Pakistan Economic and Social Review
Volume 50, No. 1 (Summer 2012), pp. 23-40

PUBLIC DEBT SUSTAINABILITY
Evidence from Developing Country

TAHIR MAHMOOD and SHAHNAZ A. RAUF*

Abstract. This paper examines the debt sustainability issue in Pakistan by using the present value of budget constraint approach. Empirical results indicate that the series of government expenditure, revenue and discounted debt are non-stationary. The necessary conditions for debt sustainability are not met and debt has remained unsustainable throughout the period from 1971-2011. The debt reduction achieved in the early period of 2000s seems to be transitory in nature. It is also shown that the problem of debt sustainability stems from persistent fiscal indiscipline. The paper concludes that debt profile of the country will remain under pressure if a major correction in fiscal policy is not made.

Keywords: Public debt, Discounted debt, Primary surpluses, Debt sustainability, Dynamic OLS, Cointegration

JEL classification: C22, C52, E62, F34

I. INTRODUCTION

The recent global recession and the resulting increase in fiscal deficit has generated renewed interest in domestic as well as external debt sustainability issue of the highly indebted developed and developing countries. To deal with recessionary phase most governments have been following counter cyclical fiscal policies by giving large fiscal stimulus to their economies. This has, however, led to increased budget deficits and worsening of the debt sustainability indicators.

---

*The authors are, respectively, Associate Professor of Economics at University of Veterinary and Animal Sciences, Lahore, and Professor of Economics at Air University, Islamabad (Pakistan).
Corresponding author e-mail: tahir.chaudary@gmail.com

Although the fiscal stimulus in Pakistan was restrained by the IMF SBA programme of 2008, the fiscal deficit increased from 3.3 percent of GDP to 6.6 during 2005-2011 percent, causing decrease in debt to GDP ratio from 62.6 percent of GDP to 59.4 percent of GDP over this period, while GDP growth remained as low as 2 percent during the same period. Both the fiscal deficit and debt to GDP ratio were higher than the average ratios of the developing countries (State Bank of Pakistan, 2010).

The debt sustainability issues evaluated in terms of the inter-temporal budget constraint imply that without a major correction in fiscal policy, which may be socially or economically less palatable, the present debt profile of the country will continue to remain under pressure. It also means high inflation will persist if the government continues to finance its budgetary deficit through seigniorage revenue, *i.e.* borrowings from the State Bank of Pakistan. Further more the objective of fiscal decentralization and attainment of fiscal space can be achieved only if the provincial governments also show fiscal discipline and prudent economic management. For the second year in a row that provinces are showing either deficit or a surplus lower than envisaged in the budgets. As a result, the government's fiscal deficit targets are missed.

The assessment of debt sustainability issue has been made by studies in terms of traditional debt indicators. For example, Bilquees (2003) and Pasha and Ghaus (2005) simply examine the evolution of public debt and identify the cumulative effect of successive large primary budget deficit and the non-interest current account deficit as the two main factors responsible for the rise in debt. However, there is hardly any study on empirical testing of the debt sustainability issue based on a sound theoretical model. This paper, on the other hand, empirically tests the debt sustainability issue based on a theoretical framework relevant to the macro economic framework prevailing in Pakistan as well as in developing countries.

In other words, a theoretical model forms the basis of examining the sustainability issue and testing of the validity of government inter-temporal budget constraint or the Non-Ponzi Condition. Structural breaks in fiscal policy are also tested to assess the validity of inferences made about the debt sustainability issue using the dynamic ordinary least square technique.

Plan of this paper is as follows, after introduction section II presents a theoretical framework that forms the basis of the model estimation. Section III discusses the estimation methods. Section IV presents the results of debt sustainability tests and finally the conclusion and some recommendations are given in section V of the paper.

II. THEORETICAL FRAMEWORK
The Present Value Budget Constraint (PVBC) Approach to Public Debt Sustainability

The issue of debt sustainability and debt dynamics has been studied in the literature under two approaches, *i.e.* the Accounting and the Present Value approaches (Cuddington, 1996). Although the starting point of both the approaches involves the government budget constraint, the accounting approach entails the use of derived necessary and sufficient conditions for analyzing the debt sustainability issue, whereas the present value budget constraint (PVBC) approach evaluates debt sustainability through econometric testing of the validity of the PV of the budget constraint or Non-Ponzi game (NPG) conditions. Empirical evidence regarding the use of this approach to test the stationarity of budget deficit and the discounted debt series is scant and the available literature provides mixed results. For example, Hamilton and Flavin (1986) reports stationarity of both the series, whereas Wilcox (1989) and Trehan and Walsh (1991) report weak evidence of sustainability of the discounted debt series. Similarly, Luporini (1999) report mixed results about the stationarity of the discounted debt series of Brazil.

