The Nexus of Government Spending and Economic Growth:

Evidence from Pakistan and SAARC region

By:

Rabia Saba
13/mphil/2009

Supervisor:

Dr. Zafar Moueen Nasir
Chief of Research
Pakistan Institute of Development
Economics (PIDE), Islamabad

Department of Economics
Pakistan Institute of Development Economics (PIDE)
Islamabad
June, 2012

Contents

Chapter 5

Chapter 6

ABSTRACT

The study was designed to explore the relationship between public expenditure and economic growth in Pakistan and SAARC region. The given aspiration is achieved by using time series autoregressive distributive lag (ARDL) model and different form of panel analysis for Pakistan and selected SAARC countries, respectively. The results of ARDL model evaluate that total government outlay is positively related with the growth rate of GDP. In addition, education expenditure is negatively related to growth in both cases, this might be due to poor governance, brain drain and investment in quantitative expansion rather than qualitative enhancement. The health care expenditure is capricious with respect to its sign in accelerating the growth of Pakistan. Defense expenditure coefficient is insignificant for Pakistan. For selected SAARC countries, total government spending is the engine of economic growth in all form of panel models. In second model, defense expenditure sign is negative showing its negative correlation with economic growth. While, health and education spending amplify the growth rate but later one has been insignificant. The study concludes that public expenditure plays determining role in setting the level of economic growth while it is important to consider its composition, increase the accountability and efficiency of public spending.

CHAPTER # 1

INTRODUCTION

1.1. BACKGROUND OF THE STUDY

The correlation between government expenditure and economic growth is a debatable issue among scholars. Some of the scholars argue that increased government spending on physical infrastructure and socio economic promotes growth of the economy for example, spending on health and education increases labor productivity which in turn increases national output.

While other scholars do not support the claim that increased government spending promote economic growth, instead of that they emphasize that higher government expenditure may retard on the whole performance of the economy. For example, government may increase taxes or borrowing or both in order to finance its growing expenditure. This will reduce aggregate demand and income. Similarly, high profit tax is likely to raise production cost which in turn reduces investment expenditure and firm's profitability. Increased government borrowing for financing its expenditure will crowd out private sector hence private investment will fall. Moreover, if government increases borrowing in order to support its expenditure it will crowd-out the private sector, thus private investment will fall.

In addition sometimes to ensure public that their government will remain in power, government misallocates the resources and invest in non productive projects that the private sector can do more competently. That's why some of the studies suggest negative relationship between increased public spending and economic growth.

The overwhelming growth process requires not only increasing public spending but also improving its composition and efficiency (Economic report of Pakistan 2005). It may help government to get benefits from limited resources because government spending can give basis for effort to reduce country poverty and enhance growth.

Lucas (1988) argues that economic growth is mainly due to rate of accumulation of human capital that is a physical means of production like factories and machines and a person can invest in it through better education and medical treatment (Becker, 1964). Similarly, healthy and educated people are expected to work more efficiently and contribute positively in the economy (Beraldo, 2009). It is claimed by World Health Organization (WHO, 2005) that fifty percent of economic growth differential among developed and developing nation attribute to ill health and low life expectancy. In addition, developed countries spend high percentage of their Gross Domestic Product on Health Care as they believe that healthy people can serve as a major driver for economic activities and development.

Psyccharapolous (1973) comments if you see any economy not doing well find out what is spent on education. Regarding this aspect public policy about social sector is very important for economy because it can influence growth rate. People are not liability rather they are potential assets. Asia today needs massive investment in its teeming millions to convert them into a real asset for the future. Haq (1992) says that the concept of Human capital has relatively more important in labor-surplus countries like SAARC region. Demographic pattern of the SAARC region proves that the region covers hardly 4% of the world's total land but one quarter of the world's total population (database profile on macroeconomic and HRD Indicators in the SAARC Region 2008). The excess labor in these countries is the human resource available in more abundance than the tangible capital resource. The effective inputs of health and education can transform this human resource into human capital.

Most of the economists initially from Adam Smith who first time highlighted the role of education in economic development considered skills of labor as essential component of economic progress. Other early economists like Marshall and Von Thunen accepted the importance of education in their work; however the theory was not properly developed until 1960 when the determining work of three great economists Theodore W Schultz, Jacob Mincer and Gary Becker formally linked up educational investment to human capital formation and economic development.

Theoretically, education expenditures should accelerate economic growth. However, this is necessary but not sufficient condition for growth. There are certain other factors which determine whether investment in education sector will affect growth significantly or not like institutional structure, labor market characteristics. For example the educated labor is busy in rent seeking activities other than growth oriented activities. Similarly large portion of spending goes in quantitative expansion rather than qualitative enhancement.

Improved health promotes the valuable and persistent use of knowledge and skills that individual acquire through education (Schultz, 1999).Improved health care is a principal human want.

The empirical literature clearly explains the possible trade-off between defense spending and expenditures on health and education. Defense spending is classified as Non-Developmental expenditure but it is necessary for security of the country. Some studies explain its positive impact on economic growth {Benoit (1978), Frederickson & Looney

(1982)}, while other contradict and explicate its negative impact on economic growth (Lim, 1983).

Haq (1992) says that SAARC countries should freeze their military expenditure. The region contains billion of poorest people in the world whereas half of them don't even have access to clean water. Some countries including Pakistan spend several times more on military than on social sector.

The unsustainable and declining trend in economic growth of Pakistan is troublesome for policy makers and foreign aid donors. There can be numerous reasons for the absence of Keynesian Hypothesis in Pakistan. First, huge fraction of public spending is dedicated to current expenditure the main elements of it are interest payments and defense spending. Secondly, in spite of the government efforts of fiscal transparency and better expenditure management, government activities on development are actually slow due to inefficiency in the government policies in contrast with private sector. This incompetence of public sector is due to political favoritism and corruption.

SAARC is an underdeveloped region of the world but blessed with enormous human resources considered to be the potential asset of any country. Economic growth is related to overcome the problem of spending on Education, Health and Defense. Any country should balance both defense and social expenditure in such a manner that none is neglected. In this context the study is an academic attempt to explore nexus of public Expenditure and Economic Growth in SAARC region where two rival countries India and Pakistan are spending several times more on defense while social sector is the most neglected area.

1.2. OBJECTIVES OF THE STUDY

Government spending in different sectors has been a debate among economists, policy makers and politicians; predominantly the way it influences the growth of the economy.

Particularly, this research has the following objectives.

- To analyze the relationship between aggregate government spending and economic growth of Pakistan both in short and long run by employing ARDL.
- To find out the relationship of spending in health, education and defense with economic growth in Pakistan.
- To explore the relationship of total governments spending, spending in defense, education and health with economic growth of selected SAARC countries by using the Panel estimation.

1.3. RATIONALE OF THE STUDY

SAARC countries occupying hardly four percent of the world total land with one fourth of the world's total population. These countries are blessed with abundant human resource which is real asset and essential for growth of the economy but there is wastage of this resource.

India and Pakistan are situated in this region, unfortunately hostile relationship of both led to more expenditure on defense while very little is allocated to social sector. Militarization is the priority area for both countries which takes away billion of dollars that can be spent on improving the standard living. Contrary to this, developed countries give due attention to development of human capital which has resulted in increased income and economic growth. In the line of this idea; the importance of exploring the relationship of government spending with other selected variables in SAARC region cannot be ignored.

Further the study is significant if its findings are properly followed. It would facilitate the task of policy maker in their understanding of policy problems related to allocation of budget. It may enable the student of economics to know the role of government spending in the light of its composition and efficiency and will provide meaningful information to improve social sector in sampled countries.

1.4. PLAN OF THE STUDY

The study consists of four chapters including the introductory chapter. The second chapter reviews the empirical and theoretical work based on government spending on different sector and economic growth. The third chapter consists of analytical framework to examine the effect of government spending on real output. The fourth chapter deals with the data and variables description by showing the nature of data, their sources, and data format. In addition to that, it also describes the econometric technique used for the estimation of the models. Empirical results and interpretations are discussed in the fifth chapter while conclusion of the study is summarized in last section.

CHAPTER # 2

REVIEW OF LITERATURE

2.1 INTRODUCTION

This chapter presents review of the literature on the role of public expenditure, education, health and defense expenditure in promoting growth in national economy of different countries. Based on theoretical and empirical consideration, we divided literature in different sections. First section explains the empirical literature based on impact of education, health and defense expenditure on economic growth while the other one reviews the theoretical work that has been developed in this area.

2.2 REVIEW OF EMPIRICAL STUDIES

There exist a number of studies that evaluate the linkage between expenditure on human capital (health and education) and defense expenditure on economic growth. These empirical studies have contradictory results because of the difference region, data and methodologies used to estimate the results. We divide this section into two sub-sections; first one handles the empirical work using times series data while other deals with the studies using panel data for analysis.

2.2.1 Review of Time Series Studies (Analysis):

In this subsection, we explain studies that use the time series analysis or taken into consideration only one country. The reason for such analysis is the results of particular country the study may not depend on panel data. The study by Belgrave and Craigwell

(1995) empirically look into the relationship of public expenditure and economic growth in Barbados covering the period from 1969 to 1992. The author employs the core property of time-series analysis as unit-root test and cointegration analysis for long-run relation. The empirical findings of the study show the positive relationship among agriculture, roads and communication, health expenditure and economic growth and negative relationship emerges between economic growth and education.

Tahir (1995) scrutinize the affiliation of defense expenditure and economic growth in case of Pakistan over the period 1961–93 and India for 1960–89. The author employs the unit root test, co-integration approach and error-correction (ECM) mechanism. The findings prove long-run relationship between defense spending and output and also bi-directional causality between defense spending and output for both of the countries.

Omotor (2004) empirically analyze the educational government expenditure for Nigeria by using the data over the period from 1977 to 1998. The author replicates the model used by Orubu (1989) with some modification such as including and dropping some variables in order to avoid spurious correlation and employs ordinary least squares (OLS) technique. The empirical findings of the study show that there exists positive relationship of government spending on education and economic growth. The author of the study also recommends various policy implications to uplift the Nigerian economy through the government expenditure in education sector.

Musila and Bellasi (2004) develop the framework to inspect the impact of government educational expenditure on economic growth as a case study of Uganda. The study uses the data over the period 1965 to 1999 and employs co-integration and error-correction mechanism (ECM). The study shows that average expenditure on education is positively correlated with the growth of the output both in short and long-run. The estimation of error-correction model (ECM) suggests that 1% increase in average educational expenditure per-worker lead to 0.04% increase in output in the short-run, 0.6% in the long-run.

Halicioglu (2004) inspect the relationship involving the defense expenditure and economic growth in case of Turkey by using the data set over the period from 1950 to 2002. The authors employ Johansen multivariate co integration and vector error correction model (VECM). The results of the study show that there exists a positive long-run relationship between defense spending and economic output on aggregate level.

Xiaoqing (2005) explores the relationship among physical capital expenditure, investment in health-sector and economic growth of china over the period 1978 to 2002. Time series regression analysis estimates the relationship between the independent variables health and physical capital expenditure and dependent variable output. The empirical findings show that investment in physical capital and health sector positively affect the output level.

Adebiyi (2005) empirically explore the affiliation between the education expenditure and economic growth for Nigeria by using the data set from 1970 to 2003. The author employs the econometric methodology such as vector autoregressive models (VAR), cointegration test, correlation matrix, pair-wise Granger causality test, Error-correction Model (ECM), and impulse response functions (IRF). The empirical findings indicate that an increase in capital expenditure on education reduces gross domestic product (GDP) growth rate that is a paradox in empirical and theoretical literatures. In addition to that, the author also proposes many solutions to solve the paradox.

AL-Jarrah (2005) empirically investigates the causal relationship between the economic growth and defense spending in case of Saudi Arabia over the period 1970-2003. The author employs two different models; first one is defense spending with real GDP growth; and other one is defense spending with non-oil real GDP growth. The Johansen's maximum likelihood procedure, vector error correction models (VECM), and standard Granger causality test are conducted to examine the given relation. The estimated results show that there exists bi-directional causality between economic growth and defense spending and uni-directional causality running from non-oil economic growth to defense spending.

Haider and Butt (2007) empirically analyze the long-run causal relationship between the health care spending and GDP in case of Pakistan by using the data set from 1972 to 2005. Authors employed the VAR based Error Correction Model (ECM) along with cointegration technique. The empirical findings of the paper confirm that there exist the long-run relationship between the GDP and health care spending. The results also show the erogeneity of GDP and confirm the value and sign of the income elasticity on health care spending.

Akram *et al.* (2008) empirically explore the relationship between the health and economic growth in case of Pakistan by using the time series data from 1972-2006. The authors conduct the cointegration test, Error Correction Mechanism (ECM) for short-run inspection and Granger causality test. The empirical results indicate that there is positive relationship between health expenditure and gross domestic product (GDP) in long-run. In short-run, there is insignificant relationship between health expenditure and economic growth.

Bedia and Dumont (2008) observe the casual relationship between human capital and economic growth in case of USA by using the data set over the period 1929 to 1997. The authors employ the cointegration, error correction model (ECM), maximum likelihood framework, and ECM-based causality tests as analytical tools. The empirical findings show that bi-directional causality exists between education and health expenditure and there also exist the causality from education and health to economic growth. The results also show that the long-run dynamics of growth are somewhat explained by past health and education level.

Pradhan (2009) empirically investigate the casual relationship between education and economic growth in case of India from 1951 to 2001. The author checks the stationarity property and employs cointegration, Error Correction Model (ECM) and Granger causality test. The results show that there is a unidirectional causal relation between economic growth and education.

