Testing Wagner versus Keynesian Hypothesis for Pakistan: The Role of Aggregate and Disaggregate Expenditure

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Abstract

The objective of this study is to examine the relationship between government expenditure (at aggregate as well as disaggregate level) and economic growth for Pakistan. The study further aims to find causal relationship for existence of applicability of Wagner's or Keynesian hypothesis. Engle and Granger (1987) two step procedure and Granger causality test (1969) are employed for time series data for the period 1976 to 2015. Results suggest that only expenditure on social, economic and education services have proposed long-run association with economic growth in five of basic versions of Wagner's law for Pakistan. The causality tests are showing mix results regarding existence of applicability of Wagner's or Keynesian hypothesis. Expenditure on current subsidies, expenditure on defence, current expenditure and developmental expenditure are in favor of Wagner's law in most of the cases, where causality runs from economic growth to government expenditure. Results of expenditure on social, economic and education services are in line with existence of Keynesian hypothesis, where causality flows from government expenditure to economic growth. On the basis of results, one may conclude that government should invest for expenditure on social, economic and education services to achieve sustainable economic growth by spending more on human resource development.

Keywords: Government Expenditure, Economics Growth, Cointegration, Causality, Pakistan.

JEL: C32, E62, H51, H52

1. Introduction

The relationship between public spending and national income has been an important subject of analysis and discussion for decades among economists (Peacock & Wiseman, 1961; Gupta, 1967; Oktayer, 2013). Government attempts to stimulate economic growth through various policy instruments. One of the important instrument of fiscal policy is public spending which is used to influence economic growth. (Lahirushan & Gunasekara, 2015). The government expenditure policy has a crucial role to operate functions of the economy whether it is developed or underdeveloped. The recessionary/expansionary periods reduce/increase the abilities of state to enhance economy through fiscal policy instruments unless share of public spending to GDP increases/reduces (Magazzino, 2012). Government revenue was more important than government expenditure till 20th century, while functions and activities of state were confined to a specific limit (World Development Report, 1988). The thinking about functions of state has been changed and present state is now considered to be a welfare state for the economy. The state increases welfare of nation through spending on developmental projects and also social, economic and education services i.e. employment, health, agricultural and industrial development, fresh and clean water (World Development Report, 1988). The rapid economic growth is un-desirable without state influence, while private institutes are only curious about to earn profit and to survive in economy.

There exists mainly two approaches in the literature regarding pubic spending and growth i.e. "Wagner's law" or "Keynesian hypothesis". The fundamental arguments for these two approaches is rely on causal link between public spending and growth (Samudram, 2009). Wagner (1883) states public spending and growth have positive association (Henrkeson, 1993). He is of the view that during industrialization process, government expenditure tends to expand in case of increase in per capita income of a nation, which indicates causality flows from output to public spending (Cheltsos & Kollias, 1997). While, Keynes (1936) postulates government expenditure is exogenous policy instrument which is used to accelerate growth and to correct short-run as well as long-run cyclical fluctuations (Ansari et al., 1997). The public spending is not cause of economic growth and spending do not play decisive role to accomplish growth, so that causality flows from public spending to national output.

The relationship between public spending and economic growth is one of the most debated issue, because government expenditure policy is important tool in economic analysis (Montiel, 2010). Wagner's and Keynesian hypothesis have been empirically tested for both developed and developing countries (Ansari et al., 1997; Biswal et al., 1999; Islam, 2001; 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 causality is unidirectional flows from economic growth to public spending (Ansari et al., 1997; Islam, 2001; Chow et al., 2002; Faris, 2002; Monteil, 2010; Abdullah & Mamoor, 2010; Kumar et al., 2012; Barra, 2015; Thabane & Lebina, 2016). Second strand depends upon applicability of Keynesian hypotheses, where causality is also unidirectional flows from public spending to economic growth (Halicioglu, 2003; Babatunde, 2011). Third strand is based on existence of both Wagner's and Keynesian hypothesis, where causality is bidirectional for public spending and economic growth (Biswal et al., 1999; Dritsakis & Adamopoulos, 2004; Ziramba, 2008; Katrakilidis & Tsaliki, 2009; Samudram, 2009; Ono, 2014).

In sum, the literature provides existence of positive or negative relationship between public spending and economic growth for developed and underdeveloped countries and also reveals applicability of Wagner's or Keynesian hypothesis. However, there is limited work found for existence of relationship between government expenditure (at aggregate as well as disaggregated level) and economic growth specifically for Pakistan. There is less discussion for Pakistan on six basic versions of Wagner's law developed by Peacock-Wiseman (1961), Pryor (1968), Goffman (1968), Michos (1975), Mann (1980) and Murthy (1993) respectively. The present study aims to fill this gap by analyzing relationship between total public spending, its components and economic growth by employing six of the mathematical formulations of Wagner's law. The objective of this study is to examine relationship between government expenditure (at aggregate as well as disaggregate level) and economic growth for Pakistan from 1976 to 2015. The specific objectives of the study are as follow: to analyze relationship between government expenditure and economic growth, and to test validity of Wagner's or Keynesian hypothesis.

The study contributes to existing literature by investigating relationship between government expenditure (at aggregate as well as disaggregate level) and economic growth for Pakistan. The applicability of Wagner's or Keynesian hypothesis is tested by incorporating six of mathematical formulations of Wagner's law for direction of causality between variables. The findings of this

study will help policy makers and government to design appropriate policies to accelerate the pace of growth. Theoretical model is based on Peacock-Wiseman (1961), Pryor (1968), Goffman (1968), Michos (1975), Mann (1980) & Murthy (1993) versions of Wagner's hypothesis. Whereas, total government expenditure at aggregate level as well as disaggregate level is treated as dependent variable, while GDP is taken as explanatory variable. Time series data for Pakistan over the period 1976 to 2015 has been utilized for analysis. This study uses time series data so Augmented Dickey Fuller (ADF) and Phillips-Perron (PP) unit root tests are applied to check non-stationary properties of time series, because the series having unit root will mislead results. Engle and Granger (1987) methodology of cointegrtaion is used to examine long-run relationship between variables of analysis. The causality tests allow us to discuss the causal links between variables, therefore Granger causality test is applied to determine the existence of validity of Wagner's or Keynesian hypothesis.

The rest of study is organized in following manners. 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 empirical results of the study. Section 5 consists of concluding remarks and policy recommendations.

2. Literature Review

Government expenditure policy plays a pivotal role to operate the economy whether it is developed or underdeveloped, because it helps to enhance economic activities of these nations. The role of government towards economic growth is important theoretically and empirically. Ansari et al. (1997) analyzed hypothesis of income and expenditure for three African countries such as South Africa, Ghana and Kenya. They applied Holmes-Hutton statistical procedure for time span ranging from 1957 to 1990. The results showed no cointegration between public spending and output for Ghana, Kenya and South Africa. The causality results suggested causality flows from economic growth to spending in favor of Wagner's law for Ghana. There was no causality for Kenya. There was unidirectional causality in favor of Keynesian hypothesis for South Africa. They concluded that many factors i.e. defence expenditure do not helpful to increase growth, but developmental expenditure on roads, dams, bridges, transportation and communication enhance growth and development in economy. Biswal et al. (1999) found relationship between total public spending, its various subcomponents and national income for

Canada. They applied cointegration methodology and causality tests for time span ranging from 1950 to 1995. The results showed absence of cointegration between components of public spending except current outlays and total current expenditure. These two expenditure expressed bi-directional and others had unidirectional causality in favor of Wagner's and Keynesian hypothesis. They concluded that stabilization policy cannot use transfer payments as their instrument but these could be helpful in implementing the fiscal austerity programme. Spending on other goods and services or public debt could offer significant stabilization power. Finally, current outlay, public purchases, spending on wages and salaries are not good choice for policy recommendations.

Burney (2002) examined association between public spending and socioeconomic variables, along with level of income for Kuwait. Cointegration methodology was employed for time span ranging from 1969 to 1995. Results found little support for cointegration between variables under analysis. Causality results were not in favor of Wagner's hypothesis. He concluded that GNP, GDR, trade openness, revenues supply, population configuration and revenue constraints may influence long-run government expenditure. Wagner's hypothesis may not be valid for Kuwait, because large portion of its revenue is assessed exogenously. While for those countries where Wagner's hypothesis is applicable, their income is determined within domestic economy. Faris (2002) investigated relationship between public spending and output for case of Gulf Cooperation Council countries. Cointegration and causality test were employed for time span 1970 to 1997. Results described cointegration between real total government spending, its components and economic growth such as capital and current outlay. The causality test explained that Wagner's hypothesis is applicable in GCC countries except Bahrain. In Bahrain, both Wagner and Keynesian hypothesis exist. He concluded that Keynesian hypothesis is not applicable among these countries, because a huge part of government spending is devoted to current expenditures such as discount on utility bills, recreational facilities and defence spending. Even these expenditure may not helpful in growth enhancing actions. Therefore, efficiency and effectiveness of expenditure is prerequisite to gain from government expenditure.