Basically, the usual budget constraint of a government, expressed as below, provides information about the extent of budget deficit and the various sources of financing the deficit.[1]

$$G_t - R_t + i_t B_{t-1} = \Delta B_t \tag{1}$$

Where B_t is public debt inclusive of domestic and external debt, G_t is government expenditure, and R_t is revenue.

In the context of Pakistan and developing countries, one difficulty with the above mentioned budget constraint is that the debt sustainability analysis must involve its reliance on seigniorage and tax revenue/non tax revenue/surcharges etc. to finance the deficit. For example, Pakistan like other developing countries is financing a substantial proportion of its fiscal deficit with these two sources. Of the overall budget deficit, financing through internal borrowing increased from 42 percent to 91 percent, out of which bank borrowing was 27 percent and 51.5 percent during 2007-2011. Therefore, a realistic budget constraint for developing countries like Pakistan may be written as:

---

[1]This paper is heavily drawn from two studies, *i.e.* Cuddington (1996) and Sidiropoulos and Papadopoulos (1999).

$$G_t - R_t + r_t B_{t-1} = \Delta B_t + \Delta H_t \quad (2)$$

$$B_t = B_t^D + B_t^F$$

R = Tax revenue + Non-tax revenue + surcharges + Grants.[2]

G = Government current and development expenditure (exclusive of interest payments)

B_t = Public Debt

B_t^F = External Debt (excluding guaranteed and non-guaranteed private debt)

r_t = Real interest rate

B_t^D = Domestic Debt

H_t = High Powered Money for budgetary support

The LHS of budget constraint of equation (2) expresses fiscal deficit as a sum of primary deficit and the real interest rate, whereas the RHS of the equation indicates the sources of financing of fiscal deficit.

With a little manipulation, we get

$$-PS_t + (1 + r_t)B_{t-1} = B_t + \Delta H_t$$

$$B_t = (1 + r_t)B_{t-1} - (PS_t + \Delta H_t) \quad (3)$$

$$B_t = (1 + r_t)B_{t-1} - S_t \quad (4)$$

Where PS_t is the primary balance?

Since the variable measuring primary balances is of prime interest, it may be noted that a negative primary balance, *i.e.* $PS_t < 0$, simply means that the government is going to meet its debt obligations either by issuing new debt or by monetizing it. Alternatively it may also opt for a mix of the two sources to finance the budgetary deficit. On the contrary, in case of a primary surplus, *i.e.* $PS_t > 0$, the government can use primary surplus to retire its debt and reduce the stock of debt. Thus the sum of primary balances and change in monetary base is denoted by $S_t = (PS_t + \Delta H_t)$.

[2]Grants proceeds are a financing component. It is not a debt generating one. So we include it in the revenue receipt.

To derive the intertemporal budget constraint, the above mentioned equation is iterated N periods forward, *i.e.*

$$B_t = (1+r_{t+1})^{-1} B_{t+1} + (1+r_{t+1})^{-1} S_{t+1} \tag{5}$$

$$B_{t+1} = (1+r_{t+2})^{-1} B_{t+2} + (1+r_{t+2})^{-1} S_{t+2}$$

By substituting values of B_{t+1} in equation (5) and taking expectations, as N tends to infinity the resulting equation takes the following form:

$$B_t = \lim_{N\to\infty} E_t \prod_{j=1}^{N} (1+r_{t+j})^{-1} B_{t+N} + \lim_{N\to\infty} E_t \sum_{N=0}^{\infty} \prod_{j=1}^{N} (1+r_{t+j})^{-1} S_{t+N} \tag{6}$$

Where $\prod_{j=1}^{N} (1+r_{t+j})^{-1}$ is the time-varying real discount factor.

A necessary and sufficient condition for debt sustainability is that as $N \to \infty$, the present discounted value of the expected debt to GDP ratio converges to zero. Thus the government solvency constraint, or transversality condition, can be expressed as:

$$E_t \lim_{N\to\infty} \prod_{j=1}^{N} (1+r_{t+j})^{-1} B_{t+N} = 0 \tag{7}$$

In case of $\lim_{N\to\infty} \prod_{j=1}^{N} (1+r_{t+j})^{-1} B_{t+N} < 0$, the expected discounted future primary surpluses will exceed the present value of public debt; it means the government will be accumulating tax revenues (Luporini, 2000).

