆ln(GDP) does not cause ∆ln(ECS/GDP) | 1.1281 | No |
| | ∆ln(ECS/GDP) does not cause ∆ln(GDP) | 1.0305 | No |
| 5b | ∆ln(GDP) does not cause ∆ln(ESEES/GDP) | 1.0585 | No |
| | ∆ln(ESEES/GDP) does not cause ∆ln(GDP) | 0.3417 | No |
| 5c | ∆ln(GDP) does not cause ∆ln(ED/GDP) | 3.2029** | Yes (WH holds) |
| | ∆ln(ED/GDP) does not cause ∆ln(GDP) | 0.0606 | No |
| 5d | ∆ln(GDP) does not cause ∆ln(CE/GDP) | 0.7485 | No |
| | ∆ln(CE/GDP) does not cause ∆ln(GDP) | 0.0490 | No |

| Model | Null Hypothesis | F-Statistics | Causality |
|---|---|---|---|
| 5e | ∆ln(GDP) does not cause ∆ln(DE/GDP) | 0.8960 | No |
| | ∆ln(DE/GDP) does not cause ∆ln(GDP) | 4.3445** | Yes (KH holds) |
| 6 | ∆ln(GDP/N) does not cause ∆ln(GE/GDP) | 2.5967* | Yes (WH holds) |
| | ∆ln(GE/GDP) does not cause ∆ln(DGDP/N) | 0.4667 | No |
| 6a | ∆ln(GDP/N) does not cause ∆ln(ECS/GDP) | 1.3944 | No |
| | ∆ln(ECS/GDP) does not cause ∆ln(GDP/N) | 0.9612 | No |
| 6b | ∆ln(GDP/N) does not cause ∆ln(ESEES/GDP) | 2.2958* | Yes (WH holds) |
| | ∆ln(ESEES/GDP) does not cause ∆ln(GDP/N) | 0.4847 | No |
| 6c | ∆ln(GDP/N) does not cause ∆ln(ED/GDP) | 3.0955* | Yes (WH holds) |
| | ∆ln(ED/GDP) does not cause ∆ln(GDP/N) | 0.0212 | No |
| 6d | ∆ln(GDP/N) does not cause ∆ln(CE/GDP) | 1.0242 | No |
| | ∆ln(CE/GDP) does not cause ∆ln(GDP/N) | 0.0050 | No |
| 6e | ∆ln(GDP/N) does not cause ∆ln(DE/GDP) | 0.8565 | No |
| | ∆ln(DE/GDP) does not cause ∆ln(GDP/N) | 3.7982* | Yes (KH holds) |

**Note:** ***, **, * shows significance at 1%, 5%, and 10% level, respectively. WH, KH denotes Wagner's hypothesis and Keynesian hypothesis, respectively.

In sum, there is no long run relationship between output and total government expenditures in all the models. Ansari et al. (1997), Biswal et al. (1999), Iyare and Lorde (2004), Afzal and Abbas (2010), Babatunde (2011), Rauf et al. (2012), and Muhammad et al. (2015) also found no cointegration between total government expenditure and economic growth. No long run relationship exists between defence expenditure and output in all the models. Chowdhury (1991), Cohen et al. (1996), Khilji and Akhtar (1997), Antonakis (1999), and Smyth and Narayan (2009) also found absence of cointegration between defense expenditure and output. Result also shows that no long run relationship exists among current expenditure and output in all the models. Bose et al. (2007) also found absence of long run association between current expenditure and output. However, in all the models expenditure on social, economic and education services have long run and positive relationship with GDP in Pakistan. Iqbal and Zahid (1998), Birdsall et al. (1995), Idrees and Siddiqi (2013), and Mercan and Sezer (2014) also found long run and positive relationship between social, economic and education services and output. In short run, unidirectional causality exists in favor of Wagener's hypothesis from output to expenditure on current subsidies, expenditure on social, economic and education services, defence expenditure, and current expenditure in majority of the models. However, unidirectional causality exists in favor of Keynesian hypothesis from developmental expenditure to output in all the models.

## 5. Conclusion

The government expenditure policy plays a critical role in the economy of both developed and underdeveloped countries. Previous literature provides mix result between public spending and economic growth as well as applicability of Wagner's or Keynesian hypothesis. Wagner (1883) argues that causality flows from GDP to public spending, while Keynes (1936) advocates that causality runs from government expenditure to GDP. The objective of this study is to examine the long run as well as short run relationship between government expenditure at aggregate as well as disaggregate level and economic growth in

Pakistan. There are different mathematical formulations of Wagner's law presented by different researchers. This study uses six functional forms of Wagner's law and further classify these forms to incorporate disaggregate expenditure. Study uses annual time series data of Pakistan from 1976 to 2015 and applies Engle and Granger (1987) cointegration test for long run relationship, while Granger (1969) causality test is employed for short run analysis.

Result shows that no long run relationship exists between GDP and total expenditure as well as its sub-components i.e. expenditure on current subsidies, defence expenditure, current expenditure, and developmental expenditure in all the models. However, long run relationship exists among GDP and expenditure on social, economic and education services in Pakistan. Therefore, an increase in economic growth will increase the expenditure on social, economic and education services because more educated and healthy people would take active participation in labor markets.

In short run, Granger causality shows mix results for the existence of Wagner's or Keynesian hypothesis in Pakistan. Unidirectional causality in favor of Wagener's hypothesis exists from GDP to expenditure on current subsidies, expenditure on social, economic and education services, defence expenditure, and current expenditure in majority of the models. None of these expenditures play any role in boosting economic growth, while an increase in GDP will increase the government expenditure in these subcomponents in the short run. However, unidirectional causality in favor of Keynesian hypothesis flows from developmental expenditure to GDP in all the models. Hence, an increase in developmental expenditure is a prerequisite to boost economic growth in Pakistan in the short run.

In the light of the above findings, the study suggests the following recommendations: Expenditure on social, economic and education services have long run positive relationship with economic growth, therefore, government should invest more on human resource development to achieve sustainable economic growth. Government has to reallocate more resources towards developmental projects to achieve higher economic growth in the short run.

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