Halicioglu (2003) empirically examined long run association between public spending and output for Turkey. Cointegration and causality test are applied for time span ranging from 1960 to 2000. Results suggested that there exists cointegration between public spending and economic growth. The results of causality suggested neither unidirectional nor bidirectional causality in

favor of Wagner's vs. Keynesian hypothesis. Iyare et al. (2004) analyzed long-run association between public spending and national income for nine Caribbean countries. Cointegration and causality tests were employed for the period 1950 to 2000. Results indicated absence of cointegration between public spending and output for Caribbean countries except Grenada, Guyana and Jamaica. Results of causality test were mixed, but in most of the countries, Wagner's hypothesis is applicable. Chang et al. (2004) empirically estimated the applicability of Wagner's hypothesis on ten countries including seven industrialized and three emerging industrialized countries of Asia. They used Johansen and Juselius cointegration (1992) for the period 1951 to 1996. Cointegration results suggested public spending and output is moving together in long-run for Japan, South Korea, Taiwan, UK and US. Results of causality test discussed that Wagner's hypothesis is applicable for Japan, US, UK, South Korea and Taiwan in favor of Wagner's law. For remaining five countries, neither Wagner's nor Keynesian hypothesis validated.

Dritsakis et al. (2004) examined association between public spending and output for Greek. Cointegration and causality tests applied for period 1960 to 2001. Results dictated presence of cointegrtion between variables. Results of long-run causality test suggested unidirectional causality runs from output to government expenditure for major parts of government expenditure i.e. education, healthcare and culture. The short-run causality test revealed Keynesian theory is applicable with general government spending, while Wagner's hypothesis is validated for aggregate expenditure and social welfare expenditure. They concluded that both Wagner's and Keynesian hypothesis are applicable for most of expenditure in Greek. This implies that government expenditure and economic growth increase each other at the same time. They further elaborated that Wagner's hypothesis is valid for total expenditure and social welfare expenditure. While the causality results for general government expenditure do favor Keynesian hypothesis. Loizides and Vamvoukas (2005) proposed link between public spending, government size and output for UK, Ireland and Greece. Cointegration methodology was used for bivariate as well as trivariate analysis and causality test for the period 1960 to 1990. Bivariate analysis were not in favor of long-run relationship. As inflation and unemployment is included, the trivariate analysis showed the presence of long-run association. The results of causality suggested that causal link flows from public spending to economic growth in favor of Keynesian hypothesis in short run for all countries and in long run for UK and Ireland. Wagner's hypothesis is applicable for

Greece. When inflation is included, causality flows from economic growth to government size for UK, which is also indicating existence of Wagner's hypothesis. They concluded that impact of growth on public sector is significant, which indicates government expenditure helps to promote growth.

Rehman et al. (2007) examined association between government expenditure and output for Pakistan. Johansen co-integration and causality tests were applied for the period 1972 to 2004. Results elaborated the existence of cointegration between public spending ratio, real per capita GDP, financial development and trade openness. They concluded that major determinants of public spending consist of per capita output, financial developments and trade openness. These determinants have long-run and significant impact, therefore policy makers can take different actions to boost economy with the help of these determinants. Ziramba (2008) analyzed relationships between real public spending and real output for South Africa. ARDL bound test was applied for the period 1960 to 2006. Results suggested that public spending and output are moving together in long-run. Results of short-run causality indicated both Wagner's and Keynesian hypothesis are valid, while in long-run causality do not follow any direction. Katrakilidis and Tsaliki (2009) analyzed association between public expenditure and output for Greek economy. ADRL co-integration approach was employed for the period 1968 to 2004. Results suggested presence of cointegration between variables. Results of causality analysis suggested a bidirectional causal relationship which support both Wagner's and Keynesian hypothesis. They concluded that investments in social and economic infrastructure enhance private investment, output and productivity which may maximize the growth potential of economy.

Samundram et al. (2009) analyzed whether Keynesian or Wagner's hypothesis hold for Malaysia by using ARDL bound testing approach for the period 1970-2004. Empirical results indicated existence of cointegration between aggregate public spending including spending on education, agriculture, defense and development and GDP. Findings further indicated that long run causality is bi-directional in favor of both Keynes and Wagner's view with structural break for 1998 in case of GNP and expenditure on health and administration. Long run causality supports Wagner's hypothesis for all other expenditure categories. They concluded administration and health spending is mandatory while estimating long-run elasticity for relevant models. Afzal and Abbas (2010) examined existence of Wagner's hypothesis for economy of Pakistan by

cointegration methodology time span ranging from 1960 to 2007. Cointegration results indicated that aggregate expenditure, its subcomponents and output are not moving together in long-run. Results of causality elaborated unidirectional flow in favor of Wagner's law for total public spending, defence spending, interest payments and fiscal deficit. They suggested Wagner's hypothesis is valid for period 1981 – 1991, when fiscal deficit is included in case of public spending.

Montiel (2010) examined relationship between public spending and output in Mexico. Cointegration and causality tests were applied for the period 1950 to 1990. Results suggested the presences of cointegration between public spending and output. Results of causality test suggested unidirectional causality which supports Wagner's hypothesis. He concluded fiscal policy do not act as a stabilizer of Mexico economy and stabilization function is not supported. Abdullah and Mamoor (2010) examined applicability of Wagner's hypothesis in Malaysia. ARLD and causality test were employed for the period 1970 to 2007. Results indicated long-run relationship between government expenditure and economic growth and significant in implementing developmental spending. Results also suggested that association between development expenditure and economic growth is validated in four out of five version of Wagner's law. They concluded Wagner's hypothesis is still applicable for Malaysia. Babatunde (2011) analyzed existence of Wagner's in Nigeria through employing ARDL bound testing approach for the period 1970 to 2007. Results explored that there is absence of cointegration between variables. Results of causality test indicated Wagner's hypothesis is not applicable to Malaysian economy. He concluded fiscal policy variables are major determinants of economic growth and public spending is an exogenous factor.

Kumar et al. (2012) examined applicability of Wagner's hypothesis in New Zealand by using ARDL bounds test technique for time period 1960 to 2007. Results indicated public spending and output are moving together in long-run. Share of government spending in income may slightly effected by trade openness. Results of long run causality were of the view Wagner's hypothesis is valid for economy of New Zealand, but in short run Keynesian hypothesis hold true. Nworji et al. (2012) investigated association between government expenditure and economic growth in Nigeria by employing OLS multiple regression model for time span ranging from 1970 to 2009. Results showed capital and recurrent expenditure has negative and insignificant impact on national income. Output is positively and significantly affected by

expenditures on transfer payments, social and community services. The findings suggested both Wagner's and Keynesian hypothesis are applicable for Nigeria. They concluded that expenditures on social, economic and community services should be directed to productive economic activities to stimulate growth. Rauf et al. (2012) analyzed association between public spending and output in Pakistan. They employed ARL co-integration (2001) time span ranges from 1970 to 2009. The results indicated absence of long-run association between government expenditure and output. Causality results neither follow Wagner's nor Keynesian hypothesis for Pakistan indicating absence of any causal link between public spending and output. They concluded increase in public spending is not because of growth in output for Pakistan, this may occur due to other important factors.

Magazzino (2012) analyzed association between aggregate public spending, its subcomponents and aggregate income for Italy. Cointegration and causality tests were applied for the period 1960 to 2008. Co-integration analysis revealed that expenditure on grants for production, passive interests as well as public investments and output are moving together in long-run. Causality results showed spending on dependent labor income in short-run and spending on passive interests in long run is line with validity of Wagner's hypothesis. On other hand, unidirectional causality is validated for Keynesian hypothesis in case of spending on grants for production, public investments and passive interests in long-run and grants for production in short-run. He concluded causality analysis were more support for Keynesian hypothesis than Wagner hypothesis. Oktayer (2013) examined association between public spending and economic growth for Turkey. ARDL bound testing approach was used time span ranging from 1950 to 2010. Cointegration and causality results with bivariate analysis neither indicated long-run relationship nor validity of Wagner's hypothesis. In the trivariate analysis by including inflation rate, revealed existence of cointegration, and also showed that Wagner's law hold. He concluded that inclusion of third variable (e.g. inflation) in system may change the whole scenario.