On the contrary if the term, $\lim_{N\to\infty} \prod_{j=1}^{N} (1+r_{t+j})^{-1} B_{t+s} > 0$ the present value of the government debt will exceed the expected primary surpluses, which means the government is continually borrowing to meet interest obligations on its debt.

Equation (7) implies that debt is solvent if the transversality condition ensures the non-explosiveness of public debt and when No Ponzi Game (NPG) condition is fulfilled, *i.e.* the present discounted value of all future debt balances must be zero. It means no new debt is issued to meet the interest payment of the government.

$$B_t = E_t \sum_{N=0}^{\infty} \prod_{j=1}^{N} (1+r_{t+j})^{-1} S_{t+N} \tag{8}$$

It follows that the current debt is offset by the sum of current and expected future discounted surplus and it means that the budget constraint holds in present value terms as expressed in equation (8).

TESTING FOR SUSTAINABILITY OF PUBLIC DEBT

The above stated conditions of debt sustainability derived from the PVBC approach can be used to test, the time series data on expenditure, revenue, deficit and debt. If the PVBC holds for the data then the null hypothesis, that $\lim_{N\to\infty} \prod_{j=1}^{N} (1+r_{t+j})^{-1} B_{t+N} = 0$, cannot be rejected. Assuming, real interest rate r_t as stationary and also the discount factor as constant, equation (6) can be written as

$$B_t = E_t \sum_{N=0}^{\infty} (1+r)^{-(N+1)} \overline{S}_{t+N} + \lim_{N\to\infty} (1+r)^{-(N+1)} E_t B_{t+N}$$

$$B_t = E_t \sum_{N=0}^{\infty} (1+r)^{-(N+1)} (\kappa_{t+N} - z_{t+N}] + \lim_{N\to\infty} (1+r)^{-(N+1)} E_t B_{t+N} \qquad (9)$$

Where, z_t is government expenditure inclusive of interest rate payments and κ_t is revenue inclusive of seignorage revenue.

Following Papadopoulos and Sidiropoulos (1999), a testable equation is derived by taking the first difference of equation (6) and substituting it for ΔB_t from equation (2).

$$\Delta B_t = E_t \sum_{N=0}^{\infty} (1+r)^{-(N+1)} (\Delta\kappa_{t+N} - \Delta z_{t+N}] + \lim_{N\to\infty} (1+r)^{-(N+1)} E_t \Delta B_{t+N} \quad (10)$$

$$z_t - \kappa_t = \sum_{N=0}^{\infty} (1+r)^{-(N+1)} E_t (\Delta\kappa_{t+N} - \Delta z_{t+N}) \qquad (11)$$

Thus equation (10) forms the basis of empirical analysis. It implies that the sum of present value of discounted current budget surplus and the future surplus will equal the amount needed to repay the principal amount and the interest. Thus when this condition holds, it is said that the current expected path of government spending and revenue are sustainable.

As Papadopoulos and Sidiropoulos (1999) demonstrated, if the limit term in equation (10) is zero, it means that a co integration relationship exists which is a necessary condition for the government inter-temporal budget constraint to hold.

To test the sustainability condition in equation (7), the procedure is to test for stationarity of discounted debt series B_t or to test for the co integration between the variable $z_t - \kappa_t$.

In doing so the co integrating regression takes the following form:

$$\kappa_r = \alpha + \beta z_t + v_t \tag{12}$$

The null hypothesis to be tested here is $\beta = 1$ and v_t is stationary, this implies that κ_t and z_t are co-integrated variables of order one with the co integrating vector being (1, –1) for PVBC to hold. It means if the null hypothesis is not rejected public debt is said to be sustainable.

TESTING FOR STATIONARITY OF THE DISCOUNTED DEBT SERIES

To test the stationarity of the discounted debt series, a testable equation is derived using the discounted debt series.

