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WHAT MATTERS FOR ECONOMIC GROWTH IN PAKISTAN: FISCAL POLICY OR ITS COMPOSITION?

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ABSTRACT

This study employed autoregressive distributed lag (ARDL) model to examines the impact of various fiscal policy variables, such as, productive expenditures, non-productive expenditures, distortionary taxes and non-distortionary taxes on economic growth in Pakistan in the framework of endogenous growth model. Our results revealed that non-productive expenditures and non-distortionary taxation have neutral impact on economic growth in both the long run and short run. Productive expenditures affect economic growth positively and significantly. Distortionary taxes retard economic growth. Human capital proxied by secondary school enrollment enhances per capita GDP. Impact of labor force on GDP per capita is negative and insignificant.

Keywords: Fiscal Policy, Productive and Non-productive expenditures, Distortionary and Non-distortionary taxes, ARDL approach, Economic Growth, Pakistan

JEL Codes: O4, H2 and H5.

INTRODUCTION

Determinants of economic growth have been debated by economists for decades. Sustainable economic growth is considered crucial for improving the living standards. It is even more important for developing countries like Pakistan which are suffering from many economic problems. About 24 % of people live below the poverty line (Akram *et al.*, 2011). Pakistan is ranked 136 among 177 countries with respect to human development index and 77 among 108 countries with respect to human poverty index (Human Development Report 2007-08). Approximately 6 % of labor force is unemployed (Government of Pakistan, 2010-11) . Inflation rate is about 14% according to CPI and 23.2 % according to WPI (Government of Pakistan, 2010-11). Trade deficit of Pakistan stood at $10.52 billion for the year 2010-2011 (Government of

Pakistan, 2010-11). Gap in distribution of income is widening day by day in Pakistan. According to Human Development index estimates of 2011, Pakistan is ranked 145 among 187 countries. Trends of HDI depict that wellbeing of people of Pakistan is on the downward trend for the last two decades. Pakistan is under huge debt burden and standard of living will further go down if Pakistan fails to repay the debt by 2015. Standard of living of population can only be improved by such macroeconomic policies which can promote rapid and sustainable economic growth, alleviate poverty and bring stability in other macroeconomic indicators. In this regard, fiscal policy may be regarded as an essential determinant of sustainable economic growth. A sound fiscal policy can be helpful in attaining the sustainable economic growth by facilitating research and development programmes, maintaining law and order condition, promoting the incentive for investment and alleviating poverty. While inefficient fiscal policy leads to high inflation, high interest rate, and crowding out of private investment. Thus it becomes a source of hurdle in attaining sustainable economic growth. Literature regarding fiscal policy and economic growth can be divided into two main streams. The first is the Neo classical growth models of Solow (1956) and Swan (1956) who believed that, in the long run, it is the technological progress and population growth that determine economic growth. They are of the view that government can influence the population growth rate, saving rate and incentive to invest in human and physical investment through its different policies. These policies can change the equilibrium factor ratio or affect the transition path of steady state growth rate. In other words, fiscal policy may affect path of output but not its slope. According to Neo classical growth model, impact of fiscal policy on steady economic growth is temporary and not the permanent one (see for example, Chamley (1986) and Judd (1985).

While on the other side, public policy endogenous growth model by Barro (1990), Lucas (1990) and King and Rebelo (1990) believed that physical and human capital do affect economic growth but fiscal policy variables like distortionary taxation and productive expenditure affect both the output level and its steady state growth rate. Battery of studies like Barro and Sala-i-Martin (1992); (Barro and Sala-i-Martin, 1995), Jones *et al.* (1993), Easterly and Rebelo (1993), and (Stokey and Rebelo, 1995) have examined the endogenous growth model and also explained the condition under which fiscal policy variables can influence economic growth. According to Barro (1990), a balanced increase in productive expenditures and distortionary taxes has uncertain impact on economic growth. Increased productive expenditures financed by non-distortionary taxes have an unambiguous positive impact on per capita income. When non-distortionary taxes are increased to finance additional non-productive expenditures, it unambiguously affects growth of per capita income negatively. Likewise, increase in non-productive expenditure financed by non-distortionary taxes has neutral impact on per capita GDP.

Many studies like Kneller *et al.* (1999) , Bleaney *et al.* (2001), Derin (2003), Amanja and Morrissey (2005) and Adefeso *et al.* (2010) have empirically examined Barro"s prediction. All these authors are of the view that complete specification of budget constraint must be considered to estimate the impact of fiscal policy on economic growth. They focused on the OECD countries, developing and developed countries, Kenya and Nigeria. Very few studies have examined the impact of fiscal policy on economic growth in Pakistan. Most of the studies have either analyzed the impact of government expenditure or taxation or budget deficit on economic growth. Recently, Ali and Ahmad (2010) investigated the relationship between fiscal policy and economic growth. They used budget deficit as a measure of fiscal policy in order to see its impact on economic growth. But not a single study has analyzed the impact of fiscal policy on economic growth considering the complete budget constraint in Pakistan.

This study is based on works of Kneller *et al.* (1999) and Amanja and Morrissey (2005). Specifically, this study tests the theoretical hypothesis of Barro (1990) model that productive expenditures spur economic growth and distortionary taxes deter economic growth. Moreover, non-productive expenditures and non-distortionary taxes have neutral impact on economic growth. We do not find any study that investigated these hypotheses in case of Pakistan. According to Kneller *et al.* (1999) removing non-productive and non-distortionary variables from the model, makes the estimated parameters of other variables, like fiscal policy and non-fiscal policy variables more accurate and precise. Thus, this study will contribute to existing literature by investigating Barro"s prediction over the period 1979-2009 in Pakistan. The motivation to conduct this research is the fact that impact of fiscal policy on growth especially related to Barro"s prediction has not received much attention in Pakistan. The study also recommends policy measures, based on research findings related to sound fiscal policy that may help boost economic growth. The rest of the paper unfolds as follows: In section II relevant studies are reviewed. Theoretical framework is given in section III. Methodologies and sources of data are presented in section IV. Section V contains estimation and interpretation of results. Finally, conclusion and policy recommendation are given in Section VI.