Mahmoodi (2014) examined association between government expenditure and output for twenty Asian countries' panel. Panel co-integration test was employed for the period 1970 to 2010. Empirical result indicated co-integration exists only for developing panel. For the case of advanced and newly industrialized countries, panel causality framework indicated that causality is bidirectional in short-run. Empirical evidence of developing panel showed in short run, unidirectional causality dictated Wagner's hypothesis, while in long-run bidirectional causality

exists. Barra et al. (2015) examined association between government expenditure and economic growth for Italy. Cointegration and causality test were employed time span ranging from 1951 to 2009. Results revealed the existence of cointegration between variables. Causality test suggested unidirectional causality for validity of Wagner's hypothesis. They concluded those public spendings which grow at a slower than economic growth can be reduced by establishment of Ministry of Finance. Muhammad et al. (2015) analyzed association between government expenditure and economic growth in Pakistan by employing cointegration approach for time span ranging from 1972 to 2013. Results showed public spending and output are not moving together in long-run. Causality results indicated no causal relations between public spending and national output which indicates no findings to support Keynesian and Wagner hypothesis in Pakistan. Growth rates are not achieved by expenditure, because these are not important tool for Pakistan.

Lahirushan and Gunasekara (2015) investigated relationship between public spending and output for Asian countries. They used panel co-integration for the period 1973 to 2013. Results suggested absence of cointegration relationship between government expenditure and output in Asian region. Causality test results showed that both Keynesian and Wagner's hypothesis are valid. They concluded that prominent role is played by government to achieve growth in Asian region. Thabane and Lebina (2016) analyzed relationship between government expenditure and economic growth in Lesotho. Cointegration and causality tests were applied for the time span ranging from 1980 to 2012. Results indicated both government expenditure and economic growth are moving together in long-run. The causality results of short-run and long-run suggested Wagner's hypothesis is valid. They concluded that investment by government in physical infrastructure will enhance growth and improve fiscal sustainability as compared to recurrent expenditure. Therefore, government should reallocate its expenditure for investment in physical infrastructure.

Literature represents mixed results of association between total government expenditure, its subcomponents and economic growth. Direction of causality for applicability of Wagner's and Keynesian hypothesis also give mix results. However, few of the studies found for Pakistan which investigated the relationship between aggregated as well as disaggregated expenditure and economic growth. There is less discussion on six basic versions of Wagner's law for Pakistan at aggregate and disaggregate level of expenditure. The reason behind testing government

expenditure at partial level is because, this analysis provides clear picture of the economy. Government can pay a special attention to a particular sector of the economy where serious actions are required. Therefore, it is necessary to inspect role of state towards development of nation.

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), 19th century German political economist formulated a principle called "Law of the Increasing Extension of State Activity". He had not presented his ideas in form of a law, later on his views named as Wagner's hypothesis or Wagner's law (Henrekson, 1993; Halicioglu, 2003). The law argues government expenditure raises 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. Wagner's hypothesis cited that public activity level may exceed due to three reasons (Chang, 2002). First, expenditure on socioeconomic regulation, law and order situations may increase due to urbanization and agglomeration of population. Second, income elasticity of demand for goods provided by government such as health services, education, cultural activities and welfare expenditure is greater than unity. Third, government provides necessary funds in form of capital expenditures to fulfill technological needs of an industrialized economy which private organizations cannot provide.

On the other hand, Keynes (1936) views relationship between government expenditure and economic growth is opposite to Wagner's hypothesis. The 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 hypothesis treats demand as a prerequisite for growth. His analysis concludes economic performance may improve by demand management policies. However, inefficiencies of market failure can also improve by government intervention.

Various researchers (Musgrave, 1969; 1973) have challenged on Wagner's law, either law relates to absolute size of the government or relative size of the government in national economy, it is not clear. Musgrave & Musgrave (1984) comment that association between public and private goods is complementary instead of substitute in nature. Peacock and Wiseman (1967) brought up with displacement effect idea by using political theory to elaborate consequences of political events on government expenditure. Dutt and Ghosh (1997) commented Wagner was neither explicit in hypothesis formulation nor presented his law in mathematical form. Several mathematical specifications have been developed time to time by researchers to prove Wagner's or Keynesian view since 1960s for developed and developing countries. The following are widely acceptable functional forms:

3.1.1. Model 1

The functional form of model 1 is presented by Peacock-Wiseman (1961). In this model, total government expenditure (GE) is a function of national output (GDP). If elasticity of GE with respect to GDP exceed unity, Wagner's hypothesis will supported and reveals public spending grows at faster rate than national output. The functional form of model 1 is as follow:

$$\mathbf{GE = f\ (GDP)}$$

Where, GE is total government expenditure, and GDP is gross domestic product.

3.1.2. Model 2

The functional form of model 2 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 exceed unity. The functional form of model 2 is as follow:

$$\mathbf{GCE = f\ (GDP)}$$

Where, GCE is government consumption expenditure, GDP is gross domestic product.

3.1.3. Model 3

The functional form of model 3 is related to 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 exceed unity, Wagner's hypothesis is supported. The functional form of model 3 is as follow:

GE = f (GDP/N)

Where, GE is total government expenditure, GDP is gross domestic product, and N is population.

3.1.4. Model 4

The functional form of model 4 is introduced by Michos (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 functional form of model 4 is as follow:

(GE/N) = f (GDP/N)

Where, GE is total government expenditure, GDP is gross domestic product, and N is population,

3.1.5. Model 5

The functional form of model 5 developed by Mann (1980) which is the modified version of Peacock-Wiseman (1961). In this model, total government expenditure as a percentage of total 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 validate. The functional form of model 5 is as follow:

(GE/GDP) = f (GDP)

Where, GE is total government expenditure, and GDP is gross domestic product

3.1.6. Model 6

Finally, the functional form of model 6 is firstly proposed by Musgrave (1969), later on modified by Ram (1986), Murthy (1993), Henrekson (1993) and Hseih and Lai (1994) respectively. In this model, the total government expenditures 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 functional form of model 6 is as follow:

(GE/GDP) = f (GDP/N)

Where, GE is total government expenditure, GDP is gross domestic product, and N is population.

3.2. Methodology

3.2.1. Econometric Model

Wagner's (1883) hypothesis formulates public spending increases faster than economic growth. The share of GDP to public spending increases as an economy develops. Non-linear association between public spending and GDP leads specification of mathematical expressions of Wagner's law in exponential form. This study adopts six of functional forms of Wagner's law as discussed earlier. Mathematical formulation of six of Wagner's law depends upon exponential form can be written in equation form as:

3.2.1.1. Model 1

The functional form of model 1 is presented by Peacock-Wiseman (1961). In this model, total government expenditure (GE) is a function of national outp

ut (GDP). The equation of the model 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.

The functional form which is presented by Peacock-Wiseman (1961) can be further extended by disaggregated expenditure as:

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

Where, ECS_t is expenditure on current subsidies, GDP_t is gross domestic product, and u_{2t} is error term.

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

Where, $ESEES_t$ is expenditure on social, economic and education services, GDP_t is gross domestic product, and u_{3t} is error term

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

Where, ED_t is expenditure on defence, GDP_t is gross domestic product, u_{4t} is error term.

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

Where, CE_t is current expenditure, GDP_t is gross domestic product, and u_{5t} is error term

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

Where, DE_t is developmental expenditure, GDP_t is gross domestic product, and u_{6t} is error term.

Wagner's hypothesis is supported if α_1, β_1, γ_1, δ_1, ρ_1 and Θ_1 exceed unity (>1).

3.2.1.2. Model 2

The functional form of model 2 is proposed by Pryor (1968). In this model, government consumption expenditure (GCE) is based on national output (GDP). The equation of the model 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 α_1 exceed unity (>1).

3.2.1.3. Model 3:

The functional form of model 3 is related to Goffman (1968). In this model, the total government expenditure (GE) depends on per capita output (GDP/N). The equation of model 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 functional form which is formulated by Goffman (1968) can be further extended by disaggregated expenditure as:

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

Where, ECS_t is expenditure on current subsidies, GDP_t is gross domestic product, N_t is population, and u_{2t} is error term.