Since $B_t = (1 + r_t)B_{t-1} - S_t$ (13)

And assuming that the discount factor is Q_t

$$Q_t = \prod_{j=0}^{t-1} (1 + r_t)^{-1} \; ; \; Q_0 = 1$$

Multiplying (13) by discounted factor we get:

$$Q_t B_t = Q_{t-1} B_{t-1} - Q_t S_t$$

and

$$b_t = b_{t-1} - s_t \tag{14}$$

Where $b_t = B_t Q_t$

Appling recursive substitution to equation (14), we obtain the government inter-temporal budget constraint.

$$b_t = \sum_{j=1}^{N} s_{t+j} + b_{t+N}$$

It explains that debt is sustainable if the government's budget is balanced in expected value terms. Taking expectations as of time *t* and applying limit as *N* tends to infinity we get equation (15)

$$b_t = E_t \sum_{j=1}^{N} s_{t+j} + \lim_{N\to\infty} E_t b_{t+N} \tag{15}$$

It means government's budget is balanced in expected present value terms when, its debt can be offset by the sum of expected future discounted primary surpluses. It implies that $\lim b_{N\to\infty} = 0$

From equation (15), we get:

$$b_t = E_t \sum_{j=1}^{N} s_{t+j} \tag{16}$$

This is the discounted debt equation that can be tested, and the null hypothesis of debt sustainability is *that debt will be sustainable if the discounted debt series is stationary*.

III. ESTIMATION METHODOLOGY

The PVBC approach to the debt sustainability issue involves econometric testing of the validity of the PVBC (equation 9) or the NPG (equation 8) condition for a set of time series. In this context, two empirical approaches have been used to test the validity of PVBC or the NPG condition.

The first methodology, proposed by Hamilton and Flavin (1986), is to apply unit root test on the series of discounted public debt; where sustainability implies a stationary process.

The second approach involves using cointegration test looking for a cointegrating relationship linking the primary balances, the stock of public debt and interest payments. Therefore, the estimated co-integration regression takes the following form:

$$\kappa_r = \alpha + \beta z_t + \nu_t \tag{17}$$

The null hypothesis to be tested is that $\beta = 1$ and v_t is stationary. This implies that a necessary and sufficient condition for sustainability is that κ_t and z_t are cointegrated variables of order one with the co integrating vector being (1, –1) for PVBC to hold.

In addition to the above two methods used for testing the validity of PVBC or NPG conditions, the *Dynamic OLS (DOLS)*[3] estimator technique is used, which is asymptotically equivalent to Johansen's (1988) maximum-

[3]For this methodology see Arghyrou (2004).

likelihood estimator and is considered appropriate in case of a small sample like ours. Since the model is bivariate, the issue of multi-co integration does not arise and the DOLS regression equation takes the following form:

$$\kappa_t = \alpha + \beta z_t + \sum_{i=-k}^{k} \gamma_i \Delta z_{t-i} + \nu_t \tag{18}$$

Equation (18) is the standard augmented OLS regression model with addition of a few lead and lag differences of the regressor. This is done to control for any endogenous feedback arising from the dependent to independent variables and to obtain consistent estimates of the cointegrating vectors. Thus the estimated cointegrating vector is given as $CV_t = \kappa_t - \alpha - \beta z_t$, and is taken as a measure of fiscal equilibrium. To test the cointegration hypothesis between κ_t and z_t, the unit root test is applied on CV_t and the linear restriction on the cointegrating parameters are then tested using a Wald test.

MODEL FOR TESTING STRUCTURAL BREAKS

Since unit root (ADF) tests are biased towards rejecting stationarity if the deterministic components of the series tested have structural breaks (Perron, 1989). Chi-square test proposed by Quintos (1995) is used to test for structural breaks in fiscal policy. For this test, DOLS equation (18) is augmented by adding the slope dummy (Dz_t) variable.

$$\kappa_t = \alpha + \beta z_t + \sum_{j=1}^{m} \gamma_i \Delta z_{t-j} + \delta (Dz)_t + \upsilon_t \tag{19}$$

D_t = 1 if $t \in (1, \ldots\ldots, T)$

= 0 if $t \in (T + 1, \ldots\ldots, N)$

In this equation, we take the value of z_t up to the date of the tested break point (T) and zero afterwards; and N is the last sample observation. The test involves estimating equation (19) consecutively, following Andrews (1993) the initial and final parts of the sample are trimmed by 15 percent. In each estimation round, the sample size remains constant but the definition of (Dz) changes: for the first estimation round, the last observation in Dz_t is set to be zero; the rest of the observations are set to be equal to z_t. The estimation is repeated, substituting in each estimation round the values of z_t by zero backwards. Hence, for the last estimation round, only the first observation of (Dz_t) takes the value of z_t; all the rest are set as equal to zero. In each estimation round the statistical significance of the dummy variable is examined by using a Wald test. The null hypothesis describing the structural

stability is (H_0: $\delta = 0$). Structural breaks are identified in those dates for which the estimated Wald statistic is higher than the 5% critical value of χ^2 (1). If the structural breaks are identified, the sustainability analysis has to be augmented to account for breaks. Assuming that the number of structural breaks has been identified, the DOLS estimator in equation (19) takes the following form:

$$\kappa_t = \alpha + \beta z_t + \sum_{i=1}^{j} \delta_i D_{it} z_t + \sum_{i=-k}^{k} \gamma_i \Delta z_{t-i} + \upsilon_t \qquad (20)$$