Bukenya (2009) scrutinizes the possible dynamic relations between health care expenditure and economic growth measured by gross state product in case of southeast United States. The study examines the data series for the period 1980 to 2004 by using causality test and vector autoregressive (VAR) analysis. The empirical results of unvaried and multivariate time series analysis suggest weak but positive relationship between these variables. The results of the VAR analyses are correspondingly limited. However, the shapes of the impulse functions verify the positive relationship between personal health care expenditure and economic growth.

Saad and Kalakech (2010) inspect the effects of government expenditure of education, health, and defense and agriculture sector on the economic growth in case of Lebanon.

The authors use the annual data set over the period from the 1962 to 2007 and employ the macroeconomic endogenous growth model, unit root tests and cointegration technique. Analysis of the study reveals that there emerge negative relation between economic growth and health and education expenditure in short-run but this result disappear in long-run as positive effect work.

Chandra (2010) scrutinize the nexus of government expenditure on education and economic growth for India by using the data series from 1952-2009. The study reveals that expenditure on education does not have immediate impact on the economy but it is fruitful for future investments. It not only improves the quality of work force but also affects the other aspects of life by its positive externalities. The author also conducts the liner and non-linear Granger causality method and empirical findings suggests that investments in education be likely to influence economic growth after some time-lag but economic growth influence the level of government spending on education irrespective of any lag effects.

Taban (2010) inspects the rapport between the government spending and economic growth in case of Turkey by using the data set over the time period from 1987 to 2006. The author develops the macroeconomic model of Barro (1990) and empirically estimate it by employing the Zivot-Andrews (ZA) unit-root test with the help of EVIEWS programming codes, bounds testing approach to cointegration, autoregressive distributive lag model (ARDL) and MWALD (Toda and Yomamoto) causality test. The empirical findings show that there exists long-run but not short-run relation among share of GDP, total government spending, share of government investment and growth rate of per capita

GDP. The causality test shows that there exists strong bi-directional causality between the total government spending and economic growth.

Ghali (1997) looked at the relationship between public spending and economic growth in case of Saudi Arabia by using data set over time the period 1960-1996. He chose barro model and estimate it by using VAR. The result shows that causality runs from economic growth to public spending only which supports wagner hypothesis. Hence in order to reduce fiscal deficit government should control its spending.

Nurudeen and Usman (2010) investigate the effect of government expenditure on economic growth in Nigeria using time series data from 1970 to 2008. Authors employ the Keynesian and endogenous growth models along with the co-integration and error-correction mechanism (ECM).The result of the study reveals that government total expenditure, government recurrent expenditure and educational expenditure have negative impact on economic growth. Opposite to it increased government expenditure on transport and communication and health leads to increase in economic growth. Findings also show that inflation and fiscal deficit is also prominent in this case.

Rehman *et al.* (2010) empirically find out the direction of causality between public expenditure and economic growth for Pakistan during 1971-2006 by applying Toda-Yamamoto Augmented Granger Causality. The result of the paper supports to the Wagner's law i.e. in Pakistan causality runs from economic growth to public spending at both aggregate and disaggregate level rather than public expenditure to economic growth (Keynesian law).

Dilrukshini (2001) explores the relationship between public expenditure and economic growth in Sri lanka from 1952-2002. The paper tests the validity of Wagner and

Keynesian law by applying Johnson cointegration and granger causality test. The results conclude that there is no positive and significant long run relationship between public expenditure and national income in case of Sri-lanka. Public expenditure changes due to changing economic circumstances.

Albatel (2000) observe the impact and direction of government expenditure growth and growth of public expenditure for Saudi Arabia from 1964-1995. The paper employs series of unit root, cointegration, and causality and regression analysis. Results conclude that there exist bidirectional causality between public expenditure and economic growth. Government size in Saudi Arabia raises in absolute and relative term hence economy support Wagner's law. Public expenditure on infrastructure which stimulates economic growth should increase in order to put country on path of higher growth.

Yuk (2005) considers the long run relationship between public spending and economic growth for United Kingdom from 1830-1993. Co integration result shows that there is no long-run relationship between GDP, exports and public expenditure. The author than apply granger causality test by using VAR model. His findings suggest that government spending does granger cause economic growth. This causality supports Keynesian view.

Iqbal and Mustafa (1998) find out the effect of the some of the key macroeconomic variables on Pakistan's economic growth over the period 1959-60 to 1996-97. The authors carry out multiple regression frameworks in order to segregate the effects of key macroeconomic variables on growth. The results conclude that primary school enrollment accelerate growth. Similarly increase stock of physical capital ant trade also increase economic growth while budget deficit and external debt are negatively related to growth. The best alternative to finance economic growth is relying on domestic resources.

2.2.2 Review of Panel data studies (Analysis):

Since, we want to analyze the linkages among public spending on human capital i.e. health and education and defense expenditure along with economic growth. The contribution of expenditure varies across the countries and there is need to evaluate that effect not only for Pakistan but also for other countries as panel technique. For theoretical and regional justification, we employ selected SAARC countries that require the panel estimation procedure. In order to fulfill that gap, this section explains the review of different empirical studies that use the panel studies for analysis.

Hsieh and Lai (1994) empirically examine the association between the government expenditure and economic growth in case of G-7[1]. The time period under analysis for data varies from country to country due to world war-II. The authors employ the multivariate time series analysis and impulse response functions in the context of vector autoregressive (VAR) technique. The empirical findings show that the relationship between the economic growth and government expenditure varies across countries and there exist weak relationship between these two variables among G-7 countries.

Gupta *et al.* (2002) develop the nexus among economic growth and government spending on education and health care for 50 developing and transition economies by using the data set over the period 1993 to 1994. The authors employ the ordinary east square (OLS) and two-stage least squares (2SLS) regressions analysis on the linear and log-log specifications of the model. The empirical findings show that an increase in public spending on both education and health contribute positively for education attainment and health status but there does not appear any causal relationship. There also exist positive

[1]These countries include Canada, France, Germany, United Kingdom (U.K), Italy, Japan and U.S.A.

and strong relationship between economic growth and education expenditure but this relationship is weaker for health.

Fan and Rao (2003) analyze the trends, determinants and impact of government spending on economic growth in case of 43 developing countries over the time period from 1980 and 1998. The empirical findings of the study show that government spending in agriculture and health are mainly strong in promoting economic growth of Africa. In case of Asia, government expenditures on agriculture, education, and defense contribute positive to economic growth. Health spending has a positive growth-promoting effect for Latin American countries. While, structural adjustment programs are positively link with economic growth in Asia and Latin American countries.

Jung and Thorbecke (2003) empirically scrutinize the impact of education spending on economic growth and human capital and poverty in case of Tanzania and Zambia for the time period of mid 1990's. The authors employ the standard neo-classical multi sector computable general equilibrium (CGE) modeling approach. The findings of the study show that an increase in public spending on education can promote economic growth and poverty alleviation but the effects of education expenditure on economic growth and poverty reduction varies from country to country.

Bloom *et al.* (2004) inspect the effect of health on economic growth by using production function approach over the period 1960-1990 for different countries. The authors employ the non-linear least squares and include the Time-dummies as proxies for the average worldwide level and growth rate of total factor productivity (TFP). The empirical results show that good health has a positive, great, and statistically significant effect on output and improvements on health expenditures have positive effect on economic growth.

Wilson and Briscoe (2004) find out the impact of human capital on economic growth for European Union (EU) member states by taking the time period from 1970 to 2000. The study reviews a large number of growth models, beginning with the growth accounting models, through to the endogenous growth models that attempt to specify and quantify the relationship between gross national product (GNP) and human resource. The study found loose connection between investment in human resources and growth in gross national product, but obvious causal relationships are difficult to establish. It also concludes that the relationship between investment in education and training on national economic growth is positive and significant.

Al-Yousif (2008) empirically analyze the relationship between human capital and economic growth for six Gulf Cooperation Council (GCC) member countries (Saudi Arabia, Kuwait, U.A.E, Oman, Bahrain and Qatar) by using the time series data from 1977-2004. The study employs Granger-causality test within an error-correction framework and cointegration analysis. The empirical findings show that causality between education and economic growth is bi-directional; the results are also country specific and vary with the proxies used to measure human capital.

Li and Liang (2009) empirically examine the growth model which considers health and education in human capital by using the panel data based on the provincial level from 1978 to 2005 for Chinese economy. The empirical evidence shows that both health and education have positive and significant effects on economic growth. The results also show that the contact of health and education stock will not reduce their impact on growth.

Beraldo (2009) analyze the impact of public and private expenditure of health and education sector on economic growth during the period 1971 to 1998 for 19 OECD countries. The study uses the growth accounting frame-work and evaluates that more investing countries in education and health sector have faster growth rate. The study also analyzes that public and private expenditure on human capital has different impact on economic growth. The empirical finding suggests that public expenditure influence the gross domestic product (GDP) growth more than the private investments and investment in public health and education is positively correlated with the growth rate but estimated impact of health expenditure is stronger than educational expenditure.

Narayan *et al.* (2010) empirically scrutinize the relationship between the health expenditure and economic growth for a panel of 5 Asian countries over the period 1974 to 2007. The authors employ the panel unit-root test, panel cointegration with structural breaks and panel long-run estimator. The empirical findings of the research show that there exist the long-run relationship among all the variants of the growth model and variables. The results also include that health expenditure, investment, exports and research and development (R&D) are positively correlated with economic growth and imports have negative effect, while education has an insignificant effect on economic growth in the long-run.

Alam *et al.* (2010) analyze the long-run relationship between social expenditures and economic growth in case of 10 Asian developing countries, Bangladesh, India, Indonesia, Korea, Malaysia, Pakistan, Philippine, Singapore, Sri Lanka, and Thailand. The authors employ the cointegration tests, panel unit-root test, and panel cointegration test. The empirical findings show that there exist the long-run dynamic relationship among education, health expenditures and economic growth. And analysis under consideration shows that these public social expenditures can affect economic growth positively.

Pradhan (2011) examines the relationship between government expenditure and economic growth in seven SAARC countries for period 1970-2007. He used panel co integration and panel causality and found long run relationship between public spending and economic growth. The study verifies bidirectional causality between government spending and economic growth in each individual country (except Pakistan and Sri lanka) which support Keynesian and Wagner law.

Kusham shakya (2007) found positive association between human resource development and per capita income in Saarc countries through physical quality of life index (PQLI). It also concludes that most important sources of human resource development are health and education so countries should invest enough amounts in these sectors.

Hirnissa and Baharom (2009) examine the relationship between the defenses, education and Health expenditure in case of eight Asian countries[2] by using the data set from 1970 to 2005. The authors employ the autoregressive distributed lag-restricted error correction model and stationarity property. The empirical findings of the paper show that there exist bidirectional causality between education and defense and unidirectional causality running from education to health for South Korea, in case of Malaysia unidirectional causality running from health to education, in case of Nepal education is being granger caused by health and defense, education granger cause defense and bidirectional causality between education and health exist for the case of Singapore, in the case of Philippines and Sri Lanka no meaningful relationship could be detected, For the case of Bangladesh,

[2] These countries include Malaysia, Indonesia, Singapore, Philippines, Bangladesh, Nepal, Sri Lanka and South Korea.

unidirectional causality runs from health to defense, and subsequently from defense to education, and in the case of Indonesia bidirectional causality between education and health is found and defense have no meaningful relationship with health and education.

Baldacci *et al.* (2004) used panel data for 120 developing countries and find out direct and indirect links between social spending, human capital and growth in system of equations. The paper explores that both education and health spending have significant and positive effect on accumulation of human capital and hence contributes to economic growth indirectly. The positive effect of social spending on social indicator and growth is highest in low income countries.

Fan and Saurkar (2006) explore the trends, determination and impact of public spending on long run growth of national economies in 44 developing countries. These countries are from three regions Africa, Asia and Latin America. The results conclude that the efficiency of government spending in economic growth is mixed. Government spending in Agriculture and Education had strong impact in promoting economic growth in Africa and Asia. While in Latin America spending in agriculture, infrastructure and social security, all had growth promoting effects. However structural adjustment programs had negative impact on Africa’s growth.

Kneller *et al.* (1998) find out the relationship between fiscal policy and economic growth by using panel data for 22 OECD countries from 1970-1995. The results of fixed effect model are consistent with Barro’s (1990) model that productive expenditure promotes economic growth while non productive expenditure does not. Similarly, distortionary taxation reduces growth while non-distortionary taxation does not.

Haque *et al.* (2007) find out the impact of public expenditure on growth for 30 developing countries during 1970-1980. They focus on disaggregated government expenditure particularly. The paper results conclude that share of government capital expenditure in GDP is positively and significantly associated with economic growth while current expenditure is insignificant. The government investment and total expenditure in education is positively associated with growth.

Abdullah (2009) explores the relationship between fiscal variables and economic growth in Asian economies by using generalized method of moment GMM as dynamic panel data analysis over the period 1985-2001. The results conclude that there is positive long run and significant relationship between health, education, aggregate government expenditure and economic growth while there is negative and significant correlation ship between defense expenditure, distortionary taxation, budget balance and real per capita GDP.

Habibullah *et al.* (2008) empirically examines the relationship between military expenditure and economic growth in twelve Asian countries Bangladesh, China, India, Indonesia, Japan, Malaysia, Pakistan, Philippines, Singapore, South Korea, Sri Lanka and Thailand, for the period 1989 to 2004. The authors employ the autoregressive distributed lag (ARDL), Test for panel unit root, Test for panel cointegration, Test for long-run causality. The empirical findings of the panel cointegration show that economic growth and military expenditures are co integrated while panel error correction model indicate that economic growth and defense spending in these Asian countries are not related.

2.3 REVIEW OF THEORATICAL STUDIES

There exist abundance of empirical literature on the topic under consideration but only few studies employ theoretical aspect of the nexus among expenditure on human capital (education and health) and economic growth. This sub-section defines the work of different theoretical studies.