LITERATURE REVIEW

Whether fiscal policy stifles or promotes growth has been a hot debate since Adam Smith's era. The Neoclassical economists are of the view that fiscal policy cannot affect output growth in the long-run. However, they believe that it may affect its level. On the other hand, proponents of public policy endogenous growth model hold the contrary view. According to them fiscal policy can affect level of output as well as its long-run growth (see for example, (Barro, 1990; Barro and Sala-i-Martin, 1992).

Numerous researchers have examined the relationship between fiscal policy and economic growth. Some studies use single fiscal policy variable as a proxy of fiscal policy. In many studies, such as, Xu (1994), Engen and Skinner (1996), taxation is used as an indicator of fiscal policy. Barro (1990) utilized government expenditures as a proxy for fiscal policy. Levine and Renelt (1992) in their study, pointed out that no single variable can completely capture the fiscal policy instance. While some studies predict that structure of taxation and expenditure matters a lot in determining the impact of fiscal variables on economic growth. Shantayanan *et al.* (1993) , Kneller *et al.* (1999), Devarajan. *et al.* (1996), Bleaney *et al.* (2001), Derin (2003), Benos (2004), Gupta *et al.* (2005) and Ghosh and Gergoriou (2006) are the main works investigating fiscal policy endogenous growth models based on panel data. Kukk (2007), based on the cross sectional estimation, examined the impact of fiscal policy structure on economic Growth. While other authors like (Kocherlakota and Yi, 1997), Amanja and Morrissey (2005), Joharji and Starr (2010), and Adefeso *et al.* (2010) examined public policy endogenous model using time series analysis. The following comprehensive review of above mentioned studies is helpful in understanding as to why the structure of fiscal policy matters in determining economic growth and what is the impact of various fiscal policy variables on economic growth.

Kneller *et al.* (1999) empirically tested the public policy endogenous growth model. This model predicts that composition of taxation and government expenditure will affect the steady state growth rate. They used panel data of twenty two OECD countries for 26 years from 1970 to 1995. Their results not only supported the Neo Classical prediction but also suggested that adding the fiscal variable without considering the budget constraint leads to widely differing results. They also suggested that changing the classification of government expenditure, taxation and change in regression specification also lead to robust results. They concluded that the productive expenditures promote economic growth while the distortionary taxation stifles it. If fiscal variables are added by considering budget constraint, non-distortionary taxes and non-productive expenditures have neutral impact on economic growth.

Devarajan. *et al.* (1996) used pooled data from 1970 to 1990 for 43 developing countries to analyze the link of structure of government expenditures to economic growth. They classified public expenditures into further productive and nonproductive expenditures. They considered education, defense, health, transport and communication as capital expenditures. The empirical results were very surprising because they indicated that capital expenditures have significant and negative impact on economic growth whereas current (non-productive) expenditures have positive and significant influence on economic growth in developing countries. The negative impact of capital expenditures is due to excessive government expenditures towards productive expenditures at the expense of non-productive expenditures. Bleaney *et al.* (2001) tested Barro"s prediction that government expenditures and taxation have temporary as well as permanent impact on steady state growth rate. They used annual and five years averaging panel data instead of static panel data from 1970 to 1995 for capturing the short-run and long-run effects. Moreover, they considered specification bias regarding the implicit financing assumption of budget constraint and also tested for the endogeneity of fiscal variables. Their results were completely in accordance with Barro's prediction. The results also indicated that education and health expenditures have relatively smaller impact on economic growth compared with other productive expenditures. Consumption taxation should be regarded as a non-distortionary tax rather than less distortionary tax. Moreover, their results also showed that averaging the five years does not fully depict the long run effects.

Derin (2003) using the panel data estimation technique explored the endogenous growth model prediction regarding relationship between fiscal policy indicators and long run GDP per capita for 33 developing countries and 15 European Union countries. The thesis covered annual data from 1970 to 1999 and utilized the average of 5 year data in order to capture the long run relation and overcome short run fluctuations. The study took into account the budget constraint specification because ignoring budget constraint specification leads to biased results. The study found that investment and per capita GDP are positively and significantly related. The distortionary taxation has negative and significant impact in EU countries while it has insignificant relation in case of developing countries. So the study suggested that distortionary taxation does not enhance long run growth in developing economies. Whereas productive expenditures have negative and significant impact in developing countries while it has insignificant relation in case of EU countries. So the policy related to productive expenditures is effective in case of developing countries. The study also concluded that endogenous growth model holds for only developed countries. The impact of labor force growth, non-distortionary taxation and non-productive expenditures on long run per capita GDP is insignificant for both the developed and developing countries.

Benos (2004) divided government expenditures into further productive and non-productive expenditures and taxes into distortionary and non-distortionary taxes in order to perceive their association with economic growth through GMM and static panel techniques. He used the unbalanced data of 16 OECD countries covering the period 1990-1997. His results indicated an inverted U-shaped relation of health, education and fuel energy expenditures with economic growth. Education has a stronger positive relation to economic growth for poor countries and health expenditures have an inverse relation to it. There exists a U-shaped relationship of housing, transport, communication, social security expenditures with economic growth. The study indicated a positive relation of budget deficit to economic growth. On the other hand, the nonlinear relationship of distortionary taxes to economic growth is ambiguous because of its sensitivity to the estimation technique.

Gupta *et al.* (2005) empirically investigated the relationship of fiscal policy to economic growth for low income countries. The study also analyzed the composition of government expenditure through panel data analysis of 39 lower income countries from 1990 to 2002. The study indicated that fiscal policy is effective not only in short-run but also in long-run. It also revealed that GDP bears negative relationship to budget deficit as 2% reduction in the deficit as a % of GDP increases per capita growth rate by 1% annually. Moreover, if the structure of government expenditures consists of more productive than non-productive expenditure then it has positive impact on economic growth. The study also indicated that the relationship between fiscal policy and economic growth is nonlinear for those countries that have unstable macroeconomic condition.