In this equation $i = 1 \ldots j$; $D_{it} = 0$ if t (1, ……, T_i); and $D_{it} = z_t$ if t ($T_i + 1$, ……, N)

Where T_i is the date on which the i^{th} identified structural break occurs. Equation (20) picks up the long run (total multiplier) effect of structural breaks in fiscal policy. A significant and positive (negative) coefficient of slope dummy implies a move towards (away from) debt sustainability. The cointegrating vector with structural breaks is given as $CVB\kappa_t = \kappa_t - \alpha - \beta z_t - \sum_{i=1}^{j} \delta_i D_{it} z_t$. Thus debt sustainability is consistent with $CVB\kappa_t$ being stationary; the β coefficient (adjusted for dummies) being equal to one ($\beta + \sum_{i=1}^{j} \delta_i = 1_t$); and $\alpha = 0$.

IV. RESULTS OF SUSTAINABILITY TESTS

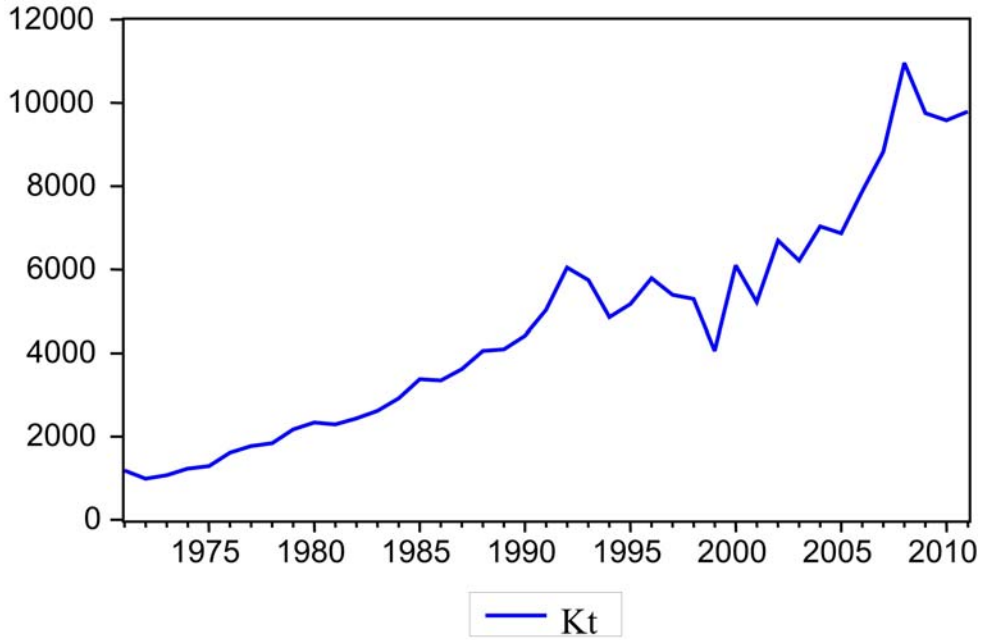
To examine the debt sustainability issue using the present value budget constraint approach, the stationarity of the data series is checked by applying the unit root test to the time series of revenue, expenditure and debt. After establishing the stationarity of the series, cointegration between revenue and expenditure (inclusive of interest payments) is tested. Finally stability tests are applied to detect the stability of the cointegration vector overtime in the presence of structural breaks.

As a first step, the visual plot of the time series of revenue and expenditure is presented in Figure 1. It is shown that the two series have trended upward and visually these series are found to be non-stationary.

Dickey-Fuller and Phillips-Perron (1988) unit root tests reported in Table 2 also indicate the existence of unit root at level for both the variables but are rejected at the first difference. Thus the two series are stationary in first difference and are integrated of order one I(1).

