WHAT LIES BEHIND FISCAL DEFICIT:
A CASE OF PAKISTAN[*]

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Abstract
The article aims to investigate some of the important factors contributing to the fiscal deficit in Pakistan for the period of 1976 to 2010. International trade, economic growth, total debt servicing and broad money supply are considered as foremost factors affecting fiscal deficit in Pakistan. The empirical findings reveal that only economic growth has an insignificant impact on fiscal deficit in the long run but has significant impact in the short run. Whereas, all other factors such as international trade, total debt servicing and broad money supply affect fiscal deficit significantly in both short run as well as in the long run.

Moreover, it is found that there exists univariate Granger causality which runs from economic growth to fiscal deficit, from total debt servicing to fiscal deficit, and there exists bivariate causality between money supply and fiscal deficit in the short run. Also, in the long run all the factors Granger cause to fiscal deficit. The study has also found the existence of joint causality among fiscal deficit, trade, economic growth, total debt servicing and money supply.

Keywords: Pakistan, fiscal deficit, economic growth, total debt servicing, international trade broad money supply.

1. Introduction

Fiscal imbalance is one of the prime macro economic problems for all economic policy advisors of the world. Fiscal deficit problems arise because of excessive public expenditure over public revenue. In developing countries a rising public expenditure is justified on the basis of the economic development targets that are to be achieved. For example, the famous Wagner law propagates the rising public expenditure due to the industrialization process of the country. Based on the Wagner law, Peacock and Wiseman (1961) also justified the increase in public expenditure mainly because of economic development and increased welfare of the people.

A country experiencing fiscal deficit in its budget has to rely on both domestic and foreign borrowings which ultimately decline the self respect of the country as a whole. A rise in public expenditure (as compared to public revenue) entails many implications on the functioning of the economy. High fiscal deficit in most of the countries has led to a debate in economic literature on fiscal consolidations and its impact on macro economic variables (Alesina, 2010; Alesina and Ardagna, 2009; Kumar *et al.*, 2007; Chaudhary and Shabbir, 2005; Ihori and Atsushi, 2005; Giavazzi, 1996; Giavazzi, 1990).

As far as the meaning of fiscal deficit is concerned, different terminologies have been used in the economic literature for the budget deficit. The most commonly used terminologies are primary deficit, conventional deficit and operational deficit. Conventional deficit is primary deficit augmented by interest payments on both domestic and foreign debt, while operational deficit equals conventional deficit adjusted for inflation (Agenor and Montiel, 2008). The present paper refers to primary deficit that means a difference between government revenue and expenditure.

Pakistan has been experiencing fiscal deficit problems for the last years. For example in the 1992-93 budget deficit was 9.5 per cent of GDP which was more than twice than in 1989-90. The fiscal imbalance widened from 5.3 percent of GDP in 2008-09 to 6.3 per cent in 2009-10 (Pakistan Economic Survey, 2010-2011). Generation of additional revenue was restricted mainly because of the weaker economic activity for the last years. Tax-to-GDP ratio has been the lowest in Pakistan as compared to other developing countries. It has remained on average 9.2 per cent since 2000s, as compared to around 15 percent in Sri Lanka and 16 per cent in India (Pakistan Economic Survey 2010-11). Total expenditure and total revenue composition remained nearly stagnant since 1990's and the shocks are absorbed by development expenditure that is also the lowest among developing countries at the same development level. Total development expenditure has also shown a declining trend since 2007-08. Different internal factors have been stressing the fiscal balance; for example, large additional subsidies to the electricity sector and the catastrophic floods during the summer of 2010 put heavy pressure on the fiscal budget. Higher fiscal deficit has made Pakistan dependent on foreign debt which has been accumulating in absolute and relative terms. Total external debt and liabilities averaged around 30 percent of GDP since 2004 (Pakistan Economic Survey, 2011-12).

Because of its serious debt problems, Pakistan has witnessed deterioration in investment rate and economic growth, as well as a rise in the incidence of poverty. Looking at the grim situation of the fiscal imbalance the question arises what are the likely factors affecting fiscal deficit in Pakistan? The primary objective of this paper is to determine the factors contributing to the fiscal deficit in Pakistan. An effort is made to explore the association between fiscal deficit and some of the key macroeconomic variables. The paper is organized into different sections. Section 2 is the compendium of the literature on the related subject. Section 3 explains data selection and the methodological framework. Section 4 discusses the results. Finally, section 5 concludes with the findings of the study and suggests some policy implication.

2. Literature review

Economic literature is rich on the discussion of the fiscal imbalances from different perspectives. Some theories focus on fiscal consolidation while others relate fiscal deficit to the debt-GDP ratio. Fiscal consolidation and its impact on the key macro economic variables have been discussed by many researchers. De Cos and Enrique (2012) estimated the models to discover the determinants and consequences of fiscal consolidations for a panel of OECD countries. According to them, fiscal adjustments are not independent of the developments in the country and their results indicate that economic growth is the only relevant ingredient for successful reduction in budget deficits. The study concludes that fiscal adjustments positively affect GDP under exogeneity of fiscal tightening and exert negative impact in the short-run on economic growth under endogeneity assumption.

Alesian and Roberto (1997) find in their paper that fiscal adjustments through spending cuts on transfers and the government wage bill have better chances of success and are expansionary. On the other hand fiscal adjustments through tax increases and cuts in public investment are not long lasting deficit reduction and are contractionary. Roubini and Sachs (1989) worked on exploring political and economic determinants of budget deficits in the industrialized countries and found that countries characterized by a short average tenure of government along with many political parties in a ruling coalition experience larger budget deficits.

The impact of fiscal deficit on other macroeconomic variables has been also discussed. For example, Ahmed (2007) finds the strong impact of fiscal deficit on inflation in Pakistan. Her results show that in the long run a 1% increase in fiscal deficit leads to a 0.447% increase in seigniorage which in turn results in a price hike of 0.5156%. Agha and Khan (2006) in their empirical analysis of fiscal imbalances and inflation in Pakistan find short run as well as long run relationship among money supply, budget deficit and inflation. They conclude that bank borrowing is more inflationary than non-bank borrowing.