Ghosh and Gergoriou (2006) analyzed optimum fiscal policy within Endogenous growth model framework. They used panel data for fifteen developing countries. The study employed OLS fixed effect and GMM technique for the empirical analysis. Their findings were consistent with those of Devarajan. *et al*. (1996) that current expenditures significantly decreased growth while capital expenditures significantly increased it. Kukk (2007) investigated the short run and long run impact of fiscal policy on economic growth using cross sectional data. The results suggested that fiscal policy significantly impacted long run growth and had no impact on short run growth. All categories of tax revenue had significant and positive impact on economic growth, whereas non-tax revenues had no significant impact on economic growth. Productive and non-productive expenditures had, respectively, positive and negative impact on economic growth. He further concluded that changing the composition of expenditure and taxation had identical impact on balance of the budget but has different impact on economic growth.

Martin and Fardmanesh (1990) analyzed the relationship among taxation, expenditures, deficit and economic growth through reduced form model. The study used cross-sectional data of 76 developing and developed countries. Their results suggested that government expenditures had positive impact on economic growth but if government expenditures increased the budget deficit then they had negative effect on economic growth. Taxes also had negative impact on economic growth but they stimulated it if they helped in decreasing the budget deficit. The study also concluded that level of development in countries also mattered for fiscal policy to impact economic growth. Gerson (1998) analyzed the relationship between fiscal policy and economic growth. He analyzed this relationship through the channel of marginal productivity of labor, marginal productivity of capital and cost or return to labor and physical capital. The reviewed literature evidenced that health and education expenditure had positive and significant impact on per capita output growth rate. The infrastructure expenditures increased output growth by increasing the incentive for private investment. However, their impact on economic growth was weak. Moreover, defense as well as social service expenditure, if helped in stabilizing political situation in economy, affected output growth positively. The study also found out that income tax has limited impact on saving, investment and economic growth. Finally, study suggested that government expenditure policies rather than revenue policies had more significant effect on economic growth. Amanja and Morrissey (2005) empirically explored whether fiscal policy stifled or promoted economic growth in Kenya by separately considering the impact of productive and non-productive expenditures and that of distortionary and non-distortionary taxes. Time series methods i.e. Autoregressive Distributed lag technique (ARDL) and Granger causality tests were used to address the linkage between the variables. The study covered the period from 1964 to 2004. Their results were contrary to the public policy endogenous growth model that distortionary taxation promotes economic growth and productive expenditures stifle it. The non-productive and non-distortionary taxation had neutral impact on economic growth. It was consistent with the Barro's predictions. Adefeso *et al.* (2010) investigated the prediction of public policy endogenous growth model in Nigeria covering the period 1970-2005. Their results were consistent with the findings of previous studies that productive expenditure had positive impact on economic growth whereas non-distortionary taxation and non-productive expenditures casted neutral impact on economic growth. Whereas the positive impact of distortionary taxation on economic growth contradicted the previous studies. The study also concluded that composition of taxation and government expenditure mattered in impacting economic growth. Using Johansen cointegration and VECM, Joharji and Starr (2010) studied the relationship between fiscal policy and growth in Saudi Arabia from 1969 to 2005. The analysis of the study indicated that current as well as government capital expenditures had significant and positive effect on the non-oil GDP in long run. Findings of the study also showed that current expenditures had stronger long run relationship with non-oil GDP than the capital expenditures.

Babalola and Aminu (2011) estimated the effect of fiscal policy on economic growth for Nigeria using the disaggregated approach during 1977 and 2009. They used Engle-Granger cointegration approach to investigate the impact of productive, non-productive, distortionary revenue and capital expenditure on economic growth. The findings showed that productive expenditures and economic growth were positively and significantly associated in long run. But they were positively and insignificantly related in the short run. The distortionary revenue and economic growth were positively related. The study concluded that government should spend more on education, health and economic services for stimulating economic growth. Recently, Ali and Ahmad (2010) examined the impact of fiscal policy on economic growth and other macroeconomic variables for the period 1972-2008 using ARDL approach. They also investigated the role of fiscal policy under military and democratic regimes. They used budget deficit as a measure of fiscal policy. They showed that fiscal deficit was negatively related to economic growth. The study recommended that threshold level for budget deficit should be from 3 to 4 % of GDP. However, the study ignored other variables of budget constraint and only used budget deficit as a proxy for fiscal policy. According to economic literature, all the elements of budget constraint must be considered for testing the impact of fiscal policy on economic growth and only those variables should be omitted from the model which according to theory, have neutral impact on economic growth. Ignoring the elements of budget constraint may lead to specification bias. The study was aimed at analyzing the effect of fiscal policy on economic growth only and it did not investigate Barro's prediction regarding the impact of fiscal policy on economic growth. The present paper empirically investigated public policy based endogenous growth model of Barro (1990) by considering complete specification of budget constraint for Pakistan.

Theoretical Framework

According to Neoclassical growth models, fiscal policy may be helpful in determining the output level but not its steady state growth rate. Whereas the public policy growth model by Barro and Sala-i-Martin (1992) provided a theoretical and empirical substantiation that fiscal policy affects both the level and the steady state growth rate. They employed the following modified Cobb-Douglas production function for demonstrating the persistent influence of fiscal policy on economic growth. Consider n producers. Each producer produces output (y_i). Mathematically, we write the following aggregate production function:

$$\mathbf{y = A\, k^{\alpha} g^{1-\alpha} \qquad 0 < \alpha < 1} \qquad (1)$$

In equation (1) y stands for per capita output, A represents productivity level, k represents per capita capital, g is the per capita government provided input. The budget can be balanced through increase in proportional taxes (τ) and lump-sum taxes (L). Thus the budget constraint can be written as:

$$\mathbf{\tau\, n\, y + L = C + g\, n} \qquad (2)$$

Where τ are distortionary taxes which affect the investment and saving decisions and L are non-distortionary taxes which do not affect the investment and saving decisions. C represents the non-productive expenditures and is defined as those expenditures which are included by private agents in their utility functions. g stands for productive expenditures and are defined as those expenditures which are incorporated in private agent's production function.