FIGURE 1

Visual Graph of Series K_t and Z_t



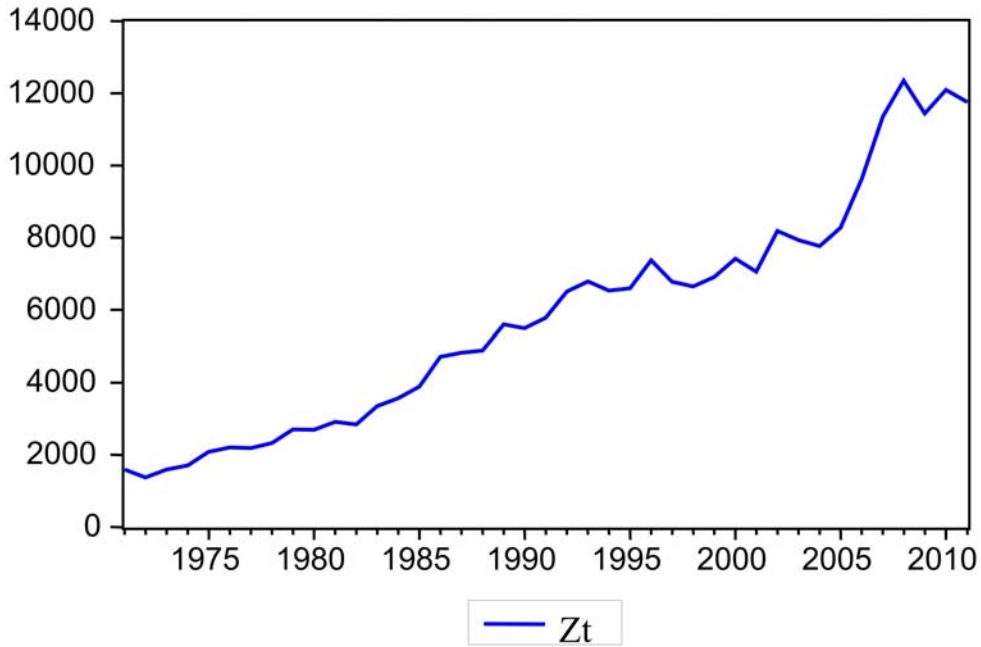


TABLE 1

Conditions for Debt Sustainability

Decade	r	G	Ps	$r < g$	$ps > 0$	Conclusion
1970s	–9.8	4.8	–6.1	$r < g$	$ps < 0$	Unsustainable
1980s	–1.4	6.6	–3.5	$r < g$	$ps < 0$	Unsustainable
1990s	–1.2	4.0	–1.3	$r < g$	$ps < 0$	Unsustainable
2000s	0.0	4.7	1.3	$r < g$	$ps > 0$	Sustainable
FY2011	–10.1	3.2	–3.2	$r < g$	$ps > 0$	Unsustainable

TABLE 2

Unit Root Test (Level and 1st Difference)

Variables (Real)		ADF	ADF (1)	ADF (2)	PP (3)
κ_t z_t	Level	–0.217 0.385	0.221 0.205	–0.018 0.321	1.060 0.399
κ_t z_t	First Difference	–8.968* –6.061*	–4.510 –4.502	–5.048 –3.684	–9.278* –6.059*

MacKinnon critical values for rejection of a unit root at 1% and 5% levels are –3.610 and –2.938.

* and ** denote significance at 1% and 5% level.

In the second step, the equation (18) is estimated using DOLS for a model without structural breaks. In view of the data frequency a lag and leads order of three was taken, but using the Akaike information Criteria the choice of optimal lag length 1 is suggested. After testing for the linear restrictions on the parameters using Wald test, the parametric restrictions for sustainability ($\alpha = 0$ and $\beta = 1$) are not satisfied. As shown in Table 3 it implies un-sustainability of public debt in Pakistan throughout the period under consideration.[4]

[4]These results are substantiated by an earlier study conducted by the authors using the accounting approach to debt sustainability (Mahmood and Rauf, 2008).

TABLE 3

Results of Estimation Using Dynamic OLS

Variables	Model without break	Model with break
Dependent: κ_t		
Constant: C	–192.15 [–1.240]	–428.04 [–1.604]
Repressors: z_t	0.831 [34.59]*	0.920 [13.960]*
D11993Xz		–0.075 [–1.69] **
D21998Xz		0.024 [0.749]
H_0: $\alpha = 0$	1.539 (0.214)	
H_0: $\beta = 1$	49.471 (000)*	
H_0: $\alpha = 0$		2.574 (0.108)
H_0: $\beta + \delta 1 + \delta 2 = 1$		10.160 (0.001)
Unit Root on Ut(CV)	–6.102*	
Unit Root on CVBR)		–5.975*
ADF critical at 1%	(–2.628)	–2.634

t-values in square bracket, p-values in parenthesis.