Agnello and Ricardo (2009) empirically assessed the sources of public deficit by focusing on political, institutional and economic determinants. They used panel data for 125 countries for the period of 1980 to 2006 and their results depict that a higher

level of political instability and inflation lead to an increase in public deficit volatility. Alesina and Perotti (1995) and Persson and Tabellini (1997) find the political system as determining the volume of the public deficit. According to them the countries with proportional rather than majoritarian and presidential electoral system, countries with coalition governments and frequent government turnovers, and the countries with lenient rather than stringent budget processes face larger deficits and debts. Alesina and Perotti (1995) and Woo (2003) emphasized on the role of political factors, social polarization, and institutional factors in determining fiscal deficit of a country. According to Leachman *et al.* (2007) fiscal performance becomes better because of strong budgeting institutions. Zafar and Mustafa (1998) in their study found a negative relationship between budget deficit and economic growth in case of Pakistan.

Chaudhary and Ahmed (1995) examined the relationship between fiscal deficit, money supply and inflation in the case of Pakistan. They find the long run relationship between budget deficit and money supply. The propagation that budget deficit through its impact on inflation stimulates economic growth has been tested in the case of Nigeria. The results show that there exists uni-directional causality from budget deficit to inflation (Oladipo and Akinbobola, 2011).

The present article discusses the fiscal imbalance issue of Pakistan from a different perspective. Contrary to earlier studies where fiscal deficit was taken as an independent variable (see for example, Zafar and Mustafa, 1998; Alesina and Perotti, 1995; Persson and Tabellini, 1997; Ahmed, 2007), the present study takes fiscal deficit as dependent variable and investigates the impacting factors on it. An effort is also made to explore the causal relationship among all the variables taken in the study. It is hypothesized that growth of GDP, money supply, total debt servicing as a percentage of GDP and the volume of trade all contribute to the fiscal deficit in Pakistan.

3. Data source, model specification and methodology

3.1. Data source

We have selected annual time series data[1] from different sources such as Pakistan Economic Survey (various volumes and issues) and World Development Indicators (2011). The data on fiscal deficit is obtained from Pakistan Economic Survey (various volumes and issues) and the data series on Per capita GDP, Total Debt Servicing, International Trade and Broad Money Supply (M2 taken as proxy for money supply) is obtained from World Development Indicators (2011), World Bank.

The data on all variables is expressed as a percentage of GDP in real terms. The data is for 35 years and covers the period from 1976 to 2010.

3. 2. Model specification

The present paper uses log linear models. The literature shows that the results based on log linear models are more robust and more consistent than the results com-

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1 The data on all the variables is available on the special request from the authors.

puted through the linear form approach (Bowers and Pierce, 1975). Ehrlich (1977) and Layson (1983) argue that the use of log linear models improves the significance and validity of the results as compared with linear form models. In addition, Cameron (1994) and Ehrlich (1996) argue that log linear form is superior to linear form approach and enhances the predicting power of the OLS estimates. The discussion guides us to construct Log Linear Model in the form:

$$LFB_t = \alpha_{C_t} + \alpha_{T_t} LT_t + \alpha_{G_t} LG_t + \alpha_{DS_t} LDS_t + \alpha_{M_t} LM_t + \mu_t \qquad (1)$$

Whereas:

Variables	Data Transformation and Data Sources	Description
LFB_t	Log [Total Expenditures – Total Income]/GDP] *Source: Pakistan Economic Survey (Various Volumes and Issues)*	Fiscal Deficit as share of GDP
LG_t	Log [(Real GDP)/(Total Population)] *Source: WDI (2011)*	Real GDP Per capita
LDS_t	*Log [(Total Debt Servicing)/(Real GDP)]* *Source: WDI (2011)*	Total Debt Servicing as share of GDP
LT_t	Log [(Exports + Imports)/(Real GDP)] *Source: WDI (2011)*	Trade as Share of GDP
LM_t	Log [(Broad Money Supply)/(Real GDP)] *Source: WDI (2011)*	Broad Money Supply as share of GDP (Proxy for money supply)
μ_t	*Error Term*	*Error Term*

3.3. Methodological framework

The unit root problem is investigated by applying Ng - Perron (2001) unit root test; once it is confirmed that the data is stable, the next step is to investigate the long run association among Fiscal Deficit and all factors which are taken into study. Auto Regressive Distributed Lag Model (ARDL) developed by Pesaran *et al.* (2001) is applied to inspect the long run relationship among the variables if the order of integration becomes I(0) and I(1).

The following steps are followed for further analysis:

3.3.1. Unit Root Test (Computing Stationarity)

Ng - Perron (2001) applies GLS de-trending method of ERS. The objective was to develop more consistent and proficient versions of the updated Phillip Perron tests of Perron and Ng (1996). The test developed by Joseph and Sinha (2007) gave more robust results as compared with the conventional unit root tests like Augmented Dickey-Fuller (1981) and Phillips and Perron (1988). These modified PP tests do not reveal the severe size distortions of the PP tests for errors with large negative MA or AR roots, and also, they could have significantly high power than that of Phillip Perron tests; in particular when the value of φ approaches to one. Using the GLS de-trended data y_t^d, the efficient modified PP tests are defined as:

$$\overline{MZ}_a = (T^{-1} y_T^d - \hat{\lambda}^2)\left[2T^{-2}\sum_{t=1}^{T} y_{t-1}^d\right]^{-1} \qquad (2)$$

$$\overline{MSB} = \left[\frac{T^{-2}\sum_{t=1}^{T} y_{t-1}^d}{\hat{\lambda}^2}\right]^{1/2} \qquad (3)$$

$$\overline{MZ}_t = \overline{MZ}_a \times \overline{MSB} \qquad (4)$$

The statistics like $\overline{MZ}_a$ and $\overline{MZ}_t$ are more proficient and efficient versions of the Phillip Perron tests. In case of negative moving average errors; the magnitude of distortions in Phillip Perron Z_a and Z_t tests is quite meager. Ng – Perron derive the asymptotic distributions of these statistics under the local alternative $\varphi = \dfrac{1-c}{T}$ for $D_t = 1$ and $D_t = (1,t)$. Specifically, they demonstrate there is no difference in the asymptotic distribution of $\overline{MZ}_t$ and DF-GLS t-test. The statistic $\overline{MZ}_t$ can possibly be estimated by applying the method of function unit root which is named as "mpp".