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

Where, $ESEES_t$ is expenditure on social, economic and education services, GDP_t is gross domestic product, N_t is population, and u_{3t} is error term.

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

Where, ED_t is expenditure on defence, GDP_t is gross domestic product, N_t is population, and u_{4t} is error term.

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

Where, CE_t is current expenditure, GDP_t is gross domestic product, N_t is population, and u_{5t} is error term.

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

Where, DE_t is developmental expenditure, GDP_t is gross domestic product, N_t is population, and u_{6t} is error term.

Wagner's hypothesis is supported if α_1, β_1, γ_1, δ_1, ρ_1 and Θ_1 exceed unity (>1).

3.2.1.4. Model 4:

The functional form of model 4 is introduced by Michas (1975), a modified version of Gupta (1967). In this model, per capita total government expenditure (GE/N) is a function of per capita output (GDP/N). The equation of the model can be written as:

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

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

The functional form which is suggested by Michos (1975) can be further extended by disaggregated expenditure as:

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

Where, ECS_t is expenditure on current subsidies, N_t is population, GDP_t is gross domestic product, and u_{2t} is error term.

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

Where, $ESEES_t$ is expenditure on social, economic and education services, N_t is population, GDP_t is gross domestic product, and u_{3t} is error term.

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

Where, ED_t is expenditure on defence, N_t is population, GDP_t is gross domestic product, and u_{4t} is error term.

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

Where, CE_t is current expenditure, N_t is population, GDP_t is gross domestic product, and u_{5t} is error term.

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

Where, DE_t is developmental expenditure, N_t is population, GDP_t is gross domestic product, and u_{6t} is error term.

Wagner's hypothesis is supported if α_1, β_1, γ_1, δ_1, ρ_1 and Θ_1 exceed unity (>1).

3.2.1.5. Model 5

The functional form of model 5 developed by Mann (1980) which is modified version of Peacock-Wiseman (1961). In this model, total government expenditure as a percentage of total output (GE/GDP) is a function of national output (GDP). The equation of the model can be written as:

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

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

The functional form which is presented by Mann (1980) can be further extended by disaggregated expenditure as:

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

Where, ECS_t is expenditure on current subsidies, GDP_t is gross domestic product, and u_{2t} is error term.

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

Where, $ESEES_t$ is expenditure on social, economic and education services, GDP_t is gross domestic product, and u_{3t} is error term.

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

Where, ED_t is expenditure on defence, GDP_t is gross domestic product, and u_{4t} is error term.

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

Where, CE_t is current expenditure, GDP_t is gross domestic product, and u_{5t} is error term.

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

Where, DE_t is developmental expenditure, GDP_t is gross domestic product, and u_{6t} is error term.

Wagner's hypothesis is supported if α_1, β_1, γ_1, δ_1, ρ_1 and Θ_1 exceed zero (>0).

3.2.1.6. Model 6

The functional form of model 6 is firstly proposed by Musgrave (1969), later on modified by Ram (1986), Murthy (1993), Henrekson (1993) and Hseih and Lai (1994) respectively. In this model, the total government expenditures to national output (GE/GDP) is a function of per capita output (GDP/N). The equation of the model 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 functional form which is modified version of Musgrave (1969) can be further extended by disaggregated expenditure as:

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

Where, ECS_t is expenditure on current subsidies, GDP_t is gross domestic product, N_t is population, and u_{2t} is error term.

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

Where, $ESEES_t$ is expenditure on social, economic and education services, GDP_t is gross domestic product, N_t is population, and u_{3t} is error term.

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

Where, ED_t is expenditure on defence, GDP_t is gross domestic product, N_t is population, and u_{4t} is error term.

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

Where, CE_t is current expenditure, GDP_t is gross domestic product, N_t is population, and u_{5t} is error term.

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

Where, DE_t is developmental expenditure, GDP_t is gross domestic product, N_t is population, and u_{6t} is error term.

Wagner's hypothesis is supported if α_1, β_1, γ_1, δ_1, ρ_1 and Θ_1 exceed zero (>0).

3.2.2. Test of Stationarity

Time series analysis are very sensitive with its non-stationary properties because if the series under consideration has unit root, it will mislead the results and conclusions as well. There are number of tests available to examine the presence of unit root. If series under consideration is stationary (mean and variance is constant), this implies that series do not follow unit root problem and integrated of order I(0). Dickey and Fuller (1979) have developed Dickey-Fuller unit root test in which they treat that error term (u_t) is uncorrelated. But in order to address the situation where error term is correlated, they have developed Augmented Dickey-Fuller unit root test in which they augmented their preceding test of unit root by adding lag of explained variable on right hand side. In ADF unit root test problem of serial correlation and hetroskedasticity is raised by adding lag of dependent variable on the right hand side. Phillips and Perron (1988) specially deals with this problem by employing nonparametric statistical methods without adding lag of explained variable.

3.2.3. Cointegration Test

The application of Engle and Granger (1987) two step procedure requires I(1) order of integration of variables. This test explores whether series under consideration has long-run equilibrium relationship or not. There are two steps to examine cointegration which are given below as:

Step 1

First step involves investigating long-run association between two variables under analysis through employing Ordinary Least Square (OLS) estimates. The general form of regression equation of OLS estimates is as follow:

$$\boldsymbol{lnG_t = \alpha_0 + \alpha_1 lnY_t + \varepsilon_t} \qquad \textbf{(7)}$$

Where G_t represents total government expenditure or disaggregated expenditure, Y_t is GDP and ε_t represents error term.

The residuals obtained from regression equation (7) are tested for stationarity through employing ADF unit root tests. If estimated residuals (ε_t) are stationary at level, then variables are cointegrated and moving together in long-run.

Step 2

After assessing long-run association between variables, we move towards 2nd step. In this step short-run relationship is analyzed by estimating an ECM or dynamic model. If variables have possessed a long-run relationship, the residuals (ε_t) obtained from estimated regression equation can be employed to estimate the ECM (Enders, 2004). 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 involves in estimating the following equation:

$$\Delta lnG_t = \alpha_0 + \sum_{i=1}^{n} \alpha_i \Delta lnG_{t-i} + \sum_{j=1}^{n} \alpha_j \Delta lnY_{t-j} + \alpha\varepsilon_{t-1} + u_t \qquad (8)$$

Where, ε_t is, the ECT is lagged estimated residual from equation (8). If variables are cointegrated, then the ECT should have negative and significant sign. The speed of adjustment of short-run equilibrium depends on the absolute value of the coefficient of error term.

3.2.4. Testing for Causality

The previous section has provided information regarding the cointegration relationship between variables, but this does not allow us to draw conclusions about the direction of the causality between variables. Therefore, Granger causality test (1969) is applied to determine the existence of causality between variables. Engle and Granger (1987) states either unidirectional or bidirectional causality must exists for I(0) variables, if variables are integrated of order I(1) and cointegrated (Biswal et al. 1999). Granger causality test is investigated by the following equations:

$$\Delta lnG_t = \alpha_0 + \sum_{i=1}^{n} \alpha_i \Delta lnG_{t-i} + \sum_{j=1}^{n} \alpha_j \Delta lnY_{t-j} + u_{1t} \qquad (9)$$

$$\Delta lnY_t = \alpha_0 + \sum_{i=1}^{n} \alpha_i \Delta lnY_{t-i} + \sum_{j=1}^{n} \alpha_j \Delta lnG_{t-j} + u_{2t} \qquad (10)$$

Where μ_{1t} and μ_{2t} are not correlated. The implications of causality test can emerge by following scenarios:

i. If $\Sigma\ \alpha_i \neq 0$ and $\Sigma\ \alpha_j = 0$ implying that causality runs from G to Y which interprets unidirectional relationship.

ii. If $\Sigma \alpha_i = 0$ and $\Sigma \alpha_j \neq 0$, the causality runs from Y to G which is also of unidirectional in nature.

iii. If $\Sigma \alpha_i \neq 0$ and $\Sigma \alpha_j \neq 0$ implying that both coefficients on lagged values of regression equations are significant and diverge from zero. Therefore, causality is bidirectional from Y to G and G to Y in nature.

iv. If $\Sigma \alpha_i = 0$ and $\Sigma \alpha_j = 0$ implying both coefficients on lagged values of regression equations are not statistically different from zero. Therefore, causal link neither follow unidirectional nor bidirectional arrows between Y and G.