*(**) Denotes the significance at 1 percent and 10 percent level

Results of the same model for structural breaks in fiscal policy and its effect on public debt are also reported in Table 3. Exact timing of the break is selected by the observation having the highest test value. Two structural breaks were identified for the years 1993 and 1998.[5] The dummy referring to 1993 has a negative sign and is significant at 10%, suggesting a move away

[5]The structural break of 1993 may be the result of financial reforms while the break of 1998 may be the result of nuclear testing. The comprehensive nuclear testing resulted in economic sanctions on Pakistan and freezing of foreign current accounts by Government of Pakistan.

from sustainability. As shown in Table 3, public debt remained unsustainable after taking into account the effect of the two structural breaks.

TABLE 4

Unit Root Test (Level)

Variables (Real)		ADF	ADF (1)	ADF (2)	PP (3)
$DISD_t$ Discounted debt (r)	Level	–1.2313	–1. 2161	–1.2082	–1.3136
$DIDR_t$ Discounted debt ($r - g$)	Level	2.0420	2.0808	1.3607	1.6277

MacKinnon critical values for rejection of a unit root at 1% and 5% levels are –3.6055, –2.9369.

*Significant at 1% level and **Significant at 5 percent.

ADF and PP tests were also applied to the discounted debt[6] series in a model including a constant term. Results reported in Table 4 are consistent with results mentioned in Table 3. The stationarity hypothesis is rejected implying non-sustainability of Pakistan's public debt.

In conclusion, the analysis of the data proves that the level of Public debt is far from the sustainable level since the last four decades. Public debt will remain to be unsustainable if the primary cause of debt accumulation, *i.e.* persistent fiscal imbalance, is not corrected.

V. CONCLUSION AND RECOMMENDATIONS

Using a modified model for debt sustainability issue we assessed the *sustainability of public debt* by testing the validity of the Government Inter-

[6]The standard way to calculate the discounted market value of debt-to- GDP series in period t is defined as $\left(1/1+r_t\right)\left[\prod_{i=1}^{t}\frac{1}{(1+r_{t-i})}\right](B/Y)_t$, where r_t is the real interest rate, $\left[\prod_{i=1}^{t}\frac{1}{(1+r_{t-i})}\right]$ is the discount factor, taking value of 1 for 1972.

temporal Budget Constraint or the Non-Ponzi Game Condition (NPG). Apart from that we applied the test for *structural breaks* in fiscal policy.

The outcome of the *empirical analysis* confirmed that when the present value budget constraint approach was used, public debt was found to be unsustainable throughout the sample period 1971-2011. However, when the Accounting Approach for debt sustainability was used, even though it confirmed unsustainability for the period prior to 2000s, the debt became sustainable in 2000s and turned again unsustainable in 2011.

The test for structural break in fiscal policy provides the exact timing of the break on the basis of the highest test value. Two structural breaks were identified for the years 1993 and 1998. The effect of these two breaks on Pakistan public debt was then investigated. The finding is that accounting for the structural break in the analysis has made no change in the results reported. It implies that despite these fiscal breaks, Pakistan public debt remained unsustainable during the period under consideration.

The debt analysis of Pakistan in this paper has established that Public Debt is not at the sustainable levels. To resolve this issue for long-term debt sustainability, following policy recommendations emerge. The incremental addition to the stock of debt is to be avoided and debt-servicing costs are to be reduced. At the same time the repayment capacity has to be enhanced by increasing exports and revenues and by bringing fiscal discipline necessary to achieve efficient use of resources. From the analysis carried out it is suggested that resource mobilization is crucial and the policy of containment of public expenditures for sake of improving primary balances may not be sustainable for long, given that the public spending on education, health and physical infrastructure are already at sub-optimal level. Increased revenues must, therefore, be a policy priority, as it will ensure the surplus primary balance along with essential expenditures on the level needed to support high medium term growth.

REFERENCES

Agénor, P. and P. J. Montiel (1996), *Development Macroeconomics*. Princeton, New Jersey, Princeton University Press.

Ahmad, V. and Rashid Amjad (1986), *The Management of Pakistan's Economy*: 1947-82. Oxford University Press, Karachi.

Ahmed, S. and John H. Rogers (1995), Government budget deficits and trade deficits: Are present value constraints satisfied in long-term data? *Journal of Monetary Economics*, Volume 36(2), pp. 351-374. http://dx.doi.org/10.1016/0304-3932(95)01215-X

Andrews, Donald W. K. (1993), Tests for parameter instability and structural change with unknown change point. *Econometrica*, Volume 61(4), pp. 821-856. http://www.jstor.org/stable/2951764

Arby, M. F. (1997), Major issues and remedies with regard to public debt in Pakistan. *Journal of the Institute of Bankers in Pakistan*.