With this specification of utility function, Barro and Sala-i-Martin (1992) derived the long run growth rate as:

$$\mathbf{\Psi = \lambda\, (1-\tau)\, (1-\alpha)\, A^{1/(1-\alpha)} (g/y)^{\alpha/(1-\alpha)} - \mu} \qquad (3)$$

λ and μ are parameters. Equation 3 shows that distortionary taxes (τ) and government productive expenditures (g) have, respectively, negative and positive impact on economic growth. Whereas indirect taxes (L) and government non-productive expenditures (C) have neutral impact on long run growth rate. This long run growth equation is based on the assumption that government budget is balanced in every period. Since this assumption of balanced budget is unrealistic especially in case of developing countries like Pakistan, therefore, the budget constraint may be modified as:

$$\mathbf{\tau\, n\, y + L = C + g\, y\, n + b} \qquad (4)$$

Where b stands for budget deficit / surplus. The study follows the growth equation of Kneller *et al.* (1999) and Bleaney *et al.* (2001) to determine the impact of fiscal policy on economic growth. They specified growth as a function of some fiscal and non-fiscal variables. We employed the following equation:

$$\Psi_t = \alpha + \sum_{i=1}^{k} X_{it}\beta_i + \sum_{j=1}^{m} Z_{jt}\gamma_j + \xi_t \qquad (5)$$

Where Ψ is per capita GDP or economic growth, X stands for a vector of fiscal policy variables, Z represents vector of the non-fiscal variables and ξ_t is white noise or random error term. If all elements of budget constraint are included and the budget is balanced then:

$$\sum_{i=1}^{k} X_{it} = 0 \qquad (6)$$

It entails perfect multicollinearity which can be avoided by omitting one of the fiscal policy variables. The variable to be omitted is decided on the basis that it must not be correlated economic growth. Otherwise, it would introduce a significant bias in estimated parameters. So equation 5 can be rewritten as:

$$\Psi_t = \alpha + \sum_{i=1}^{k-1}(\beta_i - \beta_k)X_{it} + \sum_{j=1}^{m}\gamma_i Z_{jt} + \xi_{it} \quad (7)$$

Equation 7 as explained by Kneller *et al.* (1999) and Amanja and Morrissey (2005) is the estimable model of this study. We omitted non-productive expenditures and non-distortionary taxes. In equation 7 the coefficient of fiscal policy variable is implicit financing element and can be interpreted as "the effect of a unit change in the variable offset by a unit change in the omitted fiscal variable" (Knell et al [1999]: 175). Moreover the null hypothesis for testing the fiscal policy variable should be:

$$(\beta_i - \beta_k) = 0 \text{ rather than } \beta_i = 0.$$

METHODOLOGY, DATA DESCRIPTION AND SOURCES

Model Specification

We used the annual time series data for the period 1979-2009. This study used four variants of equation 7. In the first variant all elements of budget constraint except budget deficit (in order to avoid perfect multicollinearity) are included and tested to see if coefficient of neutral element, that is, non-distortionary taxes and non-productive expenditures are zero. Second, non-productive expenditure is omitted from the model while retaining other fiscal policy variables like productive expenditure, distortionary and non-distortionary taxation in the equation and tested whether the coefficient of neutral element (non-distortionary taxation in this case) was 0. Third, non-distortionary taxes were dropped from the equation while keeping other fiscal policy variables including non-productive expenditure and tested the coefficient of neutral element for 0. Finally, we excluded both the non-productive expenditure and non-distortionary taxation. In the fourth model, more precise measures of fiscal policy variable with lower standard errors can be achieved if both the non-productive expenditure and non-distortionary taxation are omitted. In short, the study tested down from the most complete specification of budget constraint to the least complete specification in order to overcome the problem of multicollinearity.

In view of the above discussion, following four models are estimated:

$$LnY_t = \beta_0 + \beta_1 LnPE_t + \beta_2 LnNPE_t + \beta_3 LnDT_t + \beta_4 LnNDT_t + \beta_5 LnERN_t + \beta_6 LnLF_t + \xi_{1t} \quad \textbf{(a)}$$

$$LnY_t = \beta_0 + \beta_1 LnPE_t + \beta_2 LnDT_t + \beta_3 LnNDT_t + \beta_4 LnERN_t + \beta_5 LnLF_t + \xi_{2t} \quad \textbf{(b)}$$

$$LnY_t = \beta_0 + \beta_1 LnPE_t + \beta_2 LnNPE_t + \beta_3 LnDT_t + \beta_4 LnERN_t + \beta_5 LnLF_t + \xi_{3t} \quad \textbf{(c)}$$

$$LnY_t = \beta_0 + \beta_1 LnPE_t + \beta_2 LnDT_t + \beta_3 LnERN_t + \beta_4 LnLF_t + \xi_{4t} \quad \textbf{(d)}$$

Where LnY stands for natural log of per capita income, LnPE is natural log of productive expenditures, LnNPE represent natural log of non-productive expenditure, LnDT and LnIDT are natural logs of distortionary taxation and non-distortionary taxation, LnENR and LnLF are natural logs of secondary school enrolment and labor force respectively. ξ_{1t}, ξ_{2t}, ξ_{3t} and ξ_{4t} are white noise random errors with 0 mean, constant variance and no serial correlation. Here productive expenditures, non-productive expenditure, taxation and non-distortionary taxation are fiscal policy variables while secondary school enrolment and labor force are non fiscal policy variables. The purpose of taking log is to make the data smooth and to linearise the exponential variation in time series data as natural log is reverse of exponential trend.