3.3.2. ARDL for cointegration

In the present study the explanatory variables have mixed order of integration like I(0) and I(1), and in such cases, Pesaran *et al.* (2001) suggested the suitability of the Auto Regressive Distributed Lag (ARDL) approach to explore the strength of relationship among the running actors of the study in the long run. Pesaran *et al.* (2001) investigated that the existence of long run relationship among the variables of the model will be verified if computed F - statistics through Wald test becomes greater than Upper Critical Bound. Test will become inconclusive if F - statistics comes in between Lower and Upper Critical Bounds. Finally, relationship in the long run span of time will not exit if F - statistics is less than the Lower Critical Bound. However, it is important to notice that by regressing ARDL model, Banerrjee *et al.* (1998) developed Error Correction Mechanism (ECM) approach. The long run association among the variables of this study is estimated by using equations from 5 to 9. These equations are given as below:

$$\Delta LFB_t = \alpha_C + \alpha_{11} LFB_{t-1} + \alpha_{12} LT_{t-1} + \alpha_{13} LG_{t-1} + \alpha_{14} LDS_{t-1} + \alpha_{15} LM_{t-1} +$$

$$\beta_{11}\sum_{i=1}^{p}\Delta LFB_{t-i} + \beta_{12}\sum_{i=0}^{p}\Delta LT_{t-i} + \beta_{13}\sum_{i=0}^{p}\Delta LG_{t-i} + \beta_{14}\sum_{i=0}^{p}\Delta LDS_{t-i} + \beta_{15}\sum_{i=0}^{p}\Delta LM_{t-i} + \eta_1$$

$$(5)$$

$$\Delta LT_t = \alpha_C + \alpha_{21} LFB_{t-1} + \alpha_{22} LT_{t-1} + \alpha_{23} LG_{t-1} + \alpha_{24} LDS_{t-1} + \alpha_{25} LM_{t-1} +$$

$$\beta_{21} \sum_{i=0}^{p} \Delta LFB_{t-i} + \beta_{22} \sum_{i=1}^{p} \Delta LT_{t-i} + \beta_{23} \sum_{i=0}^{p} \Delta LG_{t-i} + \beta_{24} \sum_{i=0}^{p} \Delta LDS_{t-i} + \beta_{25} \sum_{i=0}^{p} \Delta LM_{t-i} + \eta_2$$

$$(6)$$

$$\Delta LG_t = \alpha_C + \alpha_{31} LFB_{t-1} + \alpha_{32} LT_{t-1} + \alpha_{33} LG_{t-1} + \alpha_{34} LDS_{t-1} + \alpha_{35} LM_{t-1} +$$

$$\beta_{31} \sum_{i=0}^{p} \Delta LFB_{t-i} + \beta_{32} \sum_{i=0}^{p} \Delta LT_{t-i} + \beta_{33} \sum_{i=1}^{p} \Delta LG_{t-i} + \beta_{34} \sum_{i=0}^{p} \Delta LDS_{t-i} + \beta_{35} \sum_{i=0}^{p} \Delta LM_{t-i} + \eta_3$$

$$(7)$$

$$\Delta LDS_t = \alpha_C + \alpha_{41} LFB_{t-1} + \alpha_{42} LT_{t-1} + \alpha_{43} LG_{t-1} + \alpha_{44} LDS_{t-1} + \alpha_{45} LM_{t-1} +$$

$$\beta_{41} \sum_{i=0}^{p} \Delta LFB_{t-i} + \beta_{42} \sum_{i=0}^{p} \Delta LT_{t-i} + \beta_{43} \sum_{i=0}^{p} \Delta LG_{t-i} + \beta_{44} \sum_{i=1}^{p} \Delta LDS_{t-i} + \beta_{45} \sum_{i=0}^{p} \Delta LM_{t-i} + \eta_4$$

$$(8)$$

$$\Delta LM_t = \alpha_C + \alpha_{51} LFB_{t-1} + \alpha_{52} LT_{t-1} + \alpha_{53} LG_{t-1} + \alpha_{54} LDS_{t-1} + \alpha_{55} LM_{t-1} +$$

$$\beta_{51} \sum_{i=0}^{p} \Delta LFB_{t-i} + \beta_{52} \sum_{i=0}^{p} \Delta LT_{t-i} + \beta_{53} \sum_{i=0}^{p} \Delta LG_{t-i} + \beta_{54} \sum_{i=0}^{p} \Delta LDS_{t-i} + \beta_{55} \sum_{i=1}^{p} \Delta LM_{t-i} + \eta_5$$

$$(9)$$

Vector Auto Regression (VAR) test depicts inconsistent results at first difference as investigated by Engle - Granger (1987). This problem of inconsistent results could be removed by incorporating the first period lagged term of error correction into the equation of ARDL. The literature reveals that any economy experiences convergence towards long run equilibrium or stability if the sign of the coefficient of the first period lagged term of error correction is significantly negative and vice versa if the sign is positive. The equations from 10 to 14 will estimate the existence of short run dynamics. The stability test of the model is conducted by applying both cumulative sum of recursive residuals (CUSUM) as well as cumulative sum of the squares of recursive residuals (CUSUMsq).

$$\Delta LFB_t = \beta_C + \beta_{11} \sum_{i=1}^{p} \Delta LFB_{t-i} + \beta_{12} \sum_{i=0}^{p} \Delta LT_{t-i} + \beta_{13} \sum_{i=0}^{p} \Delta LG_{t-i} + \beta_{14} \sum_{i=0}^{p} \Delta LDS_{t-i} +$$

$$\beta_{15} \sum_{i=0}^{p} \Delta LM_{t-i} + \gamma_{11} ECM_{t-1} + \varepsilon_1$$

$$(10)$$

$$\Delta LT_t = \beta_C + \beta_{21} \sum_{i=0}^{p} \Delta LFB_{t-i} + \beta_{22} \sum_{i=1}^{p} \Delta LT_{t-i} + \beta_{23} \sum_{i=0}^{p} \Delta LG_{t-i} + \beta_{24} \sum_{i=0}^{p} \Delta LDS_{t-i} +$$

$$\beta_{25} \sum_{i=0}^{p} \Delta LM_{t-i} + \gamma_{21} ECM_{t-1} + \varepsilon_2$$