Glomm and Ravikumar (1997) consider the new developments in endogenous growth models which are associated with productive government expenditures and long-run growth. They develop a model of capital accumulation taken by Diamond (1965) and consider two types of government expenditures that enter as inputs into the production function for final output and investment technologies. Their findings related to output elasticity of public capital and educational expenditures concludes that other types of government expenditures may well have large impacts on long-run growth along with the expenditures in infrastructure, investment technologies and education.

Cronovich (1998) analyzes the relationship between the government spending and long run economic growth both theoretically and empirically by using data from a cross-section of 30 countries. The author constructs the model in two versions of the variable, one measures human capital by workers educational attainment and second uses wages as a proxy for workers. The results of the study reveal that government spending is positively correlated with economic growth. In addition to that, the findings of regression analysis using the wage-based measure evaluate that estimated parameters are significant at conventional levels.

Angelopoulos *et al.* (2007) theoretically examine the impacts of public education expenditure on long-run growth, lifetime utility and transitional dynamics. They study takes the dynamic changes in post-war US economy and constructs Dynamic Stochastic General Equilibrium (DSGE) model based on Lucas (1990) work by adding the externalities and government expenditures on public education. The study also suggests that change in public education expenditure is financed by change in lump-sum taxes. The work conduct an empirical job by using the data over the period 1949-1984 of Jorgenson and Fraumeni (1989, 1992) for human and physical capital and finds that there is evidence of positive externalities from the stock of human capital and welfare is only achievable if increases in public education spending are go along with changes in the government tax-spending.

Blankenau *et al.* (2007) theoretically judge the relationship between public education spending and long-term growth. The study develops an overlapping generation growth model by specifying that taxation can extract the positive growth effects from increased public education spending. The regression analysis by using ordinary least squares (OLS) method and data set from 1960 to 2000 for a group of 23 developed countries reveal a positive relationship between government education spending and growth for developed countries.

CHAPTER # 3

ANALYTICAL FRAMEWORK

3.1 INTRODUCTION

In this chapter, we define the analytical framework for empirical exploration and build up the theoretical specification of the model. We followed the work of Barro (1990) based on the phenomena of "government spending and economic growth" that is empirically estimated by Taban (2010).

3.2 THEORETICAL MODEL

Our representative infinite lived household maximizes his lifetime utility in order to choose consumption path c_t .

$$U = \int_0^\infty u(c) e^{-\rho t}\, dt \qquad (3.1)$$

Where, c is consumption (goods and services) of constant number of consumer and $\rho > 0,$ is the constant rate of time preferences. The ISO-Elastic utility function or intertemporal utility function with constant elasticity of substitution is given as:

$$u(c) = \frac{c^{1-\sigma} - 1}{1 - \sigma} \qquad (3.2)$$

Where, $\sigma > 0$ with marginal utility of constant elasticity $-\sigma$ .The household per-worker production function is written as:

$$y = f(k) \qquad (3.3)$$

Where, y, k stand for output and capital per worker. However, the given production function also entails usual properties such as $\left(f^{'} > 0\right)$, $\left(f^{''} < 0\right)$ positive and marginal product of capital, respectively. The Inada-condition also enters into the production function that is $f^{'}(0) = \infty$ and $f^{'}(\infty) \leq 0$. Each household work for given amount of time, i.e. there doesn't exist labor leisure choice. Our production function is also time independent that requires no technological progress.

In Hamiltonian framework, we maximize the intertemporal utility function with constant elasticity of substitution (σ): that is

$$U = \int_0^\infty e^{-\rho t} \frac{c_t^{1-\sigma} - 1}{1-\sigma} dt \qquad (3.4)$$

The maximization of the representative household utility given in equation (3.4) gives us a growth rate of consumption at point in time.

$$\frac{c^{\cdot}}{c} = \frac{1}{\sigma}\left(f^{'} - \rho\right) \qquad (3.5)$$

Where, $f^{'}$ is marginal product of capital. The model also entails steady-state level (solution) of capital, and consumption k^*, c^* respectively. Equation (3.3) determines steady state level of k^* that follow the condition $f^{'}(k) = \rho$. However, in steady state; we also follow zero net investment along with steady-state consumption $c^* = f\left(k^*\right)$.

Recent innovation in endogenous growth model developed by Rebelo (1987) departs from the assumption of diminishing returns $f^{''} < 0$ and replaces it with constant returns to scale. The modified form of production function with constant return to a single type of capital is:

$$y = Ak \qquad (3.6)$$

Where, $A > 0$ show constant marginal product of capital. The inclusion of human and non-human capital widely support to the idea of constant return to scale. While, human investments capture education and training, as well as expenses for having and raising children [Becker and Barro (1988)]. There exists imperfect substitution of human and non-human capital in production. And production is constant return to scale in both type of capital together but diminishing returns to scale in either input separately. In order to distinguish between two types of capital for "Ak" type production function, we can also follow the work of Lucas (1988) and Rebelo (1987) that allows the sector to produce physical and human capital, respectively.

The main interest of "Ak"model depend on the transitional dynamic, where economy goes from starting ratio of physical to human capital to a steady state ratio. The importance of transitional dynamic is peculiar with respect to analyze whether economies start from different initial conditions (due to some major disturbance) might converge to same level of economic performance. In discussing the issue of steady-state growth, the important component belongs to constant return to scale in factors that are taken together. In order to conduct long-run growth analysis, we use the simplest constant- returns to scale production function as mentioned by equation (3.6).

The expenditure on research, development and knowledge that is private property is broadly defined in the form of capital. However, knowledge captures the core property of public goods that is non-rival and non-excludable with the issues of sub-optimal economic growth Romer (1986).

The production function defined in equation (3.6) requires the marginal product of capital $f^{'} = A$. We substitute it into equation (3.5) for:

$$\gamma = \dot{c}/c = (1/\sigma).(A-\rho) \qquad (3.7)$$

The logical interpretation to use symbol γ for growth rate follow that technology is adequately productive for positive steady state growth instead to follow the pattern of unbounded utility. Equation (3.7) also follows the given inequality condition:

$$A > \rho > A(1-\sigma) \qquad (3.8)$$

In the above equation, if $A > 0$, $\rho > 0$, then attainable utility with correspondent production function will be bounded. With $"Ak"$ type production function the economy always follow the position of steady-state growth, where all variables c, k, and y grow at the rate γ as shown by equation (3.7). In such model, the initial level of consumption is

$$c(0) = k(0).(A-\gamma) \qquad (3.9)$$

From equation (3.7), the more productive $(High\ A)$ economy captures the higher growth rate and the less productive $(High\ A)$ economy consists of less patient people $(Higher\ \rho)$ with the minimum desirability to substitute intertemporally $(Higher\ \sigma)$.

3.2.1 The Public Sector:

The role of public sector is important in accelerating economic growth process of the economy. In order to analyze the given issue, the contribution of Barro (1990) is worth able. We suppose that the quantity of public services that is provided to household producer is denoted by g. We further assume that these services neither require the user charges nor the congestion effect (that may arise from highways or some other public services). The model construction also abstract from externalities associated with the use of public services.

We can also assume the role of public services as an input to private production that creates positive linkages between government sector and growth. The essential assumption for production function is that production exhibits constant return to scale in k and g together, but diminishing return in k separately. The inability of government input to expand along with private capital in parallel manner may allow the production process to follow decreasing return in private input. Aschauer (1988) also argue that the services from government infrastructure are very important for such framework.

$$y = f(k,g) = Ak^{1-\alpha} g^{\alpha} \qquad (3.10)$$

Where, $0 < \alpha < 1$ and k is the representative producer's quantity of capital that also correspond to per capita amount of aggregate capital. And g is the per capita quantity of government purchases of goods and services. The above framework captures the number of problems. Firstly, the flow of public services is not directly connected with government purchases, especially the response of government to own capital and the response of national accounts to omit the rental income on public capital in the measure of current purchases. Empirical implementation of this model has an importance for analysis. But conceptually, it is good for government to as doing no production and owing no capital. Then the government is restricted to buy a flow of output from the private sector. If there exist similarities of production function for both the government and the private sector then it would be same as government buys private inputs and does it own production, instead of purchasing final input from the private sector.

The another problem that may arise is that if public sector are non-rival for the users, then the amount of government purchases matter rather than its per capita amount. Samuelson (1954) also mentions that this element is important in order to determine the desirable scale of government activity. In that framework, the present analysis can be modified to include this aspect.

The government expenditure is financed by flat income tax rate: As

$$g = T = \tau y = \tau A k^{1-\alpha} g^{\alpha} \tag{3.11}$$

Where, T is government revenue and τ is the tax rate. We normalize the number of household to unity, and modify our analysis as "g" correspond to aggregate expenditure and T is aggregate revenue.

The marginal product of capital of Cobb-Douglas production function is

$$f_k = A(1-\alpha)\left(g/k \right)^{\alpha} \tag{3.12}$$

The marginal product of capital f_k is calculated by varying k in equation (3.10) with constant g. We can define that assumption as change in capital and output does not necessitate the change in public services.

Now, we substitute $g = \tau y$ in equation (3.10) and simplify to get:

$$y = k.A^{1/(1-\alpha)}.\tau^{\alpha/(1-\alpha)} \qquad (3.13)$$

The analysis indicate that for given expenditure ratio, τ , y is proportion to k same as in "Ak" production function in equation (3.6). And the increment in flat income tax rate τ , means that increase in relative amount of public input and upward shift in coefficient of y to k .

The ratio of two productive inputs is:

$$g/k = \left(g/y\right).\left(y/k\right) = \tau.\left(y/k\right) = \left(A\tau\right)^{1/(1-\alpha)} \qquad (3.14)$$

Where, the ratio of y/k comes from equation (3.13). By replacing equation (3.14) for g/k into equation (3.12) gives us:

$$f_k = (1-\alpha).A^{1/(1-\alpha)}.\tau^{\alpha/(1-\alpha)} \qquad (3.15)$$

The increase in expenditure ratio τ implies an upward shift in marginal product of capital f_k .

We want to maximize the utility of whole society as private optimization that requires the path of consumption that satisfies equation (3.5) and f' is replaced with the marginal product of capital. We are considering the flat-rate income tax τ with the return $(1-\tau)f_k$. The substitution of marginal product of capital from equation (3.15) gives us the growth rate of consumption. That is

$$\gamma = \dot{c}/c = \left(1/\sigma\right).\left[(1-\alpha).A^{1/(1-\alpha)}.(1-\tau).\tau^{\alpha/(1-\alpha)} - \rho\right] \qquad (3.16)$$

With constant τ the government sets g and T to grow at the same rate as y . Since, the growth rate γ is constant. Hence, the transitional dynamic follow the same pattern as

$"Ak"$ model. Consumption also starts at some level $c(0)$ and grow at constant rate γ. In the same way, k and y also start at initial value $k(0)$ and $y(0)$ then grow at constant rate γ. There does not exist any transitional dynamic and always lies in the position of steady state where all quantities grow at the rate γ as indicated by equation (3.16).

However, the initial quantity of consumption is

$$c(0) = k(0).\left[(1-\tau).A^{1/(1-\alpha)}.\tau^{\alpha/(1-\alpha)} - \gamma\right] \qquad (3.17)$$

Where, γ is explained in equation (3.16). The first term is the bracket of equation (3.17) corresponds to $y(0) - g(0)$, and second term relates to initial investment, $k(0)$.

Our contribution in the interest topic is to highlight the nexus of government spending and economic growth, particularly spending on education, health and defense sectors with economic growth in the given framework. The restricted form of production function in the presence of government spending as mentioned by Cobb-Douglas form (production function) is not supportive for us to conduct both the theoretical and econometrics analysis. There is need to generate less restrictive form of production function in order to conduct the impact of alternative government spending on economic growth. We follow and extend the work of Taban (2010) based on the phenomena of government spending and economic growth. The framework is developed in the light of Barro (1990) with the alternative or general form of production function that depends on government spending and capital as inputs. We also modify our intertemporal utility function with constant elasticity of substitution (σ) as:

Our capital accumulation constraint and government budget constraint are $k = y - g - c,\ \ g = \tau y$ respectively. The general form of production function is

$$y = f(g,k) \tag{3.18}$$

The modified form is written as $y = k\, f\left(g/k \right)$, where, y is per capita government purchases, k is capital per worker, and τ is average tax-rate.

$$\gamma = \frac{\dot{c}}{c} = \left[\left(1 - g/y \right)(1-\eta)\, f\left(g/k \right) - \rho \right] / \sigma \tag{3.19}$$

$$\frac{\partial \gamma}{\partial (g/y)} = f(g/k)\left(f^{'} - 1 \right)/\sigma \tag{3.20}$$

Table: 3.1 Sign Implication of Barro (1990) Model:

Expenditure	**Under spending in productive services**	**Optimal spending in productive services**	**Overspending in productive services**
Expenditure on productive services	$\partial\gamma/\partial(g/y) > 0$	$\partial\gamma/\partial(g/y) = 0$	$\partial\gamma/\partial(g/y) < 0$

Source: Hsieh and Lai (1994).

Table: 3.2 Expected Sign (Implications):

Expenditure	**Under spending in productive services**	**Optimal spending in productive services**	**Overspending in productive services**
Expenditure on education	$\partial\gamma/\partial(g/y) > 0$	$\partial\gamma/\partial(g/y) = 0$	$\partial\gamma/\partial(g/y) < 0$
Expenditure on Health services	$\partial\gamma/\partial(g/y) > 0$	$\partial\gamma/\partial(g/y) = 0$	$\partial\gamma/\partial(g/y) < 0$

When government increases its spending in non productive projects it will lower the growth rate, autonomous of the size of government. While, increase in Government spending on productive services can either increase or lower the growth rate depending on size of the government (Taban, 2010).