Data Description and Sources

The study used annual time series data for the 1979-2009 period. The variables description, their theoretical perception and sources are shown in Table 1.

Table-1. Theoretical Perception, Sources of Data and Description of Variables

Variable Description	Proxy	Theoretical intuition or Perception	Expected Signs	Source
Productive expenditures	Development expenditure like expenditures on health, education, economic services, infrastructure, telecommunication, transport, housing facilities	Promotes growth by impacting the marginal product of private capital	Positive	Handbook of Statistics of Pakistan economy 2010
Non-productive expenditures	Non-Development expenditures including defense, interest payment, administrative, subsidies related expenditure	Do not influence marginal product of private capital and subsequently has zero effect on growth	Zero	Handbook of Statistics of Pakistan Economy 2010
Distortionary taxation	Taxes on income, profits, & capital gains, Taxes on payroll and workforce, Taxes on property including tax on Estate, inheritance, and gift taxes, wealth, capital and financial transaction.	Reduces incentives for investing in physical / human capital and thus deters growth	Negative	Government Finance Statistics, 2010
Non-distortionary taxation	Indirect taxes including custom, sales tax, federal excise taxes.	Do not discourage investing in physical / human capital and thus have neutral impact on growth	Close to Zero	Federal Board of Revenue, 2009
Labor force	labor force	May increase or decrease economic growth	Any	World Development Indicators, 2010
Human capital	Secondary school enrolment	Can increase economic growth	positive	Handbook of Statistics of Pakistan economy 2010

Estimation Technique

In this study, ARDL technique by Pesaran. and Shin. (1997) , Pesaran and Shin (1999) and is used as the methodology to empirically analyze the relationship of fiscal policy with economic growth in Pakistan.

Autoregressive Distributed Lags Approach to Cointegration

Various tests are available in econometric literature to test the long-run relationship among variables of a model. Johansen and Juselius (1990), Engle and Granger (1987), and maximum likelihood test proposed by (Johansen, 1988; Johansen, 1991) are most commonly used tests. These tests are not suitable for small samples because of their very weak power to reject the null hypothesis when it is wrong. Further, these tests require all variables to be integrated of the same order. In case, variables of the model are integrated of different orders, these tests become very complicated. ARDL approach is preferred over other approaches because of the following reasons.

First, this approach allows variables of the model to be integrated of order 0, 1 or both. Second, this approach helps in removing the intensity of serial correlation of residuals by incorporating sufficient number of lags. Third, a simple linear transformation is used to derive error correction model (ECM) from ARDL model (Shrestha and Chowdhury, 2005) . Fourth, it is better suited to small samples as compared to above mentioned approaches. Last, in ARDL approach endogeneity problem does not creep in and hence its estimates and t-ratios are unbiased and reliable. However, this approach is not applicable if the variables are I(2) or higher. The ARDL approach is based on two steps. The first step uses the F-statistic to check whether variables included in the model bear a long-run relationship. Pesaran and Shin (1999) and (Pesaran. *et al.*, 2001) provided upper critical value for I (1) variables and lower critical values for I(0) variables. The null hypothesis is rejected if calculated F-statistic happens to be larger in value than upper critical bound and fails to reject it when calculated F-statistic is smaller than the lower critical bound. When the calculated F-statistic lies between the upper and lower critical bound values, then test is considered inconclusive. At this point ARDL requires that the variables are I (0) or I (1).

To check the long run relation following ARDL equation is estimated:

$$\Delta Y_t = \alpha_0 + \alpha_1 \sum_{j=1}^{k} \Delta Y_{t-j} + \alpha_2 \sum_{j=0}^{k} \Delta X1_{t-j} + \alpha_3 \sum_{j=0}^{k} \Delta X2_{t-j} + \alpha_4 \sum_{j=0}^{k} \Delta X3_{t-j} + \alpha_5 \sum_{j=0}^{k} \Delta X4_{t-j}$$
$$+ \alpha_6 \sum_{j=0}^{k} \Delta X5_{t-j} + \alpha_7 \sum_{j=0}^{k} \Delta X6_{t-j} + \delta_1 Y_{t-1} + \delta_2 X1_{t-1} + \delta_3 X2_{t-1} + \delta_4 X3_{t-1}$$
$$+ \delta_5 X4_{t-1} + \delta_6 X5_{t-1} + \delta_7 X6_{t-1} + \varepsilon_t$$

Step 2 estimates the short-run and long-run relationship. The following equation states the long run model:

$$Y_t = \alpha_0 + \sum_{j=1}^{k} \vartheta_{1j} Y_{t-j} + \sum_{j=0}^{k} \alpha_{1j} X1_{t-j} + \sum_{j=0}^{k} \alpha_{2j} X2_{t-j} + \sum_{j=0}^{k} \alpha_{3j} X3_{t-j} + \sum_{j=0}^{k} \alpha_{4j} X4_{t-j} + \sum_{j=0}^{k} \alpha_{5j} X5_{t-j}$$
$$+ \sum_{j=0}^{k} \alpha_{6j} X6_{t-j} + \epsilon_t$$

The Error correction representation of ARDL technique is:

$$\Delta Y_t = \alpha_0 + \sum_{j=1}^{k} \vartheta_{1j} Y_{t-j} + \sum_{j=0}^{k} \alpha_{1j} \Delta X1_{t-j} + \sum_{j=0}^{k} \alpha_{2j} \Delta X2_{t-j} + \sum_{j=0}^{k} \alpha_{3j} \Delta X3_{t-j} + \sum_{j=0}^{k} \alpha_{4j} \Delta X4_{t-j}$$
$$+ \sum_{j=0}^{k} \alpha_{5j} \Delta X5_{t-j} + \sum_{j=0}^{k} \alpha_{6j} \Delta X6_{t-j} + \pi ECM_{t-1} + \mu_t$$

The stability of ARDL model is tested through sensitivity analysis. The sensitivity analysis involves Cumulative Sum (CUSUM) and Cumulative Sum of Squares (CUSUMSQ) tests and testing of Serial correlation, Functional form, Hetroskedasticity and Normality.