$$(11)$$

$$\Delta LG_t = \alpha_C + \beta_{31} \sum_{i=0}^{p} \Delta LFB_{t-i} + \beta_{32} \sum_{i=0}^{p} \Delta LT_{t-i} + \beta_{33} \sum_{i=1}^{p} \Delta LG_{t-i} + \beta_{34} \sum_{i=0}^{p} \Delta LDS_{t-i} +$$

$$\beta_{35} \sum_{i=0}^{p} \Delta LM_{t-i} + \gamma_{31} ECM_{t-1} + \varepsilon_3$$

$$(12)$$

$$\Delta LDS_t = \beta_C + \beta_{41} \sum_{i=0}^{p} \Delta LFB_{t-i} + \beta_{42} \sum_{i=0}^{p} \Delta LT_{t-i} + \beta_{43} \sum_{i=0}^{p} \Delta LG_{t-i} + \beta_{44} \sum_{i=1}^{p} \Delta LDS_{t-i} +$$
$$\beta_{45} \sum_{i=0}^{p} \Delta LM_{t-i} + \gamma_{41} ECM_{t-1} + \varepsilon_4 \tag{13}$$

$$\Delta LM_t = \beta_C + \beta_{51} \sum_{i=0}^{p} \Delta LFB_{t-i} + \beta_{52} \sum_{i=0}^{p} \Delta LT_{t-i} + \beta_{53} \sum_{i=0}^{p} \Delta LG_{t-i} + \beta_{54} \sum_{i=0}^{p} \Delta LDS_{t-i} +$$
$$\beta_{55} \sum_{i=1}^{p} \Delta LM_{t-i} + \gamma_{51} ECM_{t-1} + \varepsilon_5 \tag{14}$$

3.4. Variables and hypothesis

This study takes into account fiscal deficit as dependent variable and other factors like GDP growth, trade, debt servicing, and money supply as independent variables. The explanation of the variables used in the model is given below:

3.4.1. Fiscal deficit

Fiscal deficit generally represents the situation whereby the expenditures of the government are greater than that of its income. It opens up the room for deficit financing through both internal and external sources. It stimulates overall debt burden in the country and high debt burden will ultimately take a country into the vicious circle of foreign dependence. In many of the developing countries, the impact of dependence of any country on the foreign assistance has not been appreciable - rather it has caused many other serious challenges. Therefore, to avoid many macroeconomic ills, it is imperative to nip the macroeconomic ill like fiscal deficit from the bud. In this article, an attempt is made to investigate some of the essential instruments which cause fiscal deficit in Pakistan. The data set of fiscal deficit as share of GDP is generated by subtracting first the overall government revenue from the overall government expenditures and then taking the ratio of the resultant difference to the real GDP for the period of 1976 - 2010.

3.4.2. Trade as share of GDP

This variable is measured by taking the ratio of the value of trade to the real GDP. It usually has negative impact on the fiscal deficit in the countries where the exports of a country are greater than the imports. However, in case of Pakistan, it is anticipated that the international trade will have positive impact on the fiscal deficit. The prime reason for this positive impact is that the trade balance of Pakistan with the exception of one year has remained negative throughout the history of Pakistan and imports are always in excess of exports. Consequently, low foreign exchange earnings are earned which contribute meagerly to the government revenue on the one hand, and payments against the high imports put pressure on expenditures of the government on the other hand.

3.4.3. Real GDP per capita as a proxy for economic growth

This factor is obtained by dividing the Real GDP on the Population. It is expected that the real GDP per capita plays a vital role in reducing fiscal deficit in Pakistan.

3.4.4. Total Debt Servicing as share of GDP

This variable is measured by taking the ratio of the total debt servicing to the real GDP. This variable shows that if country is heavily paying its debt along with the interest then governments have fewer amounts available in order to invest on infrastructure, social sector development, and to address real macro-economic problems (like inflation, unemployment, low rate of economic growth and trade imbalance etc.). It is expected that increasing total debt servicing increases fiscal deficit.

3.4.5. Broad Money Supply as share of GDP

Broad money supply as share of GDP is considered the determinant of fiscal deficit in Pakistan. This variable is taken by dividing the monetary asset on the real GDP and is used as proxy for money supply. It is anticipated that monetary asset as share of GDP will reduce fiscal deficit in Pakistan.

4. Empirical estimation and interpretation of the results

Table 1 represents the descriptive statistics and pair-wise correlations. The variables of the present study are positively linked to each other and the values of mean and median are in between the range of minimum and maximum values. Also, the probability values of Jarque Bera test are more than 0.1; therefore, this table concludes that the error term of the model is normally distributed.

Table 1: Descriptive statistics and coefficient of correlation matrix

	LFB_t	LT_t	LG_t	LDS_t	LM_t
Mean	2.551989	4.117560	8.574010	4.089591	-2.367455
Median	2.615126	4.042210	8.314028	4.253773	-2.437828
Maximum	3.581301	5.025059	10.41754	5.184755	-1.496032
Minimum	1.126162	3.408249	6.346413	2.093101	-3.150237
Std. Dev.	0.708021	0.512615	1.297101	0.827380	0.497259
Skewness	-0.267400	0.377078	-0.037687	-0.846798	0.289893
Kurtosis	1.853777	1.884534	2.220712	2.855561	1.902374
Jarque-Bera	2.266439	2.568441	0.868375	4.092930	2.182992
Probability	0.321995	0.276866	0.647791	0.129191	0.335714

To check the existence of a unit root problem, the Ng - Perron (2001) test is applied. Table 2 reports mixed order of integration; some variables are integrated at level say I(0) and some variables are integrated at first difference say I(1). This gives us a strong justification to apply Auto Regressive Distributed Lag (ARDL) approach to scrutinize the strength of long run association among the both regressand and regrossors of the present study.