3.2.2 Model Specification:

This section explains the theoretical specification of the model presented in Barro (1990) that is also used in general form and empirically estimated by Taban (2010). We further derive Barro's (1990) model by using production function that depends on capital and expenditure on education, health and defense expenditure, separately as $y = f(k, g_h)$, $y = f(k, g_{Def})$, $y = f(k, g_{Edu})$ where, g_h, g_{Def} *and* g_{Edu}, stand for government spending on health, defense and education, respectively. Then, derive the Euler's equation, growth rate of consumption and its derivative for the rate of change in its growth as mentioned by equation (3.20), separately for each type of government spending. This overwhelming procedure may help us to conduct the empirical analysis for Pakistan and selected SAARC countries.

3.2.2.1. Government Spending on Health and Growth Rate

In order to derive the Euler equation and its growth rate for health spending separately, equation (3.21) is taken as production function of capital and government spending on health sector. Hamiltonian set up is developed by assuming the ISO-Elastic utility function or intertemporal utility function with constant elasticity of substitution as mentioned above in equation (3.1) and (3.2). Capital accumulation constraint and government budget constraint are the same as $\dot{k} = y - g - c,\ g = \tau y$ respectively. The general form of production function in the presence of government spending on health is written as:

$$y = f\left(k, g_h\right) \qquad (3.21)$$

The specified form is written as $y = k\, f\left(g_h \big/ k \right)$. The Euler equation with the given framework is defined as:

$$\gamma = \frac{\dot{c}}{c} = \left[\left(1 - g_h \big/ y\right)\left(1 - \eta\right) f\left(g_h \big/ k\right) - \rho\right] \Big/ \sigma \qquad (3.22)$$

Where, c/c is the growth rate of consumption and all other variables are the same as defined above except the g^h that is government spending on health. The derivative of Euler equation with respect to ratio of government spending on health to output is written as:

$$\frac{\partial \gamma}{\partial\left(g_h / y\right)} = f\left(g_h / k\right)\left(f^{'} - 1\right) / \sigma \qquad (3.23)$$

Again the sign of government spending on health depends on $f^{'}$. Either the growth rate increase or not depend on the size of $f^{'}$. If it is greater than one, its sign is positive otherwise zero or negative.

3.2.2.2. Government Spending on Education and Growth Rate

This sub-section also derives the Euler equation and its growth rate for education spending. Equation (3.24) employs the production function of capital and education expenditure of government. In first, the Hamiltonian set up is developed with the help of

ISO-Elastic utility function with constant elasticity of substitution explained in equation (3.1) and (3.2). Capital accumulation constraint and government budget constraint are the same as $k = y - g - c,\ g = \tau y.$ The general form of production function in the presence of government spending on education is written as:

$$y = f\left(k, g_{Edu}\right) \tag{3.24}$$

The specified form is written as $y = k\ f\left({g_{Edu}}/{k} \right)$. However, Euler equation in the given framework is:

$$\gamma = \frac{c^{\cdot}}{c} = \left[\left(1 - {g_{Edu}}/{y}\right)(1 - \eta)\, f\left({g_{Edu}}/{k}\right) - \rho\right] \Big/ \sigma \tag{3.25}$$

Where, $c^{\cdot}/c$ and g^{Edu} stand for the growth rate of consumption and government spending on education and all other variables have the same meaning as defined above. The derivative of Euler equation with respect to ratio of government spending on education to output is defined as:

$$\frac{\partial \gamma}{\partial\left(g_{Edu}/y\right)} = f\left(g_{Edu}/k\right)\left(f^{'} - 1\right)/\sigma \tag{3.26}$$

In the above equation (3.26), the sign of growth rate of output depends on the derivative of government spending on education $f^{'}$. In addition to that, the higher value of growth rate requires large size of $f^{'}$ on education. If $f^{'}$ is greater than one, the sign of growth rate is positive, and less than one of it induce negative growth rate.

3.2.2.3 . Government Spending on Defense and Growth Rate

This part of the research analyzes the reaction of government spending on defense and its impact on growth rate. We develop and derive the Euler equation, its growth rate for defense spending separately as indicated in equation (3.27) by taking the production function of capital and defense expenditure on government. The solution model requires the set up of Hamiltonian in the presence of intertemporal utility function with constant elasticity of substitution. The same capital accumulation constraint and government budget constraint are assumed such as $k = y - g - c,\; g = \tau y$ respectively. The general form of production function for government spending on defense is defined as:

$$y = f\left(k, g_{Def}\right) \qquad (3.27)$$

The specified form of production function is as $y = k\ f\left(g_{Def}/k \right)$. The Euler equation can be written as:

$$\gamma = \frac{c^{\cdot}}{c} = \left[\left(1 - g_{Def}/y\right)\left(1-\eta\right) f\left(g_{Def}/k\right) - \rho\right] \Big/ \sigma \qquad (3.28)$$

Where, all variables are the same that have been defined above except that government spending on defense that is defined as g^{Def}. In addition, the derivative of Euler equation with respect to ratio of government spending on defense to output is written as:

$$\frac{\partial \gamma}{\partial\left(g_{Def}/y\right)} = f\left(g_{Def}/k\right)\left(f' - 1\right)/\sigma \qquad (3.29)$$

In the above equation (3.29), the sign of growth rate of government spending on defense depends on $f^{'}$. The higher the value of $f^{'}$, the higher the growth rate, the lower the value of $f^{'}$, the reduction in the growth rate of government spending on defense to output.

By employing the government spending on each sector simultaneously, i.e. health, education and defense, the production function can be written as:

$$y = f\left(k, g_{h,Def,Edu}\right) \qquad (3.30)$$

By following the same system as defined above, we can write the growth rate of Euler equation as:

$$\frac{\partial \gamma}{\partial\left(g_{h,Def,Edu} / y\right)} = f\left(g_{h,Def,Edu} / k\right)\left(f^{'} - 1\right) / \sigma \qquad (3.31)$$

The sign of equation (3.31) is unambiguous in the presence of spending on all sector i.e. health, defense and education, simultaneously. The growth rate of output with respect to all spending can move in any direction, as it may decrease, increase or remain constant.

CHAPTER # 4

DATA, VARIABLES AND ECONOMETRIC METHODOLOGY

4.1 INTRODUCTION

This chapter briefly explains the description of variables, its nature and particularly source of data used in the underlying study. This chapter consists of three major sections. The first section highlights the nature, type, sources and data format. It also underlines the region and time period of analysis. The second segment briefly defines different variables used in the fundamental analysis. In the last, we clarify econometric technique that is used to discover empirical outcomes.

4.2 DATA

Since, we want to analyze the impact of aggregate government spending and spending in education, health and defense sectors on economic growth. In order to empirically check the coefficient effect, we take Pakistan and other selected South Asian Association of Regional Cooperation (SAARC) countries namely Pakistan, India, Sri lanka, Maldives, Bangladesh, and Nepal for empirical securitization.

The sample period for Pakistan is from 1972 to 2010 and from 1990 to 2010 for selected SAARC countries. To check the role of government spending for Pakistan mainly in three sectors requires times series analysis, the total number of observations for analysis is 39. However, for selected SAARC countries, we used panel data analysis that depends on number of countries and number of observations. The number of observations for one country is 21 and we are using six SAARC countries. So, total number of observation for selected SAARC countries or panel estimation is 126.

4.2.1 Data Source

Basically, we conduct two analyses in our research framework one for Pakistan and other for selected SAARC countries. The data source used for the dependent variables "growth rate of gross domestic product per capita" (GDPPC) is World Development Indicator (WDI) and Economic Survey of Pakistan (ESP), Some of missing values are taken from the International Financial Statistics (IFS) Published by International Monetary Fund (IMF).

Whereas the data source for health and education and defense is SAARC Report, entitled "Database Profile on Macroeconomic and HRD Indicators in the SAARC Region 1990-2008", "Stockholm International Peace Research Institute" (SIPRI), Economic Survey of Pakistan (ESP), and "Fifty Years of Pakistan's Statistics Supplement".

The data source for government spending on education and health is online data source of "SAARC Report" that collects data on all SAARC countries and for defense spending is SIPRI. The data set of all selected SAARC countries are in unique sequence.

4.3. VARIABLES

Our research work requires different variables for regression analysis and also for the model specification. This section defines both dependent and set of explanatory variables.

(i) Growth rate of Gross-domestic Product Per Capita(GDPPC)

In our empirical research, dependant variable is growth rate of Gross Domestic Product per capita (GDPPC). It is defined as gross domestic product (GDP) divided by mid-year population in constant local currency. GDP is measured by the final market value of output produced domestically. In order to calculate the growth rate of GDPPC, the first difference in the natural log of real per capita GDP series is constructed.

(ii) Government Spending

Expenditure comprises all no repayable payments by government whether requited or unrequited and whether for current or capital purpose.

(iii)Health Expenditure

Public health expenditure refers to spending on health care financed by government funds. State, regional, local government bodies and social security schemes are public funds.

(iv)Education Expenditure

Education is another explanatory variable of our research that is referred as the current operating expenditures on education, including wages and salaries apart from capital investments in buildings and equipments.

(v) Defense Spending

SIPRI defines defence spending as all of the current and capital expenditure on the armed forces as well as peace keeping forces, defence ministries and other government agencies busy in defence projects, paramilitary forces when judged to be trained, equipped and presented for military operations military space activities.

4.4 ECONOMETRIC METHODOLOGY

The section is about the econometric methodology and the empirical methods that are used in analysis. In addition, the empirical work requires the estimation procedure by employing different econometric techniques and methods that have been developed in modern era to handle the issue. Precise evolution of econometric technique for both time series and panel analysis is under consideration here. For this we regress two separate data set, one for Pakistan and other for selected SAARC countries. By following the work of Barro (1990) that is empirically estimated by Taban (2010), we analyze the impact of aggregate public spending and spending in education, health and defense sector on economic growth of Pakistan and selected SAARC countries.

Our required equations for estimation in case of Pakistan are as follow:

Model 1

$$y_t = \alpha_1 + \beta GovtExp_t + u_{1t} \tag{4.1}$$

Model 2

$$y_t = \alpha_1 + \beta_0 HeaE_t + \beta_1 DefE_t + \beta_2 EduE_t + u_{2t} \tag{4.2}$$

Where,

y_t = Growth rate of per capita aggregate real output

α_i = Intercept terms

β_i = Slope Coefficients

$GovtExp$ = Total Government Expenditure

$HeaE$ = Health Expenditure

$DefE$ = Defense Expenditure

$EduE$ = Education Expenditure

u_{it} = Error term

4.4.1 Time Series Estimation

In the first, our objective is to define the methodology for time series data. This sub-section defines the econometric technique for time series analysis that estimates the above equations for Pakistan and analyzes the given reaction by employing the annual data set.

4.4.1.1. Stationarity of the Data

Since, in case of Pakistan, we are taking the annual data set over the period 1972-2010. In order to apply the cointegration analysis over the desired equations mentioned above, it is important to check the stationarity of the data. If the data is stationary or there doesn't exist unit-root, the application of ordinary least square (OLS) method is applicable; otherwise, least square method (without the stationarity of data) gives us spurious regression results {Granger & Newbold, (1974)}. In order to conduct that analysis, we apply two important test of unit-root, i.e. augmented Dickey-Fuller (ADF) test and Phillip-Parron (PP) test.

The basic regression equations (without intercept, with intercept and with intercept and trend) for augmented Dickey-Fuller (ADF) tests are

$$\Delta Z_t = \delta Z_{t-1} + \alpha_i \sum_{i=1}^{m} \Delta Z_{t-i} + \varepsilon_t \qquad (4.3a)$$

$$\Delta Z_t = \beta_1 + \delta Z_{t-1} + \alpha_i \sum_{i=1}^{m} \Delta Z_{t-i} + \varepsilon_t \qquad (4.3b)$$

$$\Delta Z_t = \beta_1 + \beta_2 t + \delta Z_{t-1} + \alpha_i \sum_{i=1}^{m} \Delta Z_{t-i} + \varepsilon_t \qquad (4.3c)$$

Where, ε_t is white noise error-term, Z_t is variable under consideration, $\Delta Z_t = (Z_t - Z_{t-1})$ and $\Delta Z_{t-1} = (Z_{t-1} - Z_{t-2})$ and test the null hypothesis $\delta = 0$ and alternatively. In stationary analysis, Phillip-Perron (PP) captures the possibility of serial correlation in the absence of lagged differences of the regressors.

4.4.1.2. Cointegration

After defining the stationarity of the data for the underling variables, now, we conduct the cointegration or existence of long-run relation among the underling series. If the set of variables under consideration is combination of integrated of same order or one *I(1),* then Johansen cointegration technique is applicable. But in our analysis, the set of variables under consideration is the combination of integrated of order one *I(1)* and order zero *I(0)* that require to apply the autoregressive distributive lag (ARDL) model. However, ARDL technique requires bound testing approach and estimation of normalized long-run coefficients. After that analysis, the estimation of error-correction model will be conducted that give us the short-run estimates of ECM.