ESTIMATION AND INTERPRETATION OF RESULTS

For ARDL approach, it is not compulsory to test the stationarity of variables. Because ARDL can be applied on the variables whether they are integrated of order one, zero or both. However, ARDL can collapse if variables are I(2) or higher. So it cannot be applied on the variables whose order of integration is 2. So in order to confirm if any variable is integrated of higher order, unit root tests are employed. Augmented Dickey Fuller (ADF) and Phillips Perron (PP) tests were applied to test the stationarity of the variables. The results of ADF test and PP test are summarized in Table 2. The results of Table 2 show that all variables are integrated of order 1, i.e. I(1). As none of the variables is integrated of higher order, so we can confidently apply ARDL technique for examining impact of fiscal policy on economic growth.

Table-2. Results of ADF and PP Unit Root Tests

Variables	Augmented Dickey Fuller Test(τ)		Phillips-Perron Test (Zτ)	
	Level	1st difference	Level	1st difference
PER	-2.214866(1)	-3.588675(0)**	-2.532621(2)	-3.541796(3)**
DEV	0.383970(0)	-5.273656(0)*	0.403772 (2)	-5.272708 (2)*
CU	-2.460414(1)	-4.012671(0)**	-0.668774 (1)	-4.032682 (2)**
IDT	-2.972071(0)	-5.881249(0)*	-2.972071 (0)	-6.163698 (6)*
DT	0.491750(1)	-3.960355(0)**	-2.195169 (3)	-3.960219 (3)**
LF	0.848407(0)	-5.207768(0)*	0.873342 (2)	-5.229637 (3)*
ENOR	-0.915215(0)	-5.106619(0)*	-0.917703 (1)	-5.106619 (0)*

*, ** indicate 1% and 5% level of significance, respectively.
Figures in parenthesis show the lag order.

We estimated four equations. In the 1st model, all variables of budget constraint are included except budget deficit. Then, in the second and third models we excluded non-distortionary taxes and non-productive expenditures, respectively. Finally, both variables were omitted in the last equation. The study considered all the variables of budget constraint and omitted only those variables which do not have any significant effect on economic growth. It led to accurate and precise estimation of the model, because considering only one element of budget constraint would have provided us misleading information in regard to effect of fiscal policy on economic growth. In addition to it, misspecification of budget constraint leads to invalid results. In any equation, the coefficient of neutral element should be insignificant. The summary of estimation of four equations is given in Tables 3, 4, and 5.

In order to estimate the equations through ARDL technique, optimum Lag length is required. The optimum lag length for all models is selected through "Akaike Information Criterion, Schwarz

Information Criterion and Hannan-Quinn information Criterion". The results for the selection of optimal lag length for each model are provided in Table 3. The study takes the optimum lag length of 1 as suggested by Hannan-Quinn information criterion and Schwarz information criterion for carrying on further estimation.

Table-3. VAR Lag Order Selection Criterion

Criterion	Model I		Model II		Model III		Model IV	
	K=1	K=2	K=1	K=2	K=1	K=2	K=1	K=2
Log L	423.39	479.02	362.66	401.06	364.54	390.35	303.76	318.78
AIC[1]	-25.34	-25.80*	-22.11	-22.28*	-22.22*	-21.541	-18.88*	-18.192
SC[2]	-22.70*	-20.84	-20.13*	-18.60	-20.24*	-17.864	-17.46*	-15.598
HQ[3]	-24.51*	-24.24	-21.49*	-21.13	-21.60*	-20.390	-18.44*	-17.380

Note: * shows the selection of optimal lag length by different criterions.
K denotes the lag length.
[1] Akaike information criterion
[2] Schwarz information criterion
[3] Hannan-Quinn information criterion

The next step tests long run relationship of each model. To test the long run relationship, equation 1 of ARDL is estimated and F statistic is obtained to test the joint hypotheses that all slope coefficients of lagged variables are equal to zero. The Microfit 5 software provides the facility of estimating the F-statistic for bounds test related to ARDL. The stability of ARDL model is tested through sensitivity analysis. The results of the test for checking the existence of long run relationship and diagnostic test for each equation are reported in Table 4.

Table-4. Diagnostic Tests and Tests for Existence of Long-run Relationship

Diagnostic test	Model I		Model II		Model III		Model IV	
LM Test	0.7608(0.383)		1.1942(0.274)		1.1339(0.287)		1.4256(0.232)	
Normality test	0.8455(0.655)		2.3754(0.123)		2.0317(0.154)		1.4785(0.224)	
RR Test	3.8919(0.05)**		0.9529(0.621)		1.5323(0.465)		1.5295(0.465)	
White Test	1.7911(0.181)		3.3358(0.068)**		1.3535(0.245)		2.5762(0.108)	
Long run relationship								
F- statistic	4.2843**		4.5670**		5.1717*		5.6965*	
Critical bound value	UCB	LCB	UCB	LCB	UCB	LCB	UCB	LCB
	3.7689	2.4887	3.8502	2.5936	4.5996	3.1815	4.7416	3.3915

Notes: * and ** show the 5% and 10% levels of significance, respectively.
UCB represents the upper critical bound and LCB represents the lower critical bound.
LM test checks the existence of autocorrelation.
Figures in parenthesis show the probability values.
White test is used to test for the existence of Hetroskedasticity.
Ramsey's RESET Test (RR test) is used to check the specification error due to functional form of model.

This table shows that long run relationship between the variables exists for the first two equations at 10% level of significance. However, for the last two equations long run relation between the variables exists at 5 % level of significance. The results of diagnostic tests are shown in the upper part of Table 4 which verifies that there exists no autocorrelation and variables are normally distributed in all the four equations. Moreover, there exists no hetroskedasticity problem in the first, the third and the last equation. However, this problem exists in case of the second equation. Samreth (2008) states that if variables in the estimated model have different lag lengths so it is natural to test for hetroskedasticity. The problem of functional form in equation 1 exists due to missing of some important variables that impact economic growth. However, does not occur in case of other equations.