	Lag Length Criterion	MZa	MZt	MSB	MPT
LFB_t	SIC	-5.19001	-1.59826	0.30795	4.75303
	AIC	-5.19001	-1.59826	0.30795	4.75303
	HQC	-5.19001	-1.59826	0.30795	4.75303
ΔLFB_t	SIC	-15.8243***	-2.80986	0.17757	1.55940
	AIC	-15.8243***	-2.80986	0.17757	1.55940
	HQC	-15.8243***	-2.80986	0.17757	1.55940
LT_t	SIC	-6.96954*	-1.81431	0.26032	3.69693
	AIC	-6.96954*	-1.81431	0.26032	3.69693
	HQC	-6.96954*	-1.81431	0.26032	3.69693
ΔLT_t	SIC	-15.8237***	-2.80199	0.17708	1.58852
	AIC	-15.8237***	-2.80199	0.17708	1.58852
	HQC	-15.8237***	-2.80199	0.17708	1.58852
LG_t	SIC	0.18773	0.11205	0.59687	25.1593
	AIC	0.18773	0.11205	0.59687	25.1593
	HQC	0.18773	0.11205	0.59687	25.1593
ΔLG_t	SIC	-15.9400***	-2.82130	0.17700	1.54376
	AIC	-15.9400***	-2.82130	0.17700	1.54376
	HQC	-15.9400***	-2.82130	0.17700	1.54376
LDS_t	SIC	-0.60621	-0.34814	0.57429	20.2379
	AIC	-0.38224	-0.23778	0.62207	23.7458
	HQC	-0.60621	-0.34814	0.57429	20.2379
ΔLDS_t	SIC	-14.9166***	-2.70838	0.18157	1.72730
	AIC	-14.9166***	-2.70838	0.18157	1.72730
	HQC	-14.9166***	-2.70838	0.18157	1.72730
LM_t	SIC	-8.18047**	-2.00603	0.24522	3.05630
	AIC	-8.18047**	-2.00603	0.24522	3.05630
	HQC	-8.18047**	-2.00603	0.24522	3.05630
ΔLM_t	SIC	-14.9349***	-2.72508	0.18246	1.66899
	AIC	-14.9349***	-2.72508	0.18246	1.66899
	HQC	-14.9349***	-2.72508	0.18246	1.66899
Asymptotic critical values*	1%	-13.8000	-2.58000	0.17400	1.78000
	5%	-8.10000	-1.98000	0.23300	3.17000
	10%	-5.70000	-1.62000	0.27500	4.45000
Note: *, ** & *** indicate significance at10%, 5% & 1% levels respectively. SIC = Schwarz Information Criterion. AIC = Akaike Information Criterion. HQC = Hannan-Quinn Criterion.					

Table 3 discloses that both F-statistics and W–statistics are significant at 5% level of significance, hence indicating the existence of long run relationship among fiscal deficit, international trade, economic growth, total debt servicing and broad money supply.

Table 3: ARDL bounds testing approach

Estimated Models	$FB_t = f(T_t, G_t, DS_t, M_t)$	$T_t = f(FB_t, G_t, DS_t, M_t)$	$M_t = f(DS_t, G_t, T_t, FB_t)$	$G_t = f(T_t, FB_t, DS_t, M_t)$	$DS_t = f(G_t, T_t, FB_t, M_t)$
Optimal lags	(1,1,0,1,1)	(1,1,1,0,0)	(1,0,0,1,1)	(1,1,1,1,0)	(1,0,0,1,1)
F-statistics	4.7663*	9.3927*	4.2902**	5.0063*	3.0027
W-statistics	23.8317*	46.9633*	21.4510**	25.0313*	15.0136
	Critical Bounds For F – Statistics			Critical Bounds For W – Statistics	
Significance Level	Lower Critical Bound	Upper Critical Bound	Lower Critical Bound	Upper Critical Bound	
5 per cent	3.2178	4.6443	16.0888	23.2217	
10 per cent	2.6867	3.8991	13.4337	19.4955	
DIAGNOSTIC TESTS					
R^2	0.9445	0.9697	0.95457	0.9933	0.62823
Adjusted - R^2	0.6019	0.9612	0.94184	0.9911	0.8845
F-statistics	2.0644	114.334*	75.0353*	446.7616*	35.9902*
Breusch Godfrey LM Test	0.6019 [0.446]	2.1848 [0.139]	0.1618 [0. 691]	1.3339 [0.260]	2.8713 [0.103]
Hetero – skedasticity Test	0.4744 [0. 496]	0.4887 [0.490]	0.25462 [0.617]	2.9780 [0.094]	0.4372 [0.513]
Ramsey RESET	2.0644 [0.164]	1.2885 [0.256]	0.2408 [0.627]	7.7040 [0.011]	1.6240 [0.215]
Note: * & ** show significant at 5% & 10% level respectively. We have used critical bounds developed by Narayan (2005) for W – Statistics.					

The impact of regressors on regressand is captured by applying Fully Modified Ordinary Least Square (FMOLS) technique for estimating long run dynamics whereas Error Correction Mechanism (ECM) is applied to compute short run dynamics and these results for both long run and short run dynamics are reported in Table 4.

Table 4: Long run and short run dynamics

Estimated long run coefficients				
Dependent variable: LFB_t				
Variable	Coefficient	Std. Error	t-Statistic	Prob. Value
LFB_{t-1}	0.574358	0.120632	4.761233	0.0001
LT_t	0.968076	0.114588	8.448291	0.0000
LG_t	-0.112680	0.075129	-1.499817	0.1457
LDS_t	0.294335	0.129280	2.276718	0.0313
LDS_{t-1}	-0.263071	0.116939	-2.249632	0.0332
LM_{t-1}	-0.630570	0.146651	-4.299790	0.0002
C	-3.619095	1.247847	-2.900272	0.0075
Estimated Short run Coefficients by Error Correction Mechanism				
Dependent Variable: ΔLFB_t				
Variable	Coefficient	Std. Error	t-Statistic	Prob. Value
ΔLT_t	0.688296	0.293052	2.348714	0.0267
ΔLG_t	-1.545823	0.560700	-2.756954	0.0105
ΔLDS_{t-1}	-0.219245	0.124367	-1.762884	0.0897
ΔLM_t	-1.071200	0.626832	-1.708910	0.0994
ecm_{t-1}	-0.281337	0.157989	-1.780742	0.0866
C	0.166492	0.081729	2.037115	0.0519
R-squared	0.845402	Mean dependent variable		-0.027696
Adjusted R-squared	0.815671	S.D. dependent variable		0.466116
S.E. of regression	0.200120	Akaike info criterion		-0.212439
Sum squared residual	1.041247	Schwarz criterion		0.062386
Log likelihood	9.399032	Hannan-Quinn criterion		-0.121343
F-statistic	28.43557	Durbin-Watson stat		1.978190
Prob. (F-statistic)	0.000000			

The results in the above table reveal that economic growth is insignificantly and inversely related to fiscal deficit in long run but it is significantly and inversely linked to fiscal deficit in the short run; first lag of total debt servicing is significantly and inversely associated with fiscal deficit in both long run and short run. Lag of broad money supply is significantly but inversely interconnected to the fiscal deficit in the long run but broad money supply adds inversely and significantly to fiscal deficit in the short run in Pakistan.