4.4.1.3. Bounds Testing Approach

The bounds testing approach to cointegration gives us the existence of long-run relation among the variables or series. In bound testing approach, there are two bounds that is lower and upper bound. The existence of F-calculated above the upper bound implies long-run relation and vice versa. In addition to that, there also exist an conditional error-correction model (CECM) that does not require the unit-root testing procedure and applicable on both integrated of order zero *I(0)* or integrated of order one *I(1)* and mixture of *I(0)& I(1)*, the unrestricted error-correction model (UECM) is written as:

$$\Delta ly_t = \alpha + \sum_{i=0}^{k} \beta_{1i} \Delta ly_{t-i} + \sum_{i=0}^{k} \beta_{2i} \Delta l\,GovtE_{t-i} + \delta_1 ly_{t-1} + \delta_2 lGovtE_{t-1} + \mu_t \qquad (4.4)$$

$$\Delta ly_t = \alpha + \sum_{i=0}^{k} \beta_{1i} \Delta ly_{t-i} + \sum_{i=0}^{k} \beta_{2i} \Delta lHealE_{t-i} + \sum_{i=0}^{k} \beta_{3i} \Delta lDefE_{t-i} + \sum_{i=0}^{k} \beta_{4i} \Delta lEduE_{t-i} + \Phi_1 ly_{t-1} + \Phi_2 lHealE_{t-1} + \Phi_3 lDefE_{t-1} + \Phi_4 lEduE_{t-1} + \nu_t \qquad (4.5)$$

Where, Δ is the first-difference operator. Residuals ν_t and μ_t are assumed to be normally distributed and white noise. In UECM model, we use lagged values of log first-difference dependant variable Δly_t , log first-difference lagged values of independent variables and log first difference dependant and independent variables for short-run and long-run dynamics, respectively. We conduct bounds-testing approach for the presence of long-run relation by applying Wald-coefficient test (F-statistics) or joint significance test on lagged-level variables in equation (4.4) and (4.5).

4.4.1.4. Estimates of Normalized Long-run ARDL Model

After conducting the bounds testing approach or confirming the existence of long-run relation among the underlying series, we estimate normalized long-run ARDL model. The long-run estimates are derived or obtained by the division of cointegration vector multiplied by minus, obtained in the regression of equation (4.4) and (4.5) in previous sub-section.

Autoregressive distributive Lag (ARDL) approach for long-run coefficient can be written as:

$$ly_t = \alpha_1 + \sum_{i=0}^{k} \beta_{1i} \, ly_{t-i} + \sum_{i=0}^{k} \beta_{2i} \, lGovE_{\,t-i} + \mu_{1t} \qquad (4.6)$$

$$ly_t = \alpha_2 + \sum_{i=0}^{k} \beta_{1i} \, ly_{t-i} + \sum_{i=0}^{k} \beta_{2i} \, l\,HealE_{\,t-i} + \sum_{i=0}^{k} \beta_{3i} lDefE_{\,t-i} + \sum_{i=0}^{k} \beta_{4i} \, lEduE_{t-i} + \mu_{2t} \qquad (4.7)$$

The coefficient and variables description have been mentioned above.

4.4.1.5 . Short-run Error Correction Model of ARDL

In order to estimate the short-run coefficient of ARDL model, we develop the short-run error correction model (ECM). In ECM, all short-run estimates of ARDL are regressed along with lagged error-correction term that is just lag of dependant variable and obtained by taking the actual minus estimated error in least square manner. The short-run ECM of equation (4.3) and (4.4) can be written as:

$$\Delta ly_t = \alpha + \sum_{i=0}^{k} \beta_{1i} \, \Delta ly_{t-i} + \sum_{i=0}^{k} \beta_{2i} \, \Delta lGovtE_{\,t-i} + \beta_{3i} \, ECT(-1) + \mu_t \qquad (4.8)$$

$$\begin{aligned} \Delta ly_t = \alpha + \sum_{i=0}^{k} \beta_{1i} \, \Delta ly_{t-i} + \sum_{i=0}^{k} \beta_{2i} \, \Delta lHealE_{\,t-i} + \sum_{i=0}^{k} \beta_{3i} \, \Delta lDefE_{t-i} + \sum_{i=0}^{k} \beta_{4i} \, \Delta lEduE_{t-i} \\ + \beta_{5i} \, ECT(-1) + \nu_t \end{aligned} \qquad (4.9)$$

Where, $ECT(-1)$ is the lagged of error-correction term.

4.4.1.6 . Stability and Diagnostic Test

In order to check the stability of underling estimated model, diagnostic tests such as Ramsey test, Autoregressive Conditional Hetroskedasticity ARCH-LM test, serial correlation test, and White hetroskedasticity test are conducted. In addition to that, CUSUM (cumulative sum of recursive residuals) and CUSUM of square developed by Brown *et al.* (1975) are conducted that check the stability of the model. The stability test takes critical bounds at 5% level of significance. The plots of CUSUM and CUSUM-square within critical bounds indicate that regression equations are correctly specified. And the parameters of the model converge to equilibrium in long-run.

4.4.2. Estimation of Panel Regression Analysis

In order to conduct the panel analysis for selected SAARC countries, we follow the theoretical work of Barro (1990) that empirically estimated by Taban (2010) and also the empirical work of Baldacci *et al.* (2008). The number of methods for panel estimation can be estimated based on equation (4.1) and (4.2) such as Pooled Least Squares (Common Constant Method), Fixed Effect [(i.e., the Least Squares Dummy Variables (LSDV)] and Random Effect Model. Temple (1999) and Baltagi (2001) argue that panel estimators are independent of same technological constraints across countries and they are most appropriate choices for growth regressions, particularly due to independent of same technological constraints across countries. However, the use of panel estimation may involve several important difficulties such as small sample bias, measurement error, endogeneity, and heterogeneity.

In panel least square, the number of different estimators can be used to overcome these problems but each have its own potency and weaknesses. In our estimation and to assess the robustness of the results, we utilize the common constant method, fixed-effect model (LSDV) and random-effect model as our baseline model.

By following the equation (4.1) and (4.2) the general representation of the equation with Pooled Least Squares (Common Constant Method) is written as:

Model A.

$$\Delta \ln Y_{it} = \beta_0 + \beta_1 \Delta \ln GovtExp_{it} + \varepsilon_{it} \qquad (4.10)$$

Model B.

$$\Delta \ln Y_{it} = \beta_0 + \beta_1 \Delta \ln HeaE_{it} + \beta_2 \Delta \ln DefE_{it} + \beta_3 \Delta \ln EduE_{it} + \varepsilon_{it} \qquad (4.11)$$

Where, all variables have been explained already. Since, the common constant method (Pooled LS Method) of estimation depends on the assumption that there is no difference among the data matrices of the cross-sectional dimension (N) i.e. it explains that the data set is priori homogenous. But this method of estimation is quite precautionary that requires the inclusion of fixed and random effects in the method of estimation (see, Asteriou & Hall, 2007).

In order to capture the country specific effects, we develop the FEM (LSDV) and REM of estimation. Where, fixed effect method deal with constant as group specific that allows different constants for each group. While the inclusion of different constants for each group implies the dummy variable procedure. The specific form of fixed effect method (FEM) by incorporating country specific effects is written as:

$$\Delta \ln Y_{it} = \alpha_{it} + \beta_1 \Delta \ln GovtExp_{it} + \varepsilon_{it} \qquad (4.12)$$

$$\Delta \ln Y_{it} = \alpha_{it} + \beta_1 \Delta \ln HeaE_{it} + \beta_2 \Delta \ln DefE_{it} + \beta_3 \Delta \ln EduE_{it} + \varepsilon_{it} \qquad (4.13)$$

Where, α_i is a country effects that also depends on time.

Random effects method treats the constants for each section as random parameters not fixed. Hence, the variability of the constant for each section comes from the fact that:

$$\alpha_i = \alpha + v_i \qquad (4.14)$$

v_i is constant mean and variance.

The specific form of random effect method (REM) with country and time effects is written as:

$$\Delta \ln Y_{it} = \lambda_0 + \beta_1 \Delta \ln GovtExp_{it} + \lambda_i + \phi_t + \varepsilon_{it} \qquad (4.15)$$

$$\Delta \ln Y_{it} = \lambda_0 + \beta_1 \Delta \ln HeaE_{it} + \beta_2 \Delta \ln DefE_{it} + \beta_3 \Delta \ln EduE_{it} + \lambda_i + \phi_t + \varepsilon_{it} \qquad (4.16)$$

Random effect method with only country effects is written as:

$$\Delta \ln Y_{it} = \lambda_0 + \beta_1 \Delta \ln GovtExp_{it} + \lambda_i + \varepsilon_{it} \qquad (4.17)$$

$$\Delta \ln Y_{it} = \lambda_0 + \beta_1 \Delta \ln HeaE_{it} + \beta_2 \Delta \ln DefE_{it} + \beta_3 \Delta \ln EduE_{it} + \lambda_i + \varepsilon_{it} \qquad (4.18)$$

Where, λ_i stand for country specific random elements:

4.4.2.1. Advantages of Random Effect Model (REM)

Random effects model is preferred over fixed effect model due to the fewer parameters for estimation as compared to the fixed effects method and the existence for additional explanatory variables that have equal value for all observations within a group (i.e., it allows using dummies).

4.4.2.2 Hausman Test for Model Specification (Fixed Effects vs Random Effects)

Hausman Statistic may be viewed as distance measure between fixed effect and random effect estimators.

Where, Ho is that Random Effects are consistent and efficient.

Versus H1 ,that random effects are inconsistent

The Hausman test uses the following test statistic:

$$H = (\hat{\beta}^{FE} - \hat{\beta}^{RE})'[Var(\hat{\beta}^{FE}) - Var(\hat{\beta}^{RE})]^{-1}(\hat{\beta}^{FE} - \hat{\beta}^{RE})......x^{2(k)}$$

The large value of the Hausman statistics implies that the Random Effects are more appropriate or LSDV estimator is inconsistent.

CHAPTER # 5

ESTIMATION RESULTS AND INTERPRETATIONS

5.1. INTRODUCTION

The issue of nexus of public expenditure and economic growth is under consideration in our analysis and also appraise by employing both the yearly data set for Pakistan and cross-section data set for selected SAARC countries.

This chapter reports the empirical results and interpretations of both types of econometric models i.e. time series models and panel estimates models. In first section of this chapter, we elucidate the results of time series model, while the second one discuss panel estimation model.

5.2. Results and Discussion

This section reports and explains the results of estimated models for Pakistan and selected SAARC countries. After mentioning the results of unit-root tests for time series analysis, we will interpret the results of autoregressive distributive lag model (ARDL) to cointegration along with error-correction short-run mechanism and long-run estimates. On the other hand, for SAARC countries analysis, we have applied the panel analysis i.e. Panel least square, Random effect model and Fixed effect model. The results based on both econometric approaches are explained in detail in the given sub-section.

5.2.1. Interpretation of Time Series Models

The sub-section explains the results and interpretation of time series models, in which dependant variable is growth rate of real gross domestic product (GDP) and independent variable is real government spending as indicated above in equation (4.13).

5.2.1.1. Unit-root Test

This sub-section explains the results of unit-root test that is performed by applying the two tests of stationarity i.e Augmented Dickey-Fuller (ADF) and Phillip-Parron (PP) tests. We have already discussed about the conceptual framework and estimation methodology of this test in last chapter. The results of both tests Augmented Dickey-Fuller (ADF) and Phillip-Parron (PP) test are explained in Table 5.1 and 5.2. We have applied logarithm on all of the variables and also put constant or constant & trend to check stationarity, wherever it is significant.

Real gross domestic product per capita (GDPP) is stationary at level having neither intercept nor trend term as it rejects the null hypothesis of non-stationary at one percent level of significance. Government expenditure is non-stationary at level; however it becomes stationary at first difference.

Expenditure on defense is significant at 5% percent level of significance. It is integrated of order one *I(1)*. Spending on development sector such as health and education is integrated of order one *I(1)* having significant constant term. Both spending is significant at one percent level of significance.

Table 5.1: Results of Unit Root Test (Augmented Dickey-Fuller Test: ADF)

Variables	Constant/ Constant &Trend	Level	Ist-difference	Order of Integration
Growth GDPPC	Constant	-4.33***	-8.56***	*I (0)*
lnGE	Constant &Trend	-2.92	-5.18***	*I (1)*
lnDefE	Constant	-2.03	-9.10**	*I (1)*
lnHeaE	Constant	-2.08	-5.73***	*I (1)*
lnEduE	Constant	-2.25	-5.46***	*I (1)*

Note: *, **, *** indicate the rejection of null hypothesis of unit-root at 10%, 5% and 1% level of significance, respectively. 9 lags (length) are used in Akaike Information Criteria.

Table (5.2) explains the results of Phillip-Parron (PP) test that have almost similar to that of ADF test. Growth rate of gross domestic product per capita GDPPC is integrated of order zero *I(0)* as it reject the null-hypothesis of non-stationary at one percent level of significance. Total government spending, health, defense and education spending accept the null hypothesis of non-stationary at order zero but reject it at one percent level of significance. In spite of this, defense spending is significant at 5% level same as appear in case of ADF test.

The analysis based on above tests indicates that the order of integration of underling series is different i.e. it is combination of order one *I(1)* and zero *I(0) integration*. Since, it is clear that our analysis doesn't require the application of Johanson cointegration rather it requires to conduct the autoregressive distributive lag (ARDL) approach both for the existence of long-run relation and short-run error-correction model. The given framework is conducted and reported below.

Table 5.2: Results of Unit Root Test (Phillip-Parron Test: PP)

Variables	Constant/ Constant &Trend	Level	Ist-difference	Order of Integration
Growth GDPPC	Constant	-4.32***	-9.00***	*I (0)*
lnGE	Constant & Trend	-2.92	-5.18***	*I (1)*
lnDefE	Constant	-2.90	-11.01**	*I (1)*
lnHeaE	Constant	-2.92	-5.07***	*I (1)*
lnEduE	Constant	-2.25	-5.49***	*I (1)*

Note: *, **, *** indicate the rejection of null hypothesis of unit-root at 10%, 5% and 1% level of significance, respectively.

5.2.1.2. Model 1:

In this sub-section, we report and interpret the results of model 1 in which our dependant variable is growth rate of GDPPC and independent variable is total government spending on all sectors including both development and non-development side. For the estimation of time series econometric model, we apply autoregressive distributive lag (ARDL) model with two lags. Standard lag length criteria are followed by using the Akaike information criteria and Schwarz Byesian criteria[3]. The results of estimated model in which we use both the variables including lags and general to specific rule for the exclusion of less significant or insignificant variables.