Table 5 summarizes the estimates of long run coefficients of all the four equations. The estimated short run coefficients using ARDL approach are reported in Table 6. Comparing the coefficients of the variables in all the equations both in long run and short run firmly supports Barro's prediction that non-distortionary taxes and non-productive expenditures have insignificant effect on economic growth. On the other hand, productive expenditures have significant positive effect on economic growth. Furthermore, real per capita GDP is negatively and significantly affected by distortionary taxation. An increase in distortionary taxation reduces the incentive for private investment by lowering its rate of return and hence leads to reduction in economic growth. Comparing the estimated coefficients and probability values of the variables in all the equations in long-run and short-run, we observe that omitting neutral impact variables has not altered the signs of all fiscal policy and non fiscal policy variables. The significance level of all fiscal policy variables, labor force and enrollment improves in both the long run and short run as explained by Kneller *et al.* (1999). The human capital is significant in short run only in the first two models. However, it is significant in short run as well as in long run in case of the last two models. All the models have a good fit.

The process of short-run adjustment can be observed from the error correction (EC) term. In model 1, coefficient of error correction term is -0.38 and is statistically significant. This indicates that 38% of the disequilibrium of the previous period will be adjusted in current year in model 1. While in model 2 the estimated coefficient of EC is -0.43. It implies that 43% of short run disequilibrium is eliminated in the current period. In case of model 3 the estimated coefficient of EC is -0.30 which shows that 30% of the disequilibrium error will be eliminated. In case of model 4 the estimated coefficient of EC is -0.35 which implies that 35% of the disequilibrium error of the previous period will be adjusted in current year. Most of the variables in Model 4 are significant because removing both neutral variables from the model leads to more precise and accurate results. The study, therefore, focuses on the interpretation of model 4 in short run and long run because it is better than any other one. Labor force has insignificant and negative impact on per capita GDP both in short-run and long-run not only in this model but also in the other three models as well. Although labor force is insignificant but we cannot exclude it from the model because it is considered in literature to be one of the most important factors affecting per capita GDP. Many studies, for example, Kneller *et al.* (1999), Bleaney *et al.* (2001) and (Fischer, 1993) provided evidence of negative and insignificant impact of labor force on per capita GDP. The reason for negative and insignificant association between labor force and GDP per capita is the poor quality of labor force in Pakistan. In addition, in Pakistan variation in labor force is greater than variation in GDP per capita.

Table-5. ARDL Based Estimates of Long Run Coefficients

Dependent Variable: LGNPPC				
Variables	Model 1	Model 2	Model 3	Model 4
Constant	6.2863 (0.000)*	6.5171 (0.000)*	5.6069 (0.000)*	5.9513 (0.000)*
DEV	0.2140 (0.032)**	0.1987 (0.011)**	0.2873 (0.014)**	0.25873 (0.000)*
CU	-0. 04117 (0.650)	-	-0.036105 (0.742)	-
DT	-0.1464 (0.039)**	-0.1331 (0.012)**	-0.1848 (-0.039)**	-0.16512 (0.003)*
IDT	0.1112 (0.316)	0.0865 (0.324)	-	-
LF	-0.0549 (0.816)	-0.0813 (0.676)	-0.00608 (0.983)	-0.0397 (0.676)
ENR	0.3106 (0.194)	0.2671 (0.135)	0.48392 (0.091)***	0.4099 (0.005)**
F – statistic	904.63 (0.000)*	1089.1 (0.000)*	1064.7 (0.000)*	1324.6 (0.000)*

Note *, ** and *** show 1%, 5% and 10% levels of significance, respectively.
Figures in parenthesis show the probability values.

Human capital proxied by secondary school enrollment and per capita GDP are positively and significantly related in short run and long run. A 10 % increase in human capital will, on average, increase GDP per capita by 1.4 % points and 4.1 percentage points in the short run and long run, respectively. Productive expenditures help in boosting up per capita GDP in short run as well as in long run. If productive expenditures are increased by 1 percentage point then on average, GDP per capita will increase by 0.9% in short run and 2.5% in long run. It is also found that distortionary taxation retards per capita GDP. This indicates that if distortionary taxes are increased by 1 percentage point then on average, GDP per capita decreases by 0.5 % in short run and 1.6% in long run.

Table-6. ARDL Based Estimates of Short Run Coefficients

Dependent Variable: LGNPPC				
Variables	Model 1	Model 2	Model 3	Model 4
DEV	0.08031 (0.002)*	0.0857 (0.000)*	0.0869 (0.000)*	0.09031 (0.000)*
CU	-0. 01545 (0.598)		-0.0109 (0.703)	
DT	-0.05494 (0.001)*	-0.0574 (0.000)*	-0.0559 (0.001)*	-0.05763 (0.000)*
IDT	0.04172 (0.382)	0.03731 (0.419)		
LF	-0.02061	-0.0351	-0.00184	-0.0138

	(0.821)	(0.682)	(0.983)	(0.864)
ENR	0.1165 (0.045)**	0.1153 (0.043)*	0.14631 (0.003)*	0.14310 (0.002)*
Ecm(-1)	-0.37527 (0.027)**	-0.4316 (0.001)*	-0.30235 (0.036)**	-0.34904 (0.000)*
R^2	0.7218	0.71815	0.7117	0.70985

Note: *, ** and *** show 1%, 5% and 10% levels of significance, respectively.
Figures in parenthesis show the probability values.

Stability of short-run and long-run coefficients is checked by Cumulative Sum (CUSUM) and Cumulative Sum of Squares (CUSUMSQ). The graphs of CUSUM and CUSUMSQ statistics for all the four models are given in Appendix. As the plots of CUSUM and CUSUMSQ statistics are found within the critical bounds of 5% level of significance, so the null hypothesis of stability of coefficients in the given regression cannot be rejected. This stability test confirms the reliability of all the ARDL models.