However, fiscal deficit is hit significantly and positively by its first lag in the long run, international trade is increasing fiscal deficit significantly both in long run and in short run and finally total debt servicing is significantly but positively contributing to the fiscal deficit in the long run in Pakistan. The coefficient of ecm_{t-1} is significantly negative. This validates that there exists convergence to achieve long run equilibrium.

Also, it takes (1/0.281337 = 3.5545) almost three and half years to achieve long run and stable equilibrium because the speed of adjustment is very strong.

It is quite understandable that economic growth helps in reducing fiscal deficit. Increase in money supply assists the government to finance its deficits and hence its impact is negative on the fiscal deficit. As far as the lag of the debt servicing is concerned, the negative sign reveals that the payment of loans during the last year reduces the size of public debt and hence allows government to allocate meager amounts for paying its debt in the present year. Consequently, public deficit shrinks in the country.

Table 5 reveals the empirical results for the existence of univariate or bivariate Granger causality. The empirical findings for short run dynamics expose that there exists univariate Granger causality from economic growth to fiscal deficit, from total debt servicing to fiscal deficit, from fiscal deficit to international trade, from international trade to economic growth, and from total debt servicing to economic growth. However, there is evidence of feedback effect between fiscal deficit and broad money supply and economic growth and broad money supply in short run in Pakistan. It is also evidenced that there exists long run Granger Causality for the model of fiscal deficit and for the model of international trade. This reveals that fiscal deficit and international trade are the functions of disequilibrium in co-integrating relationship. However, fiscal deficit, economic growth, total debt servicing and broad money supply Granger cause international trade in the long run.

Table 5: Granger causality test and joint short and long run Granger causality

Granger Causality Test					
Dependent variable	Short-run				Long-run
	ΔLFB_t	ΔLT_t	ΔLG_t	ΔLDS_t	ΔLM_t	ECM_{t-1}
	F-statistics					[t-statistics]
ΔLFB_t	–	1.149200	6.266797***	5.421499**	3.465769**	-0.315927* [-1.878044]
ΔLT_t	3.211907*	–	0.260685	0.629580	1.143720	-0.81233*** [-3.910927]
ΔLG_t	0.397912	7.965318***	–	3.118946*	151.9017***	0.009395 [0.522776]
ΔLDS_t	1.786019	1.719313	1.788549	–	1.906879	-0.215245 [-0.961424]
ΔLM_t	94.40478***	1.246212	5.320994**	1.850738	–	-0.025423 [-0.254818]

Joint Short and Long Run Granger Causality F-statistics				
	$\Delta LFB_t, ECM_{t-1}$	$\Delta LT_t, ECM_{t-1}$	$\Delta LG_t, ECM_{t-1}$	$\Delta LDS_t, ECM_{t-1}$	$\Delta LM_t, ECM_{t-1}$
ΔLFB_t	–	2.971527*	4.560686**	5.143153***	2.779043*
ΔLT_t	2.484197*	–	0.185507	0.881167	1.033996
ΔLG_t	12.12446***	14.19145***	–	15.55553***	157.7511***
ΔLDS_t	3.061462*	2.365184	1.458208	–	1.505764
ΔLM_t	63.00659***	12.75049***	9.847450***	10.16776***	–
*, **, *** represent 10%, 5% and 1% levels of significance.					

Table 5 further exposes the empirical results for the existence of joint causality (both short run and long run causality) among the variables of the study. The estimated results show that there exists joint causality among all the variables of model no. 1, model no. 3 and model no. 5.

However, for model no. 2, there exists joint causality between international trade and fiscal deficit and for model no. 4 there is joint causality between fiscal deficit and total debt servicing. Finally, stability test is applied to investigate whether a stable relation among fiscal deficit and its actors exists. It is found that both CUSUM and CUSUMsquares reveal stable results (figure 1 and 2 below).
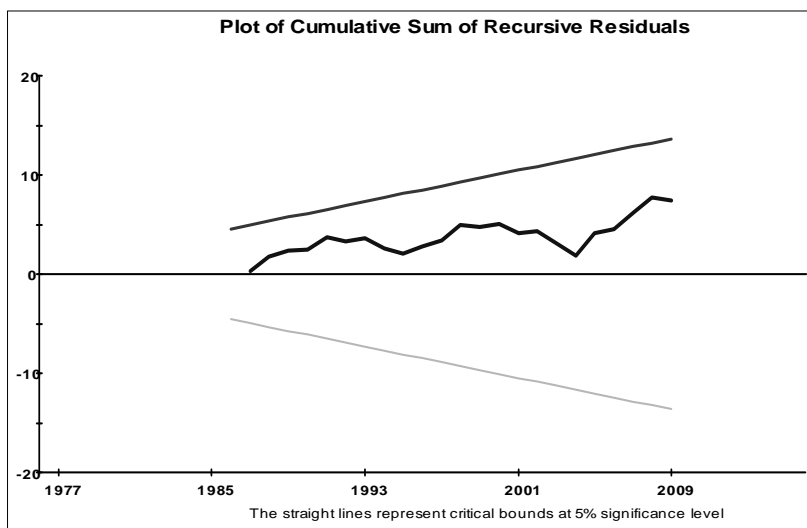