The overall model is explained by R-squared that is 0.52, mentioning that 52% variation is explained in determining the growth rate of real per capita GDP. The value of Durbin-Watson statistics strongly specifies the absence of autocorrelation at any order. However, Akaike information criteria and Schawarz Beysain criteria capture well to the

[3] The results of lag length criteria are reported in Appendix 1.

information. The cointegration term defined as the first lag of Gross Domestic Product

Table 5.3: Time Series Model 1:

Dependant Variable	Growth rate of GDP			
Variable	**Coefficient**	**Standard Errors**	**t-Statistics**	**Probability**
d(lnGE(-2))	-0.188295**	0.096387	-1.953529	0.0595
GDP(-1)	-0.727464***	0.159583	-4.558529	0.0001
lnGE(-1)	0.007485***	0.002717	2.754781	0.0096
@trend	-0.000577	0.000461	-1.252722	0.2194
R^2	0.522360		**AIC**	-5.265957
D-W stat	1.912531		**SBC**	-4.743497

Note: ***, **,* denote the significance level at 1%, 5% and 10% level of significance, respectively. R^2, D-W Stat, AIC, SBC stands for R-square, Durbin-Watson Stat, Akaike information Criteria, and Schwarz Bayesian Criteria.

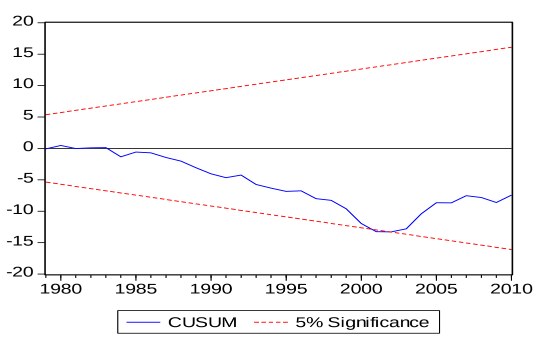
(GDP) is significant at one percent level of significance having coefficient value -0.72. It indicates that in long-run variable converge to their equilibrium path. In spite of that, long and short-run variables have significant value.

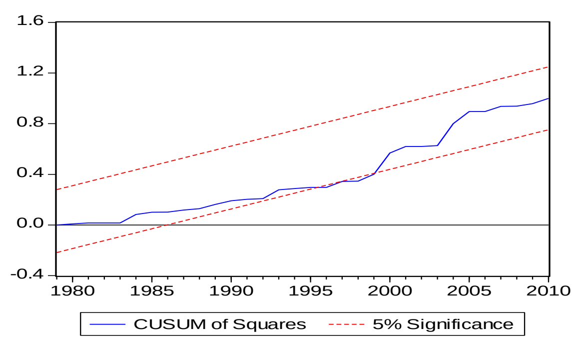
The diagnostic and stability tests of model 1 are also conducted that is reported below in table (5.4). These are hetroskedasticity test, normality test, serial correlation, autoregressive conditional hetroskedasticity (ARCH) test and functional-form misspecification (Ramsey Regression Specification Error Test). We check the relationship between real GDPPC to government spending on all sectors. We validate the normality of the equation through Jeque-Bera statistics that takes non-normal errors

Table 5.4: Diagnostic and Stability Test (Model 1):

	F-Statistics	Probability
χ^2_{NORM}	0.307664	0.857416
χ^2_{WHITE}	0.575668	0.788558
χ^2_{RAMSEY}	1.310502	0.261066
χ^2_{ARCH}	0.037917	0.846803
$\chi^2_{SerialCorr}$	0.630960	0.538994

Note: For normality test, we report Jeque-Bera statistics. χ^2_{NORM} , χ^2_{WHITE} , χ^2_{RAMSEY} , χ^2_{ARCH} , $\chi^2_{SerialCorr}$ are non-normal errors normality test, white hetroskedasticity test, Ramsey Regression Specification Error Test, and Auto regressive Conditional Hetroskedasticity (ARCH Test), Serial correlation Lagrange Multiplier Test (LM-type Breusch-Godfrey-Test). These statistics are distributed as Chi-square values and explain the degree of freedom at last column.





0.30 values along with probability value 0.85. It strongly support to the presence of normal distribution. In the mean while, the value of hetroskedasticity is 0.57 that supports to the absence of hetroskedasticity across the terms. There is no evidence of serial autocorrelation and Autoregressive conditional hetroskedasticity (ARCH) in the given model. In addition, Ramsey test strongly favor to the stability of parameters long with probability value 0.26.

After conducting the diagnostic and stability test, we plot the CUSUM and CUSUM-square statistics of estimated equation (4.4) are almost in critical bounds. In addition, they do not diverge from that critical region and prove the stability of coefficient of the estimated model. The given analysis also indicates the stability of long and short-run estimates of the model and convergence towards equilibrium.

The further step of ARDL requires the presence of long-run relation among the underlying series by the application of Bounds testing approach. It requires the restriction of all long-run coefficients with the equality of zero. Basically, it is Wald-coefficient test in econometrics that is used in bound testing approach. Table 5.5 explains the result of Wald-coefficient test that have the value of F-statistics 7.58 along with the probability value 0.0096. In short, it lies above the upper bound and mentions the rejection of null-hypothesis of no-cointegration at zero percent level of significance. It strongly validates the existence of long-run relation among the series.

Table 5.5: Bounds testing Approach (Model 1):

	F-statistics	**Probability**
	7.588820***	0.0096
Critical values of F-statistics		
Significant Level	**Lower *I(0)***	**Upper *I(1)***
1%	3.50	4.63
2.5%	3.11	4.13
5%	2.81	3.76
10%	2.49	3.38

Source: Pesaran *et.al* (2001).

Note: *** denotes the significance at 1% level of significance and rejection of null-hypothesis of no cointegration.

The application of bound testing approach is apparent above. Now, we derive or explain the long-run normalized coefficients of ARDL model that are derived by normalization process. In this process, the cointegration vector term along with minus is divided by all long-run explanatory variables. The derived/calculating value is shown in table 5.6 below.

Table 5.6: Time Series Normalized Long-run Estimates of ARDL Model 1:

Regressors	Coefficients
lnGE(-1)	0.010289***

Note: ***denote the significance level at 1% level of significance.

The result of normalized long-run coefficient is mentioned above. The dependant variable is growth rate of GDPPC, while the independent variable is total government spending in logarithm form. It has coefficient value 0.010, mentioning that one percentage increase in government expenditure may lead to 0.10 percentage point growth rate of GDPPC. It is positive and highly significant at one percent level of significance. The higher government spending on all sectors induces more new plans, generate employment, mega projects, and more private investment. This great effect may dominate in a country like Pakistan where such break through always have been effective and dominant that's why result has shown higher growth rate of GDPPC in long-run.

The result of short-run error correction model is explained below in table 5.7. We include only the significant variable in our estimation along with error-correction and trend term. The overall specification of the model is good as explained by R-squared. The value of Durbin-Watson stat mentions the absence of autocorrelation at any order. The error-correction term is cointegration vector and significant at one percent level of significant along with negative value as -0.72. It shows the speed of convergence in which short-run variable move toward their equilibrium value in long-run. However, the speed of convergence is fast and explains that change in government spending is corrected by 72% each year.

Table 5.7: Short-run Error Correction Estimates (Model 1):

Variable	Coefficient	Standard Errors	t-Statistics	Probability
d(lnGE(-2)	-0.133923*	0.070752	-1.892848	0.0672
ECM(-1)	-0.727727***	0.158850	-4.581230	0.0001
@*trend*	-0.000251	0.000243	-1.031857	0.3096
R^2	0.509769		**AIC**	-4.836660
D-W Stat	1.885290		**SBC**	-4.704700

Note: *, *** denotes the significance level at 10% and 1% level of significance, respectively. R^2, D-W Stat, AIC, SBC stand for R-Squared, Durbin-Watson Stat, Akaike information Criteria, and Schwarz Bayesian Criteria.

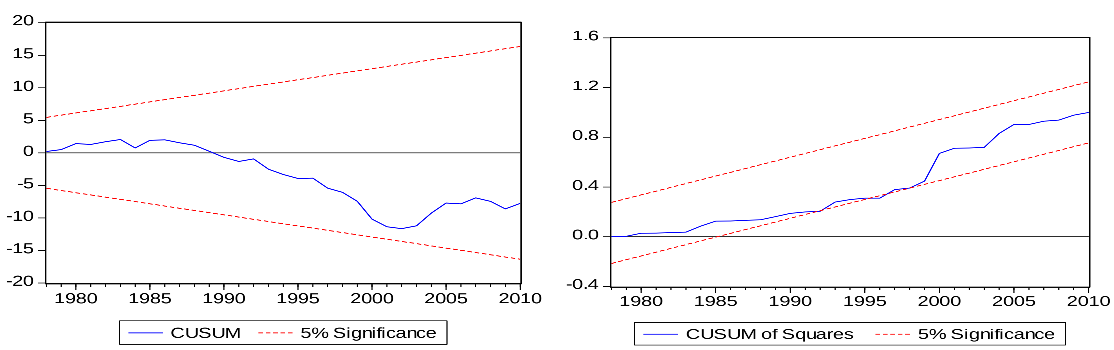
The results of short-run ECM show that government expenditure is negative and statistically significant. Its coefficient value is -0.13, mentioning that one percent increase in government spending in short-run may decrease the growth rate of GDP by 0.13 percentage point. Government may finance its growing expenditure through taxes or borrowing or both. Taxes in turn reduce income and aggregate demand and increased borrowing will crowd-out private sector, thus private investment will fall.

Table (5.8) explains the results of diagnostic and stability test of short-run error correction estimates. All diagnostic and stability test mentioned below are according to the desirable level and don’t induce any misspecification in any sense.

Table 5.8: Diagnostic and Stability Test of Short-run Error Correction (Model 1):

	F-Statistics	Probability
χ^2_{NORM}	0.632212	0.728982
χ^2_{WHITE}	0.533256	0.778436
χ^2_{RAMSEY}	0.970793	0.331874
$\chi^2_{ARCH-LM}$	0.061230	0.806096
$\chi^2_{SerialCorr}$	1.26910	0.295883

Note: For normality test, we report Jeque-Bera statistics. χ^2_{NORM} , χ^2_{WHITE} , χ^2_{RAMSEY} , χ^2_{ARCH} , $\chi^2_{SerialCorr}$ are non-normal errors normality test, white hetroskedasticity test, Ramsey Regression Specification Error Test, and Auto regressive Conditional Hetroskedasticity (ARCH Test), Serial correlation Lagrange Multiplier Test (LM-type Breusch-Godfrey-Test). These statistics are distributed as Chi-square values and capture degree of freedom on first-right column.



The graphs based on CUSUM and CUSUM-square is in critical bounds. They represent that short-run coefficients capture both the stability and convergence. Both of the graphs also mention that government spending and growth rate of output may converge to their mean value in short-run.

5.2.1.3. Model 2:

This sub-section present the results of model 2 in which dependant variable is growth rate of GDP and independent variables are government spending on health, defense and education. After analyzing the stationarity of the variables that is the combination integration of order zero and one. The results of model 2 based on equations (4.5) are reported in table 5.9. It shows that lag of dependant variable is negative and statistically significant, strongly support to the evidence of cointegration among all variables. Results of R-squared and Durbin-Watson statistics are all closed to the desirable level. All variables are statistically significance except the defense spending that is insignificant in

Table 5.9: Time Series Model 2:

Dependant Variable	Growth rate of GDP			
Variable	**Coefficient**	**Standard Errors**	**t-Statistics**	**Probability**
$d(lnDefE)_t$	-0.027893	0.033839	-0.824304	0.4167
d(lnEduE)t	-0.093011*	0.053384	-1.742297	0.0924
d(lnHeaE)t	-0.0115548*	0.064136	-1.801618	0.0824
GDP(-1)	-0.765700***	0.195487	-3.916878	0.0005
lnDefE(-1)	-0.002625	0.028851	-0.090982	0.9282
lnEduE(-1)	-0.116558***	0.045597	-2.556235	0.0163
lnHeaE(-1)	0.173486**	0.085957	2.018276	0.0532
@trend	-0.005250**	0.002398	-2.189642	0.0370
R^2	0.528527		**AIC**	-4.767048
D-W stat	2.212743		**SBC**	-4.375203

Note: ***, **,* denote the significance level at 1%, 5% and 10% level of significance, respectively. R^2, D-W Stat, AIC, SBC stands for R-square, Durbin-Watson Stat, Akaike information Criteria, and Schwarz Bayesian Criteria.

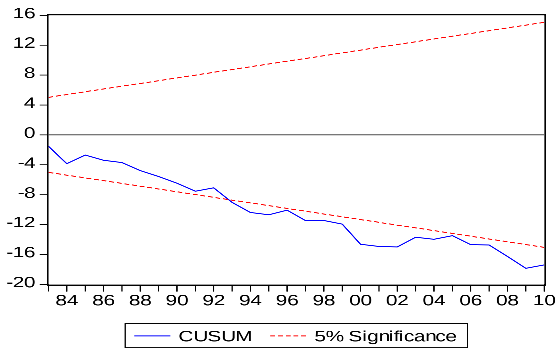
both long and short-run form. However, the information criteria captured by AIC and SBC are well defined.