3.4. Data

The annual time series data covering the period 1976 to 2015 is taken for Pakistan. The data is mainly collected from Handbook of Statistics on Pakistan Economy (2010) issued by State Bank of Pakistan and Pakistan Economic Survey (various issues). Detailed description of variables and their resources are given in Appendix A.

4. Results

4.1. Unit Root Tests

Testing for unit root in order to avoid problem of spurious regression is the first step in time series analysis which can mislead the results. Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) test for unit root are extensively used to determine the order of integration. Schwarz Information Criterion (SC) and Akaike Information Criterion (AIC) are used for determination of appropriate lag order selection for each test. The results of unit root tests indicate all the variables are integrated of order I(1). Results of ADF and PP tests are reported in table 4.1.

Table 4.1: Results of ADF and PP Unit Root Tests

Variables	Augmented Dickey Fuller (ADF)		Phillip Perron (PP)		Order of Integration	
	Level	1st Difference	Level	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)
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% level respectively.*

4.2. Results of Models

Engle and Granger (1987) two step procedure is employed for long run association between variables, because all variables of models are integrated of order I(1). In first step, ADF test is

applied to check whether or not u_t is stationary at level which means presence of long-run relationship. After estimating cointegration between variables, short-run adjustments are captured by Error Correction Model (ECM) in second step. Granger causality test is used for direction of causality between variables.

4.2.1. Results of Model 1

The results of cointegrating regression are reported in table 4.2. Results suggest that null hypothesis of no cointegration in model 1, model 1a, model 1c, model 1d and model 1e is accepted. For model 1b, null hypothesis of no cointegration do not accepted at 10% significance level which depicts presence of long-run relationship.

In model 1, total government expenditure have proposed no long-run relationship with GDP. Results imply that increase is government expenditure with output is not due to increase in economic growth. This may because of other important factors i.e. urbanization, increase population growth, market exploitations and non-stability in political activates. These spending are not helpful to stimulate the pace of development. Ansari et al. (1997), Biswal et al. (1999), Iyare et al. (2004), Afzal and Abbas (2010) also found absence of cointegration association between total public spending and national income.

Table 4.2: Results of Engle-Granger Cointegrating Regressions

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

*Note: The ln before variable name 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.*

For model 1a, expenditure on current subsidies and GDP have not proposed long-run association. This implies that decision of raising expenditure on subsidies could beneficial for producers and consumer, but may not growth enhancing. In model 1b, expenditure on social, economic and education services have positive relationship with GDP. While coefficient value is greater than one which implies as national income of Pakistan's economy increase, expenditures on social, economic and education services also increase. This expenditure category may boost economic growth, because more educated and healthy people would take active participation in more productive labor markets and hence expand economic activities. Therefore, it requires more favorable attention in the allocation of total government expenditures. Robini & Martin (1991), Belgrave & Craigwell (1995), Iqbal & Zahid (1998), Birdsall et al. (1995) and Carter et al. (2013) also found positive relationship between social, economic and education services and output.

Results of model 1c suggest absence of long-run association between expenditure on defence and output. These expenditure divert resource allocation of economy from developmental projects which is undesirable spending and burden on economy. Chowdhury (1991), Khilji (1997), Antonakis (1999), Smyth & Narayan (2009) and Shah et al. (2015) also found absence of cointegration between expenditure on defence and output. Results of model 1d indicates absence of cointegration between current expenditure and output. It is because state has to maintain expenditure for providing fresh and clean water, agricultural and industrial subsidies which may not be growth enhancing for the economy. Bose (2003) and Nitoy et al. (2013) also found absence of any cointegration association between current expenditure and output. Results for model 1e advocates absence of cointegration association relationship between developmental expenditure and output. Although value of coefficient is positive, this expenditure is not enough to transform GDP of Pakistan. There may be a considerable time-lag between developmental spending and benefits that arise.

Table 4.3: Results of ECM Regression

Model	Dependent Variable	Constant	Coefficient of Explanatory Variable	ECT (-1)
1b	ln ESEES	0.1116	0.2583	-0.4568 (-3.4514)

The next step after establishing cointegration relationship between variables in model 1b, is to develop Error Correction Model (ECM) which captures speed of short run adjustments towards the long-run equilibrium. ECM regression results are given in table 4.3. Results for model 1b denotes that coefficient of ECT has negative and significant sign, suggesting that approximately 46% short-run adjustment towards long-run equilibrium is adjusted by expenditure on social, economic and education services in the next year.

Table 4.4: Results of Granger Causality Test

Model	Null Hypothesis	Lags	F-Statistics	Prob.	Inference
1	dln GDP does not cause dln GE	2	1.8997	0.1661	No causality exists
	dln GE does not cause dln GDP	2	0.5151	0.6023	No causality exists
1a	dln GDP does not cause dln ECS	1	4.6510	**0.0380****	**Causality exists (WH holds)**
	dln ECS does not cause dln GDP	1	1.6897	0.2021	No causality exists
1b	dln GDP does not cause dln ESEES	2	5.3076	**0.0102*****	**Causality exists (WH holds)**
	dln ESEES does not cause dln GDP	2	0.3417	0.7131	No causality exists
1c	dln GDP does not cause dln ED	2	2.6638	**0.0851***	**Causality exists (WH holds)**
	dln ED does not cause dln GDP	2	0.0606	0.9413	No causality exists
1d	dln GDP does not cause dln CE	2	3.0045	**0.0637***	**Causality exists (WH holds)**
	dln CE does not cause dln GDP	2	0.0490	0.9523	No causality exists
1e	dln GDP does not cause dln DE	1	2.1335	0.1530	No causality exists
	dln DE does not cause dln GDP	1	4.3446	**0.0445****	**Causality exists (KH holds)**

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

This study further aims to analyze causality for validity of Wagner's or Keynesian hypothesis. Causality results are reported in table 4.4. Results neither establish unidirectional nor bidirectional causality for variables in model 1, which reveals Wagner's and Keynesian hypothesis are not valid for Pakistan. Wagnerian hypothesis is applicable for model 1a, model 1b, model 1c and model 1d indicating unidirectional causality running from GDP to total government expenditure, its subcomponents i.e. current subsidies, social economic and education services, current as well as developmental. For model 1e, causality flows from expenditure on social, economic and education services to GDP in favor of existence of Keynesian hypothesis. This model indicates that government expenditure is prerequisite to boost economic growth. Government spend first on social, economic and education services which will eventually stimulate growth activities. Results of model 1a, 1b, 1c and 1d implies as economic growth

proceeds, share of government in economy will rise. There are various possible explanations for non-existence of Keynesian hypothesis. First, a huge portion of public expenditure is allowed to current expenditure for subsidies, interest payment and defence purpose. These expenditure might not helpful to stimulate growth. Secondly, effectiveness and efficiency of outlay is prerequisite for gains from expenditure. Third, benefits of social, economic and education expenditure may not happen instantaneously, but it arises with time lag.

4.2.2. Results of Model II

The results of cointegration based on ADF test of model 2 are stated in table 4.5. Results show that null hypothesis of no cointegration in model 2 is accepted indicating the non-existence of long-run relationship. The results imply that increase in government consumption expenditure does not exert any long-run relationship in Pakistan, because government has to maintain these expenditure for transfer payments, recreational facilities and discount on utility bills which are not involved in growth enhancing activities. Kormendi & Meiguire (1985), Barro (1991) and Ghura (1995) also found absence of cointegration for government consumption expenditure and output.

Table 4.5 Results of Engle-Granger Cointegrating Regressions

Model	Dependent Variable	Constant	Coefficient of Explanatory Variable	Adjusted R-squared	CRDW	Calculated ADF Residuals Test
2	ln GCE	-1.6021	0.9583 (58.8839)	0.9889	0.3107	-1.7839

*Note: The ln before variable name represents logarithm. ***; **; * shows significant at 1; 5%; 10% 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). S.E values are in parenthesis.*

Findings for causality test of model 2 are shown in table 4.6. Results indicate non-validity of both Wagner's and Keynesian hypothesis for variables in model 2 for Pakistan. The results imply that government consumption expenditure may not be results in growth-enhancing activities because growth gain from these expenditure rely on usefulness and productivity of expenditure.