CONCLUSION AND POLICY RECOMMENDATIONS

This study analyzed the relationship between fiscal policy and economic growth in Pakistan for 31 years from 1979 to 2009. It considered all elements of budget constraint as suggested by Kneller *et al.* (1999) and Bleaney *et al.* (2001). The linear combination among all the elements of budget constraint was also addressed. Autoregressive Distributed Lag approach was employed for empirical estimation by classifying taxation into distortionary and non-distortionary taxation and government expenditures into productive and non-productive expenditures. The findings of the current study strongly support prediction of public policy endogenous growth model. Following are the main findings of this study. A long run equilibrium relationship holds among the variables. Non-productive expenditures and non-distortionary taxes cast neutral impact on economic growth in long run as well as in short run. Productive expenditures affect economic growth positively and significantly. Distortionary taxes retard economic growth and are found statistically significant. Secondary school enrollment as a proxy for human capital is found a source of per capita GDP growth. However, labor force affects GDP per capita negatively and insignificantly as found by Kneller *et al.* (1999) and Bleaney *et al.* (2001).

The findings of the study recommend that government should not waste its revenue in order to meet non-productive expenditures because they have neutral impact on economic growth. Government should utilize its revenue for productive purposes. This will be helpful in improving health, education and infrastructure facilities that in turn will encourage private investors. Investment will increase and eventually level of employment and economic growth will also increase. The government should allocate higher percentage of its total expenditures for improving the quality of education sector and should bridge the gap in technical training. It should take keen action in removing inequality of education in order to get more fruitful results from human capital. It should also address other factors related to demand and supply of skilled manpower. Distortionary taxes should be levied rather than non-distortionary taxes since they play a pivotal role in sustaining stability of the economy.

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Appendix

Figure-A.1. Plot of CUSUM and CUSUMSQ for Model 1

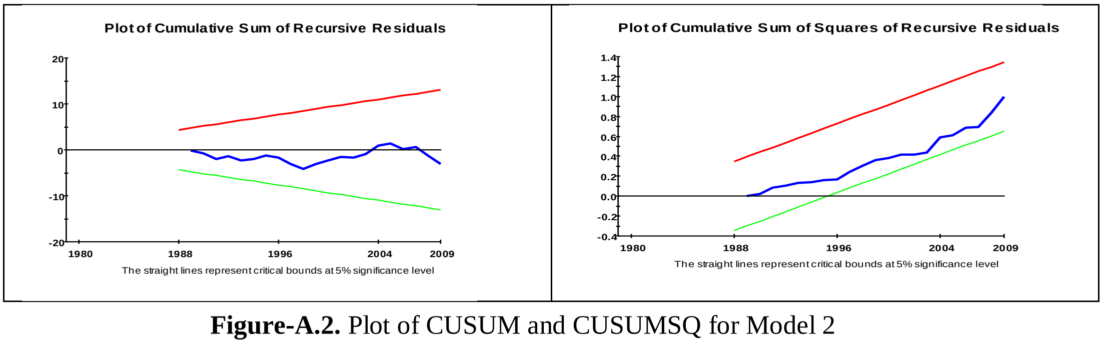

Figure-A.2. Plot of CUSUM and CUSUMSQ for Model 2

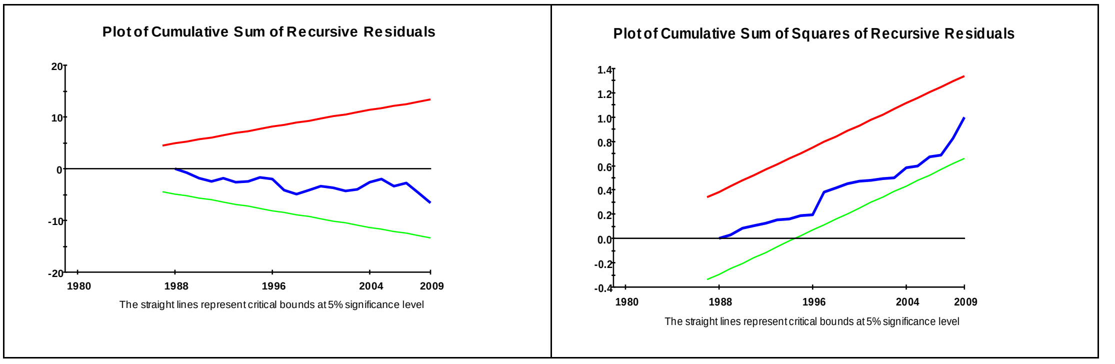

Figure-A.3. Plot of CUSUM and CUSUMSQ for Model 3

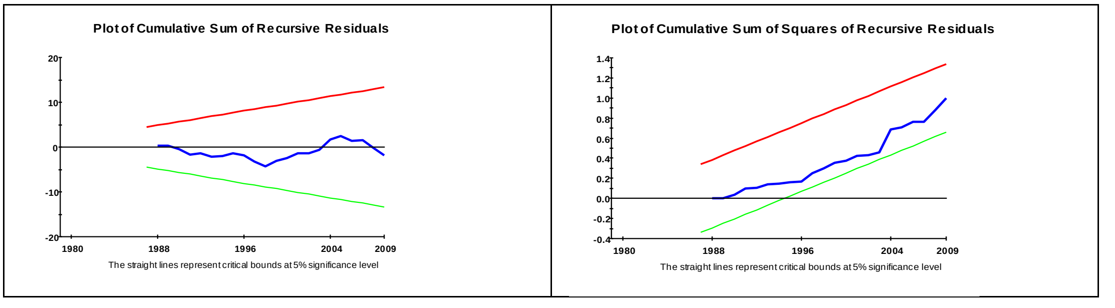

Figure-A.4. Plot of CUSUM and CUSUMSQ for Model 4