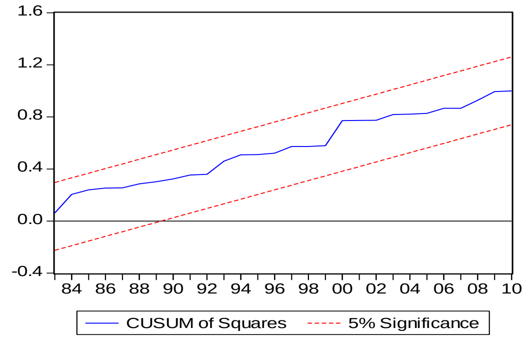
The diagnostic and stability tests of equation (4.5) of model 2 are reported in table 5.10. The results support that normality test support to the evidence of normality in the equation. All others tests such as white hetroskedasticity, Ramsey test, ARCH, and Serial correlation test buttress to evidence that there is no problem in our estimated equation. The plot of CUSUM is also plotted that shows that variable may move towards divergence in long-run. So, the macroeconomic policies should be changed for convergence. However, the plot of CUSUM-square is in critical reign, support to the convergence.

Table 5.10: Diagnostic and Stability Test (Model 2):

	F-Statistics	**Probability**
χ^2_{NORM}	0.134685	0.934875
χ^2_{WHITE}	0.800080	0.679446
χ^2_{RAMSEY}	0.561827	0.460006
χ^2_{ARCH}	0.812802	0.373636
$\chi^2_{SerialCorr}$	1.727442	0.197519

Note: For normality test, we report Jeque-Bera statistics. χ^2_{NORM} , χ^2_{WHITE} , χ^2_{RAMSEY} , χ^2_{ARCH} , $\chi^2_{SerialCorr}$ are non-normal errors normality test, white hetroskedasticity test, Ramsey Regression Specification Error Test, and Auto regressive Conditional Hetroskedasticity (ARCH Test), Serial correlation Lagrange Multiplier Test (LM-type Breusch-Godfrey-Test). These statistics are distributed as Chi-square values and explain the degree of freedom at last column.





In order to check the existence of long-run relation among the underlying series, we conduct the bounds-testing approach to cointegration. The results of that approach are reported in table (5.11) with the different critical values at different level of significance. We apply the restriction on all long-run coefficients that they all are absent from the equation/model. The calculate value of F-statist is 3.81 with the probability value 0.02 that is significant at 5 % level of significance. It supports the evidence that there is cointegration among the underling variables in long-run.

Table 5.11: Bounds testing Approach (Model 2):

	F-statistics	**Probability**
	3.819964**	0.0206
Critical values of F-statistics		
Significant Level	**Lower *I(0)***	**Upper *I(1)***
1%	3.50	4.63
2.5%	3.11	4.13
5%	2.81	3.76
10%	2.49	3.38

Source: Pesaran *et al.* (2001).

Note: ** denotes the significance at 5% level of significance and rejection of null-hypothesis of no cointegration.

After evaluating the cointegration among the long-run variables, we derive the long-run normalized coefficient of ARDL model 2. The results are mentioned in table 5.12 below. It is already mentioned that dependant variable is growth rate of GDP and independent variables are government spending on different sectors i.e. health, educational and defense. Again the model is estimated in log form; the defense spending is negatively related with the growth rate of GDP but is statistically insignificant. The sign of health spending is positive and statistically significant at 5% level. It explains that if government spending on health increases by one percentage point, growth rate of GDP increases 0.22 percentage points each year. These results are strongly supported by the previous studio and theoretical literature. Higher spending on health improves health condition of a country which escort to longer life expectancy, shifts labor supply curve outward, raise labor productivity, and enhance the productivity of investment in other types of human capital.

The results given below shows that log of education spending is negative and highly significant at one percent level of significance. It shows that one percent increase in education expenditure may result in 0.15 percentage point reduction in growth rate of GDP in long-run. This may be due to the fact that large fraction of this investment in Pakistan gone into quantitative expansion other than qualitative improvement. One more reason can be poor governance as shown by Baldaaci and others (2003). The positive effect of increased spending on education is reduced in a country suffering from poor governance.

Similarly continuous emigration of professionals (from Pakistan to more industrialized nations) called Brian drain is thought to be an obstacle in its long-term economic growth.

Large numbers of people are working outside the Pakistan after finishing their studies. Hence government bears their cost of production while other countries take benefit of this investment. Thousands of highly qualified doctors, engineers and scientists are said to move abroad, the clearest effect being an overall loss of skilled human resources. Our results are in line with Baldaaci *et al.* (2004), Dastidar (2006), Nurudeen and Usman (2010), Adebiyi (2010).

Table 5.12: Time Series Normalized Long-run Estimates of ARDL Model 2:

Regressors	Coefficients
lnDefE(-1)	-0.0034
lnEduE(-1)	-0.1522***
lnHeaE(-1)	0.2265**

Note: ***, **denote the significance level at 1% and 5% level of significance.

The results of short-run ECM of model 2 are reported in table 5.13 below. The cointegration vector i.e. Error correction term is negative and statistically significant at one percent level of significance. Its value is -0.79, evaluating that speed of convergence is high and variables move towards their long-run equilibrium. The overall specification of the model is good as measured by R-squared. The value of Durbin-Watson stat is also close to the desirable level. We also include the trend term in our estimated model that is also significant.

The results also show that defense spending is negatively related with the growth rate of GDP similar to long-run estimates but it is statistically insignificant. It indicates that in the given scenario, defense spending has no any significant effect on the growth rate of GDP. The health spending is negatively related with the growth rate of GDP, mentioning that one percent increase in health expenditure may lead to 0.08 percentage point reduction in growth rate of GDP. The sign of education spending is also negative and significant, mentioning that one percentage increase in education spending may lead to the reduction in 0.08 growth rate of GDP.

Table 5.13: Short-run Error Correction Estimates (Model 2):

Variable	**Coefficient**	**Standard Errors**	**t-Statistics**	**Probability**
$d(lnDefE)_t$	-0.020245	0.027226	-0.743597	04627
$d(lnEduE)_t$	-0.083505*	0.048096	-1.736220	0.0925
d(lnHeaE(-1))	-0.088946*	0.050951	-1.745694	0.0908
ECM	-0.796226***	0.175591	-4.534544	0.0001
@trend	-0.004089***	0.000938	-4.358704	0.0001
$\mathbf{R^2}$	0.515587		**AIC**	-4.902134
D-W Stat	2.109780		**SBC**	-4.640904

Note: *, *** denotes the significance level at 10% and 1% level of significance, respectively. R^2, D-W Stat, AIC, SBC stand for R-Squared, Durbin-Watson Stat, Akaike information Criteria, and Schwarz Bayesian Criteria.

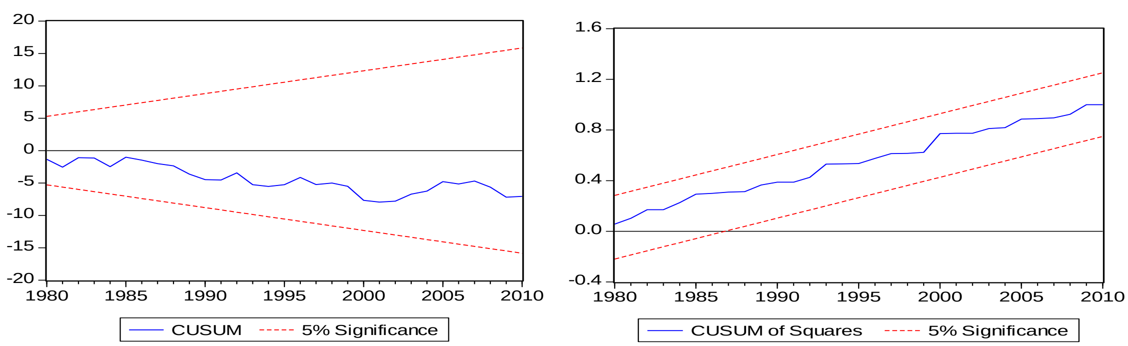
The results are not surprising because the funds intended for education sector may not be properly utilized. Poor governance has also strong adverse impact on public spending in social sector. Reducing corruption and growing accountability for public spending are not less essential than increasing spending.

Table (5.14) reports the results of diagnostic and stability test of short-run ECM of model 2. All diagnostic tests are desirable and evaluate none of the problems. The value of Ramsey test, ARCH-LM, White hetroskedasticity and Normality tests are according to the desirable level. The plots of CUSUM and CUSUM-square are also in critical region, support to the convergence of short-run ECM.

Table 5.14: Diagnostic and Stability Test of Short-run Error Correction (Model 2):

	F-Statistics	Probability
χ^2_{NORM}	0.059225	0.970822
χ^2_{WHITE}	0.567897	0.846073
χ^2_{RAMSEY}	0.077186	0.783053
$\chi^2_{ARCH-LM}$	1.027426	0.317923
$\chi^2_{SerialCorr}$	0.536703	0.590368

Note: For normality test, we report Jeque-Bera statistics. χ^2_{NORM}, χ^2_{WHITE}, χ^2_{RAMSEY}, χ^2_{ARCH}, $\chi^2_{SerialCorr}$ are non-normal errors normality test, white hetroskedasticity test, Ramsey Regression Specification Error Test, and Auto regressive Conditional Hetroskedasticity (ARCH Test), Serial correlation Lagrange Multiplier Test (LM-type Breusch-Godfrey-Test). These statistics are distributed as Chi-square values and capture degree of freedom on first-right column.



5.2.2. Interpretation of Panel Estimation Models

This part of the research presents and interprets the estimates of panel models. We estimate all models defined above by applying the panel least square, random effect model and fixed effect model on selected SAARC countries namely, Pakistan, India, Bangladesh, Sri-lanka, Nepal, and Maldives. We have defined all methodological steps of given analysis in detail in last chapter.

5.2.2.1. Model A

This sub-section presents the results of Model A as mentioned by equation (4.10), in which dependant variable is growth rate of GDP and independent variable is total government spending. We report the results of panel least square, fixed effect model and random effect model in table 5.15. The diagnostic tests for all of the three models are performed such as value of R-square varies in all of the models but satisfy to the standard level. In pooled least square, we apply the autoregressive of order two that remove the problem of autocorrelation in our data set and make the estimated value of D-W stat as desired. The overall specification of the model is explained by F-stat that is also to the desirable level in all of the form of panel.

The interpretation of coefficients of government spending is defined here. The value of the coefficient of government spending in pooled least square is 2.66, statistically significant at one percent level of significance. It mentions that according to least square results, one unit increase in total government outlays may lead to the increase in growth rate of GDP by 2.66 units. However, in the given set of countries, this effect is somewhat strong which mention that higher government spending induce more new plans, more projects and overwhelming employment opportunities. High employment may have more output in given time period that may result in high growth rate of GDP.

Table 5.15: Panel Results of Model A:

Dependent Variable:	Growth rate of GDP		
Variables	**Pooled LS**	**Fixed Effect**	**Random Effect**
C	5.117*** (14.61)		5.144*** (16.39)
$(GE)_{it}$	2.66*** (2.688)	3.30*** (2.395)	2.41*** (2.854)
Diagnostic Tests			
S	0.134	0.1974	0.06
D-W stat	2.114	2.136	1.81
F-stat	2.348**	4.88***	8.212***
Prob.(F-stat)	0.028	0.000	0.004

Note: R^2, D-W stat, F-stat and Prob. (F-stat) stand for R-squared, Durbin-Watson stat, F-statistic and probability of F-statistic, respectively. Parenthesis show t-values, *, **, *** show 0.01, 0.05 and 0.10 level of significance.

The result of fixed effect model is also evident, where coefficient value of government outlays is 3.30, statistically significant at one percent level of significance. It recommends that one unit increase in government spending may increase the growth rate of GDP 3.30 point in given time period for selected SAARC countries. In fixed effect model, we have different constant for each group. This induce that it is a group specific in which the increase in total government spending may increase the growth rate of GDP.

In random effect model, the sign of coefficient of government spending is same positive. It has coefficient value 2.41 that is statistically significant at one percent level of significance. It explains that one unit increase in government spending may increase the growth rate of output by 2.41 units. The higher government outlays increases the opportunities of major plans and projects. It induces more investment in development sector that may buttress to the high growth rate for given set of countries. In all of the three models, the size and sign of government spending in effecting the growth rate of output is almost same. All shows significant effect in promoting the growth of the economies of selected SAARC countries.

After evaluating the coefficient value of government spending in the presence of all three models, there is need to conduct the Hausman test for model specification[4]. In this test, we check the validity of random and fixed model. The value of Chi-square along with probability value is reported in table 5.16. The value of Chi-square is 0.006 having the probability value 0.937 that support fixed effect model.

Table 5.16: Hausman Test for Model Specification (Random vs. Fixed) (Model A):

Statistic	P-value
χ^2 = 0.006	0.937

Note: P-value and χ^2 are the probability value and Chi-square, respectively.

5.2.2.2. Model B.

This sub-section presents the results of panel analysis of the model B as explained by equation (4.13). In this model, the dependant variable is growth rate of GDP and independent variables are government spending on health, education and defense. We report the results of selected SAARC countries namely, Pakistan, India, Bangladesh, Nepal, Maldives and Sri-lanka based on the pooled LS, random and fixed effect model in table 5.17.

[4] The methodological set up about that test has been presented in chapter 4 in detail.

The results of Model B are presented above based on all of the estimated models. The diagnostic test of all the models explains that overall specification of the model as mentioned by R-squared is satisfactory. The value of Durbin-Watson stat indicates the absence of autocorrelation at any order. In pooled least square model, we apply the trend along with autoregressive of order one in order to remove the problem of autocorrelation.

The results of Model B evaluates that defense spending is significant and negatively related with growth rate of GDP in pooled, fixed and random analysis. However, the coefficient value of pooled least square is -2.77, significant at one percent level of significant. In least square framework, one unit increase in defense spending in given SAARC countries may lead to 2.77 units decrease in growth rate of GDP. Military expenditure absorbs significant proportion of limited financial resources. Defense expenditure averts resources away from productive activities and leave adverse impact on economic growth. Devoting a large proportion of government expenditure to military would leave other productive sectors like education, health and infrastructure with fewer financial resources. Its sign and significance is almost same in all form of pooled models.