Table 4.6: Results of Granger Causality Test

Model	Null Hypothesis	Lags	F-Statistics	Prob.	Inference
2	dln GDP does not cause dln GCE	2	1.1845	0.3189	No causality exists
	dln GCE does not cause dln GDP	2	0.3642	0.6976	No causality exists

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

4.2.3. Results of Model III

The results of cointegration in table 4.7 reveal absence of long-run relationship for model 3, model 3a, model 3c, model 3d and model 3e in Pakistan. For model 3b, the null hypothesis of no cointegration is rejected. For model 3, total government expenditure propose no long-run relationship with GDP per capita. Results imply that government expenditure plays no role for the achievement of sustainable economic growth. These expenditure may consists of rising demand for law and order enforcement, need for cultural and welfare services and the participation of public ownership in material production trend along with output. Babatunde (2011), Rauf et al. (2012) and Muhammad et al. (2015) also found absence of cointegration for total public spending and output. In model 3a, expenditure on current subsidies and GDP per capita propose absence of long-run association. Findings indicate that subsidies given by government may distort the working of the free market mechanism and can lead government failure to enhance growth activities. For model 3b, expenditure on social, economic and education services and GDP per capita have proposed positive relationship. The results dictate that human resource development is engine of economic growth, so government tends to spend more on social, economic and education services. Because a skilled and healthy labor force increases return on growth and ensures that discoveries are more rapidly absorbed in productive structure of economy. Lucas (1990), Alvina & Siddiqi (2013) and Mercan & Sezer (2014) also found positive relationship between social, economic and education services and economic growth.

Results of model 3c indicate absence of long-run association between expenditure on defence and output. Financial resources may available for other economic activities i.e. health, social programs, employment and education at the expense of reduction in defence spending. Increase in public spending for defence would results in diversion of domestic credit from civilian production and enhance cost of these credits for private sectors. The economic growth may deteriorate in its response. Linden (1992), Chowdhury (1991), Cohen (1996) and Heo (2010) found absence of cointegration association for expenditure on defence and output. Findings for model 3d show current expenditure and economic growth are not moving together in long-run. Because government spends for variety of goods and services including defence, subsides, wages and salaries. These spending may not be growth enhancing for economy. Bose (2003) and Nitoy et al. (2013) also found absence of any cointegration for current expenditure and output. Findings

for model 3e represents absence of long-run association for developmental expenditure and output. Although it has positive impact on economy, but this expenditure is not enough to transform GDP of Pakistan. That is why increasing public spending on development side may take couple of years for its implementation and its benefit.

Table 4.7: Results of Engle-Granger Cointegrating Regressions

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

*Note: The ln before variable name represents logarithm. ***; **; * shows significant at 1; 5%; 10% 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). S.E values are in parenthesis.*

Results of ECM for model 3b are reported in table 4.8. Results indicate expenditure on social, economic and education services correct about 42% short-run adjustment towards long-run equilibrium in next year.

Table 4.8: Results of ECM Regression

Model	Dependent Variable	Constant	Coefficient of Explanatory Variable	ECT (-1)
3b	ln ESEES	0.1024	0.4022 (0.9677)	-0.4186 (-3.3406)

Causality results are represented in table 4.9. Findings neither follow Wagner's nor Keynesian hypothesis for total government expenditure, expenditure on defence in model 3 and 3c for Pakistan which means non-existence of causality. Results also advocate that expenditure on current subsidies, expenditure on social economics and education services as well as current expenditure for model 3a, model 3b and model 3d is caused by economic activity which follows Wagner's hypothesis. It suggest that government spends more when economic activity expands

which can increase government tax revenue. For model 3e, unidirectional causality is running from expenditure on social, economic and education services to GDP in favor of the existence of Keynesian hypothesis for Pakistan. Results imply that economy of Pakistan is in favor of stabilization function and fiscal policy act as a stabilizer of the economy.

Table 4.9: Results of Granger Causality Test

Model	Null Hypothesis	Lags	F-Statistics	Prob.	Inference
3	dln GDP/N does not cause dln GE	2	2.1426	0.1339	No causality exists
	dln GE does not cause dln GDP/N	2	0.6333	0.5374	No causality exists
3a	dln GDP/N does not cause dln ECS	1	4.8046	**0.0351****	**Causality exists (WH holds)**
	dln ECS does not cause dln GDP/N	1	1.8617	0.1811	No causality exists
3b	dln GDP/N does not cause dln ESEES	2	5.9135	**0.0065*****	**Causality exists (WH holds)**
	dln ESEES does not cause dln GDP/N	2	0.3612	0.6997	No causality exists
3c	dln GDP/N does not cause dln ED	2	2.4471	0.1026	No causality exists
	dln ED does not cause dln GDP/N	2	0.0219	0.9784	No causality exists
3d	dln GDP/N does not cause dln CE	2	2.9954	**0.0642***	**Causality exists (WH holds)**
	dln CE does not cause dln GDP/N	2	0.0242	0.9761	No causality exists
3e	dln GDP/N does not cause dln DE	1	2.1894	0.1479	No causality exists
	dln DE does not cause dln GDP/N	1	4.7262	**0.0366****	**Causality exists (KH holds)**

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

4.2.4. Results of Model IV

The results of table 4.10 show that residual series for model 4, model 4a, model 4c, model 4d and model 4e is non-stationary at conventional level of significance which means no cointegration association. For model 4b, null hypothesis of no cointegration is rejected at 10% level of significance which depicts the existence of long-run relationship. In model 4, per capita total government expenditure have possessed no long-run relationship with per capita GDP. This implies that there are some important factors of public spending such as subsidies, defence procurements and recreational facilities which have increasing trend along with output but it is not due to growth in output. Iyare et al. (2004), Afzal & Abbas (2001), Babatunde (2011), Rauf et al. (2012) and Muhammad et al. (2015) also found absence of cointegration for per capita total government expenditure and output. For model 4a, per capita expenditure on current subsidies and per capita GDP have no cointegraion association. Results suggest subsides in isolation are harmful and less effective. Because those subsidies which are announced for the benefits of

producers, their cost usually falls on tax-payers and consumers who may not get benefit by these subsidies. In this way, subsidies would unable to enhance growth of economy as a whole.

Table 4.10 Results of Engle-Granger Cointegrating Regressions

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

*Note: The ln before variable name represents logarithm. ***; **; * shows significant at 1; 5%; 10% 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). S.E values are in parenthesis.*

In model 4b, per capita expenditure on social, economic and education services and per capita GDP have positive relationship. While coefficient value is greater than one which implies as national income of economy increases, per capita expenditures on social, economic and education services also increase. Therefore, this expenditure category requires more favorable attention in the allocation of total government expenditures because it helps to stimulate economic growth. Iqbal & Zahid (1998), Birdsall et al. (1995) and Carter et al. (2013) also found long-run association for social, economic and education services and output. Findings for model 4c indicate absence of cointegration association for per capita expenditure on defence and per capita GDP. Results imply that reducing defence spending will be particularly effective because this will eventually assist to reallocate resources on productive activities and enhance growth of the economy. Cohen (1996), Heo (2010) and Chowdhury (1991) also found absence of long-run association for per capita expenditure on defence and output. Findings for model 4d is also indicating no long-run relationship between per capita current expenditure and per capita GDP. The state is to maintain expenditure for providing fresh and clean water, recreational facilities, wages and salaries, law and order which may not be inevitably growth enhancing for the economy. Bose (2003) and Nitoy et al. (2013) found absence of any cointegration association for

current expenditure and output. Findings for model 4e indicating non-existence of long-run relationship between developmental expenditure and per capita GDP. Results imply some developmental projects of government are much expensive and time taking. These projects require more financial support by government which may impede the growth of economy because of non-availability of funds.

Table 4.11: Results of ECM Regression

Model	Dependent Variable	Constant	Coefficient of Explanatory Variable	ECT (-1)
4b	ln ESEES/N	0.0805	0.3697 (0.8801)	-0.4566 (-3.4156)

Results of ECM for model 4b are reported in table 4.11 denote that coefficient of error correction term carries negative and significant sign, suggesting that approximately 46% short-run adjustment towards long-run equilibrium is corrected by expenditure on social, economic and education services in the next year.