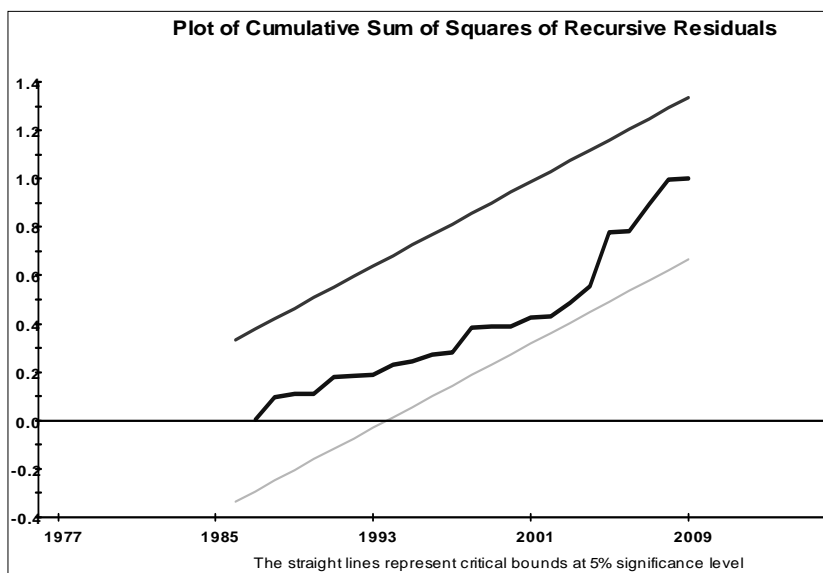**Figure 1:** Cumulative sum of recursive residuals

Figure 2: Cumulative sum of squares of recursive residuals

5. Conclusions and policy implications

5.1. Conclusions

Fiscal deficit, a permanent feature of developing countries, poses serious challenges to these economies. Pakistan has been experiencing a high fiscal deficit for the last years - its annual fiscal deficit hovers around 6 percent of GDP since 1990s (Pakistan Economic Survey, 2010-11). The consequences of such a high fiscal deficit are in terms of accelerating burden of internal and external borrowing. The study has estimated the relationship between fiscal deficit and other macroeconomic variables both for the long run as well as short run for the period of 1976-2010. Granger causality test has been also applied to find out the direction of causality among the running actors.

The study concludes that economic growth does not have any significant impact on fiscal deficit in the long run but it reduces fiscal deficit significantly in the short run. Debt servicing has positive and significant relationship with fiscal deficit indicating that any increase in debt servicing will put a pressure on government treasure. The results show that total debt servicing when lagged by one year significantly reduces fiscal deficit in both long run and short run. The broad money supply and its lag by one year is significantly curtailing fiscal deficit in the short run and long run respectively. This is very plausible as with the available money supply the government is able to release the revenue pressure. The results indicate a positive relationship between international trade and fiscal deficit in both long run and short run implying the curtailment of the volume of imports. By taking the lag of fiscal deficit by one year it is found that it has positive impact on fiscal deficit in the long run. It means fiscal deficit in the current year will enhance the deficit in the next year. This may be due to the expectations that the government will continue to increase or maintain its total expenditure next year.

This study also finds the existence of univariate Granger causality from economic growth to fiscal deficit, from total debt servicing to fiscal deficit, from fiscal deficit to international trade, from international trade to economic growth, and from total debt servicing to economic growth in short run span of time. Also, it has found that there is feedback effect between fiscal deficit and broad money supply and economic growth and broad money supply in short run in Pakistan. It is also evidenced that there exists long run Granger Causality for the model of fiscal deficit and its factors and for the model of international trade and its factors. The study has also found the existence of joint causality among fiscal deficit and its factors in model no. 1, economic growth and its factors in model no. 3, and broad money supply and its factors in model no. 5. Moreover, for model no. 2, there exists joint causality between international trade and fiscal deficit and for model no. 4, there exists joint causality between fiscal deficit and total debt servicing in Pakistan for the period of 1976 - 2010.

5.2. Policy implications

Fiscal imbalance is a serious challenge of a current time and it must be addressed seriously by considering the following steps.

1. The higher GDP growth should be targeted by removing structural barriers to economic growth. Structural reforms are required in tax legislation, trade policy, privatization of State Owned Enterprises, human resource development etc.
2. Another reason of fiscal deficit is the amount of debt servicing. The higher debt payments are increasing fiscal deficit in Pakistan. Government may give priority to generate internal resources for funds.
3. The trade balance of Pakistan has remained negative for the past decades. Efforts should be made to control negative trade balance and this is possible by increasing exports through improving the quality of products and by exploring new international avenues. To curtail imports, import substitute industry must be installed by providing enabling environment to both domestic and foreign investors. The improvement in trade balance may ultimately improve fiscal deficit.
4. The results show that increase in money supply reduces fiscal deficit in Pakistan indicating the government's reliance on banks to finance its deficit which curtails the availability of credit to the private sector for investment. The focus of the monetary management may be on reducing inflation as well as restricting the credit to the government. The government may focus on generation more revenue through introducing structural reforms like widening the tax base, reforming tax legislation policy etc.

References:

1. Agenor, P.R. and Montiel, P.J., *Development Macroeconomics*, 3rd edition, Princeton University Press, 2008.
2. Agha A.I. and Khan, M.S., 'An Empirical Analysis of Fiscal Imbalances and Inflation in Pakistan', 2006, *SBP Research Bulletin*, vol. 2, no. 2, pp. 343-362.
3. Agnello, L. and Sousa, R.M., 'The Determinants of Public Deficit Volatility', 2009, Working Paper Series no. 1042, European Central Bank, Eurosystem.
4. Ahmed, H., 'Is Inflation a Fiscal Phenomnon in Pakistan?' 2007, [Online] available at http://www.esds.ac.uk/international/documents/conf2007hahmad.pdf, accessed on September 20, 2013.
5. Alesina, A.F. and Ardagna, S., 'Large Changes in Fiscal Policy: Taxes versus Spending', 2009, NBER Working Paper no. 15438, National Bureau of Economic Research.
6. Alesina, A., 'Fiscal Adjustments: What Do We Know and What Are We Doing?', 2010, Working Paper no. 10-61, Mercatus Centre, George Mason University.
7. Alesina, A. and Perotti, R., 'The Political Economy of Budget Deficits', 1995, *IMF Staff Papers*, vol. 42, no. 1, pp. 1-31.
8. Alesina, A. and Roberto, P., 'Fiscal Adjustments in OECD Countries: Composition and Macroeconomic Effects', 1997, *International Monetary Fund Staff Papers*, vol. 44, no. 2, pp. 210 - 248.
9. Bannerjee, A., Dolado, J. and Mestre, R.,'Error-Correction Mechanism Tests for Cointegration in Single Equation Framework', 1998, *Time Series Analysis*, vol. 19, no. 3, pp. 267-283.
10. Bowers, W. and Pierce, G., 'The Illusion of Deterrence in Isaac Ehrlich's Work on the Deterrent Effect of Capital Punishment', 1975, *Yale Law Journal*, vol. 85, no. 2, pp. 187-208.