Health spending is statistically significant and positive related with the growth rate of GDP in both pooled least square and random effect model with the coefficient values, 0.988 and 0.945 respectively. However, it is negatively related with the GDP in fixed effect form but it is statistically insignificant, mentioning that it has no effect on growth rate of GDP. In random form, it mentions that one unit increase in health spending in selected SAARC countries may lead to the 0.94 units increase in growth rate of GDP.

Table 5.17: Panel Results of Model B:

Dependent Variable:	**Growth rate of GDP**		
Variables	**Pooled OLS**	**Fixed Effect**	**Random Effect**
C	6.412*** (4.304)		6.890*** (4.211)
$(DefE)_{it}$	-2.772*** (-2.441)	-5.184** (-2.031)	-2.019*** (-1.790)
$(EduE)_{it}$	0.899 (0.664)	4.559 (1.603)	0.0446 (0.0324)
$(HeaE)_{it}$	0.988*** (2.373)	-3.383 (-1.263)	0.9453** (2.055)
Diagnostic Tests			
R^2	0.311	0.272	0.258
D-W Stat	2.171	2.194	2.288
F-stat	3.130***	2.597*	4.493***
Prob.(F-stat)	0.000	0.002	0.000

Note: R^2, D-W stat, F-stat and Prob. (F-stat) stand for R-squared, Durbin-Watson stat, F-statistic and probability of F-statistic, respectively. Parenthesis show t-values, *, **, *** show 0.01, 0.05 and 0.10 level of significance.

Education spending is positively related with the output level for selected SAARC countries in all forms of pooled analysis. Its unit value varies in the range of 0.04 to 4.55. But it is statistically insignificant in all forms of estimation, mentioning that it has no impact on the growth rate of GDP in the given analysis.

In the last we checked the validity of random or fixed effect model i.e. model specification. For this we applied Hausman Test. The econometric application of this test has been explained in chapter 4. However, its results are reported in table 5.18 below. The value of Chi-square is 0.000 with the probability value 1.000 which rejects null hypothesis and accept that fixed effect model results are better than random effect model.

Table 5.18: Hausman Test for Model Specification (Random vs Fixed) (Model B):

Statistic	P-value
χ^2 = -1.36	0.928

Note: P-value and χ^2 are the probability value and Chi-square, respectively.

Chapter # 6

SUMMARY AND CONCLUSIONS

For empirical and theoretical convince, we regress two equations, one in which dependant variable is gross domestic product (GDP) and independent variable is total government outlays and in other, the same dependant variable is regressed with government spending on different sectors i.e. education, health and defense.

For Pakistan in time series framework, the results of ARDL model evaluates that government spending is positively related with the economic growth in long-run. While this sign disappear in short-run and increase in government expenditure reduces the growth rate of GDP. In the mean while, the government spending on different sectors, i.e. education, health and defense explain that in long-run health care spending is positively related with the economic growth while negatively related in short-run. The education spending is negative and significant factor to reduce the growth rate of GDP in both period of time. In addition to that, defense spending is another factor that reduces the economic growth in both periods of time but it has been insignificant.

As far as results of SAARC countries are concerned. The data from selected SAARC countries, namely Pakistan, Sri-lanka, India, Bangladesh, Nepal and Maldives are used in our analysis. Model A that has dependant variable, growth rate of GDP and independent variable total government outlays explains that all forms of panel analysis such as pooled least square, fixed effect and random effect model have similar results. For the given set of countries, government spending is significantly and positively related with the growth rate of GDP. Its value in all of the models varies in the range of 2.41 to 3.30 units. In addition to that, Hausman test indicates that fixed effect model is preferred over random effect model.

In second model where independent variables are spending on health, education and defense indicate that defense expenditure is negatively related with the growth rate of GDP. Education spending is linked to enhance the growth process for selected SAARC countries but it has been insignificant in all forms of estimation of panel analysis. The sign of health spending is positive related in two out of three forms of panel analysis. Moreover, it has negative coefficient value in fixed effect model but insignificantly related to economic growth. The results of model specification strongly vote to the preference of fixed effect model.

6.1 Policy Recommendation

Public expenditure has significant role in promoting economic growth. Government should give proper attention both to the composition and to the allocation of the budget. Education expenditure has negative impact on growth which can have the economic rational that educated labor force in power is engaged in rent seeking activities instead of growth oriented activities further more there is unemployment and brain drain of skilled labor force.

Government of Pakistan should check these issues and create more employment opportunities and offer attractive packages so that skilled labor can stay and serve their homeland happily. Instead of only quantitative expansion of education expenditure, there must be qualitative enhancement as well. There must be accounting for transparent allocation of resources. Government of the prescribed countries should increase health expenditure. There should be some collaborative policy among SAARC countries, so that they can reduce their defense expenditure which influences growth negatively.

REFERNCES:

Abdullah, H.,Habibullah, Muzafar S., Baharumshah Zubaidi A*.,* (2009), "The effect of fiscal variables on Economic growth in Asian economies: A Dynamic Panel data analysis" *International Journal of Business and Management*, Vol.4, No.1.

Adebiyi, Michael A., (2005), "Education-Economic Growth Paradox in Nigeria: An Autoregressive Model", *International Conference on Shared Growth in Africa by ISSER/Cornell University/World Bank/DFID*

Adedeji, Rasheed A.S. and M. Morrison, Eds., (1998), "The Human Dimension Africa's Persist Economic Crisis", *United Nations Economic Commission for Africa*. Hans Zell Publisher, pp. 377-391.

Angelopoulos, K., Malley, J., Philippopoulos, A., (2007), "Public education expenditure, Growth and Welfare" cesifo economic studies, University of Glasgow

Akram, N., Padda, H.I., and Khan, M., (2008), "The Long Term Impact of Health on Economic Growth in Pakistan", *The Pakistan Development Reviews,* Vol.47, No.4, pp.487-500.

Alam, S., Sultana, A., Butt. M.S., (2010),"Does Social Expenditures Promote Economic Growth? " *European journal of social sciences,* Volume 14, Number 1, pp 44-54.

Al-Yousif, Y.K, (2008), "Education Expenditure and Economic Growth: Some Empirical Evidence from the GCC Countries", *The Journal of Developing Areas,* Vol. 42, pp. 69-80

AL-Jarrah, A.M., (2005), "Defense spending and Economic Growth in an oil-rich country, the case of Saudi Arabia", *Pakistan Economic and Social Review*, Vol. XLIII, No. 2, pp. 151-166

Albatel (2000), “The Relationship Between Government Expenditure and Economic Growth in Saudi Arabia”, Journal of King Saud University, Administrative Sciences: 12 (2); 173-191

Barro, R., (1999), “Notes on growth accounting”, *Journal of Economic Growth”*, Vol. 4, No.2, pp. 119-137.

Bédia, F. A., Dumont, J.C., (2008), “Health, Education and Economic Growth: Testing for Long Run Relationships and Causal Links in United States”, *Applied Econometrics and International Development*, Vol.8, No.2, pp.101-110.

Beraldo. S, Montolio .D and Turati.G (2009) “Healthy, Educated and Wealthy: A Primer on the Impact of Private and Public Welfare Expenditures on Economic Growth” *The journal of socio- Economic*, Vol. 38, pp. 946-956

Belgrave, A., Craigwell, R., (1995), “The Impact of Government Expenditure on Economic Growth in Barbados, A Disaggregated Approach”, *Research department central bank of Barbados*, pp. 1-14.

Bloom, David E., Canning, D., and Sevilla, J., (2004), "The Effect of Health on Economic Growth: A Production Function Approach", *World Development*, Vol.32, No.1, pp. 1–13.

Bukenya, J. (2009) “Do Fluctuations in Health Expenditure affect Economic Growth?” *The Open Economics Journal*, Vol. 2, pp. 31-38

Baldaaci, E., Celement,B., Gupta, S., and Cui, Q. (2004),”Social spending, human capital and growth in developing countries: implication for achieving MDGs” International monetary fund, WP/04/217

Blankenau, Simpson and Tomaljonvich(2007), "Public education expenditure, taxation and growth: Linking data to theory" American economic review, Vol.97, No.2

Chandra. A, (2010), "Does Government Expenditure on Education Promote Economic Growth" *Jamia Millia Islamia (central university) New Delhi*, MPRA Paper No. 25480.

Cronovich (1998), "Measuring the human capital intensity of government spending and its impact on economic growth in a cross section of countries" *Scottish Journal of Political Economy,* Vol.45, No.1

Dilrukshini (2004), "Public expenditure and economic growth in Sri lanka: cointegration analysis and causality testing" Srilanka journal online, Vol.34, No.1$2

Gupta, S., Verhoeven, M., and Tiongson, R.E., (2002), "The Effectiveness of Government Spending on Education and Health care in Developing and Transition Economies", *European Journal of Political Economy*, Vol. 18, pp.717–737

Ghali, (1997), "Government spending and economic growth in Saudi Arabia", *Journal of Economic Development,* Vol. 22, No. 2

Glomm and Ravikumar (1997), "Productive government expenditure and long run growth", *Journal of Economic Dynamics and Control,* Vol.21, PP. 183-204

Fan, S., and Rao, N., (2003), "Public spending in Developing Countries: Trends, Determination and Impact", *Environment and Production Technology Division*; Discussion Paper NO. 99

Habibullah, Hook S., Afizzah, D., (2008), "Defense spending and economic growth in Asian economies: A panel error-correction approach", *MPRA Paper* No. 12105

Haider, A.S., and Butt, S.M., (2007), "The direction of causality between health spending and GDP, the case of Pakistan", *Pakistan Economic and Social Review,* Vol.45, No. 1, pp. 125-140

Hsieh, E., and Lai, S.K., (1994), "Government Spending and Economic Growth: The G-7 Experience", *Applied economics,* Vol. 26, pp.535-542

Hirnissa, T.M., and Baharom, H.A., (2009), "The Relationship Between Defense, Education and Health Expenditures in Selected Asian Countries", *International journal of Economics and finance,* Vol. 1, No. 2, pp. 149-155

Halicioglu, F., (2004), "Defense Spending and Economic Growth in Turkey: An Empirical Application of New Macroeconomic Theory", *Review of Middle East Economics and Finance,* Vol. 2, No. 3, pp. 193-201

Haque, Bose and Osbourn (2007) "Public expenditure and economic growth: A disaggregated analysis for developing countries", *Manchester school,* Vol.75, No.5

Iqbal and Mustafa (1998), "Macroeconomic determinants of economic growth in Pakistan", *The Pakistan Development Review*, Vol. 37: 2, pp. 125-148.

Jamshaid-ur-Rehman, (2010), "Cointegration Causality analysis between Public Expenditures and Economic Growth in Pakistan", *European Journal of Social Sciences,* Vol.13, No.4

Jung, S.H., and Thorbecke, E., (2003), "The impact of public education expenditure on human capital, growth, and poverty in Tanzania and Zambia: A General Equilibrium Approach", *Journal of Policy Modeling*, Vol.25, pp.701–725

Kneller, Beleaney and Gemmell (1998), "Fiscal policy and growth: evidence from OECD *countries" Journal of public economics, Vol.74. PP, 171-190*

Kusham, Shikya., (2007), “Relationship between human resource development and per capita income in SAARC countries” Unpublished paper

Li, H., and Liang, H., (2009), “Health, Education, and Economic Growth in China: Empirical Findings and Implications”, *China Economic Review*, Vol. 20, No.3, pp.374-387.

Musila, W. J. and Bellasi, W (2004) “The Impact of Education Expenditure on Economic Growth in Uganda: Evidence from Time Series Data”, *The Journal of Developing Areas*, Vol. 38 .No.1, pp.123-133.

Narayan, S., Narayan, K.P., and Mishra, S., (2010), “Investigating the Relationship between Health and Economic Growth: Empirical Evidence from a Panel of 5 Asian countries”, *Journal of Asian Economics,* Vol.21, pp.404–411

Nurudeen, A., and Usman, A. (2010) “Government Expenditure and Economic Growth in Nigeria, 1970-2008: A Disaggregated Analysis”, *Business and Economics Journal*, Vol. 4, pp. 1-11.

Omotor, G.D., (2004), “An Analysis of Federal Government Expenditure in the Education Sector of Nigeria: Implications for National Development”, *Journal of Social Science*, Vol.9, No.2, pp. 105-110.

Pradhan, R.P. (2009), “Education and Economic Growth in India: Using Error Correction Modeling”, *International Research Journal of Finance and Economics,* Vol.25, pp.140-147

Pradhan, (2011), “Government Spending and Economic Growth in SAARC: Evidence from Panel Cointegration”, *International Journal of Economic Policy in Emerging Economies*, Vol. 4, No.1

Saad, W., Kalakech, K. (2009) “The Nature of Government Expenditure and its Impact on Sustainable Economic Growth”, *Middle Eastern Finance and Economics,* No.4, pp. 38-47.

Tahir, R., (1995), “Defense Spending and Economic Growth: Re-examining the Issue of Causality for Pakistan and India”, *Pakistan Development Review*, Vol. 34, No. 4, Part III, pp. 1109-1117.

Taban, S., (2010), “An Examination of the Government Spending and Economic Growth Nexus for Turkey Using the Bound Test Approach”, *International Research Journal of Finance and Economics,* No.48, pp.184-193.

Wilson, A. R. and Briscoe, G. (2004) “The Impact of Human Capital on Economic Growth: A Review” *Third report on Vocational Training research in Europe: background report. Luxembourg:* Office for Official Publications of the European Communities: (Cedefop Reference series, 54)

Xiaoqing, X. (2005) “Investment in Physical Capital, Investment in Health and Economic Growth in China” *Investment Management and Financial Innovations*, Vol.23,pp.

Yuk (2005), “Government size and economic growth, time series evident for united kingdom” *Econometric working paper EWP0501*