Archibald, X. and K. Greenidge (2003), Debt and fiscal sustainability in Barbados. Available via Internet.

Arghyrou, Michael G. (2004), Debt sustainability, structural breaks and non-linear fiscal adjustment: A testing application to Greek fiscal policy. Public Policy Discussion Papers 04-01, Economics and Finance Section, School of Social Sciences, Brunel University.

Asian Development Bank (2002), Escaping the debt trap: An assessment of Pakistan's external debt sustainability. Working Paper No. 1.

Bilquees, F. (2003), Analysis of budget deficits, debt accumulation, and debt instability. *The Pakistan Development Review*, Volume 42, No. 3 (Autumn), pp. 177-195.

Collignon, S. and Susanne Mundschenk, The sustainability of public debt in Europe. Paper available via Internet.

Cuddington, J. (1996), Analyzing the sustainability of fiscal deficits in developing countries. World Bank Working Paper No. 1784.

Ghani, E. and H. Zang (1995), Is Ethiopia's debt sustainable? Policy Research Working Paper No. 1525. The World Bank. http://dx.doi.org/10.1596/1813-9450-1525

Goldfajn, I. and Guardia, E. (2003), Fiscal rules and debt sustainability in Brazil. Baco Central do Brasil Technical Notes No. 39, Brazil.

Government of Pakistan (2001), A Debt Reduction and Management Strategy, Summary Report of the Debt Reduction and Management Committee. Islamabad: Finance Division.

Government of Pakistan, *Pakistan Economic Survey* (various issues). Islamabad: Ministry of Finance.

Gray, S. (1998), Debt sustainability and developing economies. Available via Internet.

Greiner, A. and K. Goran, Sustainability of US public debt: Estimating smoothing spline regression. Working Paper # 83. Department of Economics, Bielefeld University, Germany.

Hakkio, C. S. and M. Rush (1991), Is the budget deficit "too large?" *Economic Inquiry*, Volume 29(3), pp. 429-445. http://dx.doi.org/10.1111/j.1465-7295.1991.tb00837.x

Hamilton, J. D. and M. A. Flavin (1986), On the limitations of government borrowing: A framework for empirical testing. *American Economic Review*, Volume 76(4), pp. 808-819. http://www.jstor.org/stable/1806077

International Monetary Fund (2001), Pakistan: Selected issues and statistical appendix. Country Report No. 01/11(2001).

International Monetary Fund, *Government Finance Statistics Yearbook* (various issues), Washington, DC.

International Monetary Fund, International Financial Statistics (CD-ROM and various issues), Washington, DC.

Kemal, A. R. (2001), Debt accumulation and its implication for growth and poverty. *The Pakistan Development Review*, Volume 40, No. 4, Part I (Winter), pp. 263-281.

Luporini, V. (2000), Sustainability of the Brazilian fiscal policy and central bank independence. *Revista Brasileira De Economia*, Volume 54(2), pp. 201-226. http://dx.doi.org/10.1590/S0034-71402000000200004

Luporini, V. (2001), Further investigation into the sustainability of Brazilian federal domestic debt. *Texto Para Discussão*, 131.

Papadopoulos, A. P. and M. G. Sidiropoulos (1999), The sustainability of fiscal policies in the European Union. *International Advances in Economic Research*, Volume 5, No. 3, pp. 289-307.

Pasha, H. A. and Ghaus, A. (2005), Sustainability of public debt in Pakistan. A Conference Paper No. 21. Available via Internet.

Pedras, G. B. V. (2000), Public debt sustainability in Brazil. Minerva Programme, Spring 2000, Washington, DC.

Perron, P. (1989), The great crash, the oil price shock, and the unit root hypothesis. *Econometrica*, Volume 57(6), pp. 1361-1401. http://www.jstor.org/stable/1913712

Quintos, Carmela E. (1995), Sustainability of the deficit process with structural shifts. *Journal of Business and Economic Statistics*, Volume 13(4), pp. 409-417. http://dx.doi.org/10.1080/07350015.1995.10524615

State Bank of Pakistan, *Annual Reports* (various issues).

World Bank, Global Development Finance (CD-ROM and Various issues), Washington, DC.

Zaaruka, B. B., T. Ndove and T. Tjipe (2004), Central government debt sustainability. *Bank of Namibia Research Department Working Paper Series*, 1(2004), pp. 1-28.