11. Cameron, S., 'A Review of the Econometric Evidence on the Effects of Capital Punishment', 1994, *Journal of Socio-Economics*, vol. 23, no. 1-2, pp. 197-214.
12. Chadhry, M. and Ahmed, N., 'Money Supply, Deficit and Inflation in Pakitsan', 1995, *Pakistan Development Review*, vol. 34, no. 4, pp. 945-956.
13. Chaudhary, M.A. and Shabbir, G., 'Macroeconomic Impacts of Budget Deficits on Pakistan's Foreign Sector', 2005, *Pakistan Development Review*, vol. XL111, no. 2, pp. 185-198.
14. Dickey, D.A. and Fuller, W.A., 'Likelihood Ratio Statistics for Autoregressive Time Series with a Unit Root', 1981, *Econometrica*, vol. 49, no. 4, pp. 1057-1072.
15. De Cos, P.H. and Benito, E.M., 'Fiscal Consolidations: Impact on Growth Determinants of Success', 2012, [Online] available at http://www.vcharite.univ-mrs.fr/ocs/index.php/LAGV11/LAGV11/paper/view/773/528, accessed on September 12, 2013.
16. Engle, R.F. and Granger, G. 'Co-integration and Error Correction: Representation, Estimation and Testing', 1987, *Econometrica*, vol. 55, no. 2, pp. 251-276.
17. Ehrlich, I., 'The Deterrent Effect of Capital Punishment Reply', 1977, *American Economic Review*, vol. 67, no. 3, pp. 452-58.
18. Ehrlich, I., 'Crime, Punishment and the Market for Offences', 1996, *Journal of Economic Perspectives*, vol. 10, no. 1, pp. 43-67.
19. Giavazzi, F. and Pagano, M., 'Non-Keynesian Effects of Fiscal Policy Changes: International Evidence and the Swedish Experience', 1996, *Swedish Economic Policy Review*, vol. 3, no. 1, pp. 67-103.
20. Giavazzi, F. and Pagano, M., 'Can Severe Fiscal Contractions Be Expansionary? Tales of Two Small Countries', 1990, NBER Working Paper no. 3372, National Bureau of Economic Research.
21. Ihori, T. and Atsushi, N., 'Japan's Fiscal Policy and Fiscal Reconstruction', *International Economics and Economic Policy*, 2005, vol. 2, no. 2-3, pp. 153-172.
22. Joseph, M. and Sinha, D., 'Does Black's Hypothesis for Output Variability Hold for Mexico?', 2007, [Online] available at http://mpra.ub.uni-muenchen.de/4021/1/MPRA_paper_4021.pdf, accessed on September 1st, 2013.
23. Kumar, M.S., Leigh, D. and Plekhanov, A., 'Fiscal Adjustments, Determinants and Macroeconomic Consequences' 2007, IMF Working Paper, WP/07/178.
24. Layson, S., 'Homicide and Deterrence: Another View of the Canadian Time-Series Evidence', 1983, *Canadian Journal of Economics*, vol. 16, no. 1, pp. 52-73.
25. Leachman, L.L., Rosas, G., Lange, P. and Bester, A., 'The Political Economy of Budget Deficits', *Economics and Politics*, vol. 19, no. 3, pp. 369-420.
26. Narayan, P.K, 'The Saving and Investment Nexus for China: Evidence from Co - Integration Tests', 2005, *Applied Economics*, vol. 37, no. 17, pp. 1979-1990.
27. Ng, S. and Perron, P., 'Lag Length Selection and the Construction of Unit Root Tests with Good Size and Power', 2001, *Econometrica*, vol. 69, no. 6, pp. 1519-1554.
28. Oladipo, S.O. and Akimboboal, T.O., 'Budget Deficit and Inflation in Nigeria: A Causal Relationship', 2011, *Journal of Emerging Trends in Economics and Management Sciences*, vol. 2, no. 1, pp. 1-8.
29. Pakistan Economic Survey, Government of Pakistan, Finance Division, Economic Adviser's Wing, Islamabad, 2011.
30. Pakistan Economic Survey, Government of Pakistan, Finance Division, Economic Adviser's Wing, Islamabad, 2012.

31. Pakistan Economic Survey, (Various Volumes and Issues), Government of Pakistan, Finance Division, Economic Adviser's Wing, Islamabad.

32. Peacock, A.T. and Wiseman, J., *The Growth of Public Expenditure in the United Kingdom,* Princeton, NJ: Princeton University Press, 1961.

33. Phillips, P.C.B. and Perron, P., 'Testing for a Unit Root in Time Series Regression', 1988, *Biometrika*, vol. 75**,** no. 2, pp. 335-346.

34. Perron, P. and Ng, S. 'Useful Modifications to Some Unit Root Tests with Dependent Errors and their Local Asymptotic Properties', 1996, *Review of Economic Studies,* vol. 63, no. 3, pp. 435-463.

35. Persson, T. and Tabellini, G., 'Political Economy and Macroeconomic Policy', 1997, NBER Working Paper no. 6329, National Bureau of Economic Research, Inc.

36. Pesaran, M.H., Richard, J. and Shin, Y., 'Bounds Testing Approaches to the Analysis of Level Relationships', 2001, *Journal of Applied Econometrics*, vol. 16, no. 3, pp. 289-326.

37. Roubini, N. and Sachs, J.D., 'Political and Economic Determinants of Budget Deficits in the Industrialized Democracies', 1989, *European Economic Review,* vol. 33, no. 5, pp. 903-938.

38. Woo, J., 'Economics, Political, and Institutional Determinants of Public Deficits', 2003, *Journal of Public Economics*, vol. 87, no. 3-4, pp. 387-426.

39. World Bank, 'World Development Indicators' [CD Rom 2011], 2011, Washington, D.C: World Bank.

40. Zafar, Z. and Mustafa, Z., 'Macroeconomic Determinant of Economic Growth in Pakistan', 1998, *Pakistan Development Review*, vol. 37, no. 2, pp. 125-148.