Table 4.12: Results of Granger Causality Test

Model	Null Hypothesis	Lags	F-Statistics	Prob.	Inference
4	dln GDP/N does not cause dln GE/N	2	2.6013	**0.0898***	**Causality exists (WH holds)**
	dln GE/N does not cause dln GDP/N	2	0.4667	0.6313	No causality exists
4a	dln GDP/N does not cause dln ECS/N	1	4.5290	**0.0404****	**Causality exists (WH holds)**
	dln ECS/N does not cause dln GDP/N	1	1.6890	0.2022	No causality exists
4b	dln GDP/N does not cause dln ESEES/N	2	6.0474	**0.0059*****	**Causality exists (WH holds)**
	dln ESEES/N does not cause dln GDP/N	2	0.3812	0.6861	No causality exists
4c	dln GDP/N does not cause dln ED/N	2	2.1376	0.1345	No causality exists
	dln ED/N does not cause dln GDP/N	2	0.0212	0.9790	No causality exists
4d	dln GDP/N does not cause dln CE/N	2	3.2304	**0.0527****	**Causality exists (WH holds)**
	dln CE/N does not cause dln GDP/N	2	0.0050	0.9950	No causality exists
4e	dln GDP/N does not cause dln DE/N	1	2.3533	0.1340	No causality exists
	dln DE/N does not cause dln GDP/N	1	3.7982	**0.0594***	**Causality exists (KH holds)**

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

The results of causality are reported in table 4.12. Findings indicate unidirectional causality is applicable for Wagner's law in model 4, model 4a, model 4b and model 4d for case of Pakistan. These results of Wagner's view suggest that role of government expenditure is endogenous factor of economic growth. Results of model 4c follows neither Wagner's nor Keynesian hypothesis meaning that no causality for variables in model 4c, because state commitment to protect civilians gives birth to high level of expenditure on defence in the country which has no role in growth of economy. For model 4e, unidirectional causality is running from expenditure on per capita social, economic and education services to GDP per capita in favor of the existence of Keynesian hypothesis for Pakistan. The results dictate that public spending as instrument of fiscal policy is supported to encourage and lead economic growth by Pakistan economy.

4.2.5. Results of Model V

The results of table 4.13 express that residual series obtained from cointegration regression for model 5, model 5a, model 5c, model 5d and model 5e are non-stationary. For model 5b, null hypothesis of no cointegration is rejected at 10% level of significance which is in favor of existence of cointegration relationship. For model 5, show no cointegraion with total government expenditure as a percentage of GDP and output. Public spending comprise of meet basic necessities of life for people, provide public goods and special discount on specific commodities. This implies that these spending do not play prominent role in society to achieve sustainable economic growth. Biswal et al. (1999), Iyare et al. (2004), Afzal & Abbas (2001) and Babatunde (2011) also found total government expenditure and output are not moving together in lon-run.

In model 5a, per capita expenditure on current subsidies as a percentage of GDP and output do not have any long-run relationship. This implies that expenditure on subsidies are raised by government for variety of economic, social and political reasons i.e. help poorer families (food and child care costs), reduce the cost of training and employing workers, reduce external costs of transport, encourage arts and other cultural services. These subsidies might not be helpful to achieve growth targets. For model 5b, expenditure on social, economic and education services as a percentage of GDP and output per capita have proposed positive relationship. This expenditure category is helpful to boost economic growth i.e. more participation in the labour force, higher productivity in terms of increased earnings and better health of population tend to positively affect higher economic growth. Michaelowa (2002), Robini & Martin (1991), Belgrave &

Craigwell (1995) and Iqbal & Zahid (1998) also found cointegration for expenditure on social, economic and education services and output.

Results of model 5c also indicate absence of cointegration with expenditure on defence as a percentage of GDP and output. Results imply that government has to maintain expenditure for the protection of civilians and protect them from any danger. These expenditure may not be necessarily growth enhancing activity. Chowdhury (1991), Cohen (1996) and Heo (2010) also found no long-run relationship between expenditure on defence and economic growth. Findings for model 5d show absence of cointegrtaion association with current expenditure as a percentage of GDP and output. Because government spends for variety of goods and services including wages and salaries, subsides, unemployment allowance and discount on list price of goods. These spending may not be growth enhancing for the economy. Bose (2003) and Nitoy et al. (2013) also found no long-run association for current expenditure and output. Findings for model 5e represent no cointegration relationship for developmental expenditure as a percentage of GDP and output. Although it has positive impact on economy, this expenditure is not enough to transform GDP for Pakistan. There may be a considerable time-lag between developmental spending and benefits that arise. That is why increasing public spending on these expenditure may take couple of years for its implementation and many years for its benefits.

Table 4.13: Results of Engle-Granger Cointegrating Regressions

Model	Dependent Variable	Constant	Coefficient of Explanatory Variable	Adjusted R-squared	CRDW	Calculated ADF Residuals Test
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

*Note: The ln before variable name represents logarithm. ***; **; * shows significant at 1; 5%; 10% 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). S.E values are in parenthesis.*

Table 4.14: Results of ECM Regression

Model	Dependent Variable	Constant	Coefficient of Explanatory Variable	ECT (-1)
5b	ln ESEES/GDP	0.1116	-0.7417 (-1.7592)	-0.4568 (-3.4514)

Results of ECM for model 5b represented in table 4.14. The sign of coefficient ECT is negative and significant which suggests that about 46% of any disequilibrium between actual and equilibrium is adjusted by per capita expenditure on social, economic and education services in next year.

Table 4.15: Results of Granger Causality Test

Model	Null Hypothesis	Lags	F-Statistics	Prob.	Inference
5	dln GDP does not cause dln GE/GDP	2	1.7900	0.1833	No causality exists
	dln GE/GDP does not cause dln GDP	2	0.5152	0.6023	No causality exists
5a	dln GDP does not cause dln ECS/GDP	2	1.1281	0.3362	No causality exists
	dln ECS/GDP does not cause dln GDP	2	1.0305	0.3684	No causality exists
5b	dln GDP does not cause dln ESEES/GDP	2	1.0585	0.3588	No causality exists
	dln ESEES/GDP does not cause dln GDP	2	0.3417	0.7131	No causality exists
5c	dln GDP does not cause dln ED/GDP	2	3.2029	**0.0540****	**Causality exists (WH holds)**
	dln ED/GDP does not cause dln GDP	2	0.0606	0.9413	No causality exists
5d	dln GDP does not cause dln CE/GDP	2	0.7485	0.4811	No causality exists
	dln CE/GDP does not cause dln GDP	2	0.0490	0.9523	No causality exists
5e	dln GDP does not cause dln DE/GDP	1	0.8960	0.3503	No causality exists
	dln DE/GDP does not cause dln GDP	1	4.3445	**0.0445****	**Causality exists (KH holds)**

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

The results of causality for model 5 are described in table 4.15. There is no causal relationship for variables in model 5, 5a, 5b and 5d. The results imply that neither Wagner's nor Keynesian hypothesis is followed by economy of Pakistan. For model 5c, the direction of causality is from GDP to per capita expenditure on defence indicating existence of validity of Wagnerian hypothesis. Results advocate that increase in spending for defence is totally rely on national

output which is heavy burden on economy. For model 5e, unidirectional causality is running from expenditure on social, economic and education services as a percentage of GDP to output in favor of the existence of Keynesian hypothesis for Pakistan. Results imply that education and health is essential to enhance growth and is fundamental by which economic development can be achieved.

4.2.6. Results of Model VI

The results of table 4.16 imply that the residual series for model 6, model 6a, model 6c, model 6d and model 6e are non-stationary at conventional level of significance except model 6b. In model 6, total government expenditure to national output proposed no long-run relationship with per capita output. Public spending increase because of the rising demand for law and order enforcement, need for culture and welfare services and the participation of public ownership in material production trend along with output. This public spending play no role for achievement of sustainable economic growth. Ansari et al. (1997), Biswal et al. (1999), Iyare et al. (2004), Afzal & Abbas (201) Babatunde (2011), Rauf et al. (2012) and Muhammad et al. (2015) also found absence of cointegration for total government expenditure to national output and per capita output.

In model 6a, expenditure on current subsidies to national output and per capita output do not have any long-run relationship. This argues that subsidies given by government may restrict working of free market mechanism. Introduction of incentives for poor and reduction of external costs of transport may lead government failure to enhance growth activities. In model 6b, expenditure on social, economic and education services to national output and per capita output have positive relationship. This expenditure category is helpful to boost economic growth, because more educated and healthy people would take active participation in more productive labor markets and expand economic activities. Therefore, this requires more favorable attention in the allocation of total government expenditures. Lucas (1990), Carter et al. (2013), Alvina & Siddiqi (2013) and Mercan & Sezer (2014) also found positive relationship between social, economic and education services with economic growth. Results of model 6c suggest absence of cointegrtaion between expenditure on defence to national output and per capita output. Financial resources may available for other economic activities i.e., employment, education, health and social programs at expense of reduction in defence spending. As a result, national income may

exploit. Chowdhury (1991), Cohen (1996) and Shah et al. (2015) also found absence of cointegration for expenditure on defence and economic growth.

Table 4.16: Results of Engle-Granger Cointegrating Regressions

Model	Dependent Variable	Constant	Coefficient of Explanatory Variable	Adjusted R-squared	CRDW	Calculated ADF Residuals Test
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 before variable name represents logarithm. ***; **; * shows significant at 1; 5%; 10% 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). S.E values are in parenthesis.*

The results of model 6d show absence of any long-run relationship between current expenditure to national output and per capita output. Because government spends more on goods and services including defence, wages and salaries, subsides and amusement facilitates. These spending may not be growth enhancing for the economy. Bose (2003) and Nitoy et al. (2013) also found absence of any long-run association for current expenditure and output. Findings for model 6e represent no long-run relationship between developmental expenditure to national output and per capita output. Although it has positive impact on economy, this expenditure is not enough to transform GDP for Pakistan. There may be a considerable time-lag between developmental spending and benefits that arise. That is why increase spending on these expenditure may take couple of years for its implementation and its benefits.

As variables of model 6b are cointegrated, this allow us to use ECM whose findings are represented in table 4.17. Results advocate that ECT term is negative and significant, suggesting about 46% short run adjustment towards long-run equilibrium is accommodated by expenditure on social, economic and education services in the next year.

Table 4.17: Results of ECM Regression

Model	Dependent Variable	Constant	Coefficient of Explanatory Variable	ECT (-1)
6b	ln ESEES/GDP	0.0805	-0.6303 (-1.5008)	-0.4566 (-3.4156)

Findings of causality test are described in table 4.18. Results indicates unidirectional causality in favor of validity of Wagner's law for model 6, model 6b and model 6c. Results imply that Keynesian hypothesis may not be applicable in Pakistan due to a huge portion of public spending is devoted to current expenditures in the form of expenditure on social, economic and education services as well as defence expenditure. Even some expenditures may not be growth-enhancing. The growth gain from government expenditure depends on the effectiveness and efficiency of spending.

Table 4.18: Results of Granger Causality Test

Model	Null Hypothesis	Lags	F-Statistics	Prob.	Inference
6	dln GDP/N does not cause dln GE/GDP	2	2.5967	**0.0901***	**Causality exists (WH holds)**
	dln GE/GDP does not cause ln DGDP/N	2	0.4667	0.6313	No causality exists
6a	dln GDP/N does not cause dln ECS/GDP	2	1.3944	0.2626	No causality exists
	dln ECS/GDP does not cause dln GDP/N	2	0.9612	0.3932	No causality exists
6b	dln GDP/N does not cause dln ESEES/GDP	4	2.2958	**0.0861***	**Causality exists (WH holds)**
	dln ESEES/GDP does not cause dln GDP/N	4	0.4847	0.7468	No causality exists
6c	dln GDP/N does not cause dln ED/GDP	2	3.0955	**0.0590***	**Causality exists (WH holds)**
	dln ED/GDP does not cause dln GDP/N	2	0.0212	0.9790	No causality exists
6d	dln GDP/N does not cause dln CE/GDP	2	1.0242	0.3706	No causality exists
	dln CE/GDP does not cause dln GDP/N	2	0.0050	0.9950	No causality exists
6e	dln GDP/N does not cause dln DE/GDP	1	0.8565	0.3611	No causality exists
	dln DE/GDP does not cause dln GDP/N	1	3.7982	**0.0594***	**Causality exists (KH holds)**

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

The results of model 6a and 6d follow neither Wagner's nor Keynesian hypothesis meaning that no causality, because state provide subsidies, wages and salaries to general public which give

birth to high level of expenditure on current subsidies and current expenditure in the country which has no role for growth of the economy. For model 6e, unidirectional causality is running between expenditure on social, economic and education services to national output and per capita output in favor of the existence of Keynesian hypothesis for Pakistan. Results of model 6e suggest that Pakistan can maximize the growth potential of its economy by spending more on social, economic and education services, which will eventually enhance output and productivity.

The results suggest that total government expenditure, its subcomponents and GDP are not moving together in long-run except expenditure on social, economic and education services for all models. Results imply although public spending has increasing trend along with output but it is not due to growth in output. This may because of other important factors i.e. high population growth rate, lack of private sectors and political instability, providing fresh and clean water, protection of civilians, agricultural and industrial subsidies which may not be growth enhancing for the economy. There may be a considerable time-lag between developmental spending and benefits that arise. That is why increase expenditure on these categories may take couple of years for its implementation and many years for its benefits. However, expenditure on social, economic and education services has significant contribution towards economic development. Because more educated and healthy people would take active participation in more productive labor markets and hence expand economic activities. Therefore, this expenditure category requires more favorable attention in the allocation of total government expenditures.

The causality results show mix results regarding existence of validity of Wagner's and Keynesian hypothesis in three ways. Firstly, neither unidirectional nor bidirectional causality exists, because state provide subsidies, maintain law and order conditions, free amusement facilities and unemployment allowance to general public which give rise to the large portion of public spending in the country that has no role for growth of the economy. Secondly, there is unidirectional casualty running from economic growth to government expenditure which advocates validity of Wagner's law. Government can maximize growth potential of its economy by spending more on subcomponents which will eventually enhance output and productivity. Finally, there is unidirectional casualty running from government expenditure to economic growth in favor of existence of Keynesian hypothesis. This states that government expenditure is exogenous policy instrument which is designed to accelerate economic growth and to correct short-run as well as long-run cyclical fluctuations (Ansari et al., 1997).

5. Conclusion

This study aims to analyze the relationship between public spending at aggregate as well as disaggregate level and economic growth for Pakistan. The study also aims to find the causal relationship for applicability of Keynesian or Wagner's hypothesis. The annual time series data for time span ranging from 1976 to 2015 is used. To accomplish objectives, Engle and Granger (1987) cointegration and Granger causality (1969) tests are employed.

This study has used six basic versions of Wagner's law as theoretical model for applicability of Wagner's or Keynesian hypothesis. Wagner (1883) argues that causality flows from GDP to public spending, while Keynes (1936) advocates public spending is a consequence rather than cause of national income, hence causality runs from government expenditure to GDP.

Results indicate only expenditure on social, economic and education services have long-run relationship with GDP in five of basic versions of Wagner's law for Pakistan. Results further suggest total public spending and its subcomponents i.e. expenditure on defence, expenditure on current subsidies, current expenditure and developmental expenditure do not show cointegration with GDP. In framework of ECM, coefficient of ECT is negative and significant for expenditure on social, economic and education services.

The causality tests are showing mix results regarding existence of validity of Wagner's or Keynesian hypothesis for Pakistan. Expenditure on current subsidies, expenditure on defence, current expenditure and developmental expenditure are in favor of Wagner's hypothesis in most of cases, where causality flows from output to public spending. Results of expenditure on social, economic and education services are in line with existence of Keynesian hypothesis, where causality flows from government expenditure to economic growth.

5.1. Policy Implications

The study suggests following policy implications that can be inferred from the findings:

- Expenditure on social, economic and education services have long-run positive relationship with economic growth, therefore government should invest on this expenditure to achieve sustainable economic growth by spending more on human resource development.

- Expenditure on current subsidies, interest payments and expenditure on defence needs to be reallocated.
- Government should invest in skills development programs to enhance the skills of the workers because they can significantly contribute to economic growth.

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Appendix A

Variables	Description	Data Source
GE	Total Government Expenditure (Rs. Million)	PES, HBSPE
ECS	Expenditure on Current Subsidies (Rs. Million)	PES
ESEES	Expenditure on Social, Economic and Education Services (Rs. Million)	PES
ED	Expenditure on Defence (Rs. Million)	PES, HBSPE
CE	Current Expenditure (Rs. Million)	PES, HBSPE
DE	Developmental Expenditure (Rs. Million)	PES, HBSPE
GCE	Government Consumption Expenditure (Rs. Million)	PES, HBSPE
GDP	Gross Domestic Product (Rs. Million)	PES, HBSPE
N	Population (Million)	PES

*(PES) Pakistan Economic Survey

*(HBSPE) Handbook of Statistics on Pakistan Economy 2010