

# DEBT SUSTAINABILITY ANALYSIS



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## **DEDICATION**

I would like to dedicate my work to my beloved parents for their endless love and to my teacher Mr. Muhammad Ali Kemal for his support and encouragement.

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## **ABSTRACT**

A debt sustainability issue is important when government do not follow any fiscal cliff and interest payments are consuming significant part of the resources. This thesis calculates sufficient condition of debt sustainability in Pakistan. It uses simple textbook methodology of government budget constraint, accounting approach to measure sustainability of debt. We have checked the extent of nominal as well as real GDP growth required to main the debt-GDP ratio level at 60 percent, 50 percent and 40 percent with level of fiscal deficit 5 percent, 4.5 percent, 4 percent, 3.5 percent and 3 percent. Thesis concludes that lower the fiscal deficit higher possibility of maintaining the debt at its sustainable level. Moreover, lower the fiscal deficit higher will be the chances to finance development expenditures as well redistribute the impact of growth. Moreover, it is also examined that maintaining debt-GDP ratio at certain level implies that we do not need to retire debt further and growth in national income is used to serve development expenditures instead of using it for debt retirement. Reducing the debt to GDP ratio by debt repayments may costs us the projects which can be beneficial for growth in those year. The projects may not set up during the time of debt retirement, thus long run growth may suffer and long run impact will be negative. Therefore, it is better to select a threshold level which maximises the use of government spending.

## SECTION 1

### INTRODUCTION

*“A duty or obligation to pay money, deliver goods, or render service under an express or implied agreement. One who owes, is a debtor or debitor; one to whom it is owed, is a debtee, creditor, or lender.”<sup>1</sup>*

Debt is a double-bladed sword. If it is used wisely and in balance, it noticeably improves welfare. On the other hand, when it is used irresponsibly so the consequences can be adverse. Over borrowing leads to insolvency and financial ruin for the individual, firms and households. But for a country, large amount of debt weakens the government’s ability to provide necessities to its people. More or less all governments experience budget deficit due to more expenditures and less revenues. Governments can increase revenue through increasing taxes, domestic or external borrowing, printing money, and by using the previous budget surplus.

According to Debt policy statement (2006-07) developing countries need to borrow in order to finance their development but this need to be balanced by ability to make repayments as well as ensuring that the borrowed funds are used for productive expenditures.

#### **1.1. Types of Debt**

There are two types of debt one is called National debt. This debt is the amount of money which federal government have borrow over the years and up till now not repaid. However the second type is Public debt. *“The portion of total debt which has a direct charge on government revenues as well as the debt obtained from the IMF is defined as public debt”<sup>2</sup>*

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<sup>1</sup> <http://www.businessdictionary.com/definition/debt.html>

<sup>2</sup> Debt policy statement 2014-15, Ministry of Finance.



When the government generates a liability on itself instead of presenting extra tax measures. Public debt is very important source of connecting financing gaps of government. Public debt can increase economic growth if utilize effectively. On the other hand, public debt creates macroeconomic problems if excessively rely on it.

Public debt is of two types one is called domestic debt and other external debt. Domestic debt is charge on budget and essentially serviced with additional borrowing or government revenues. Whereas, external debt is a charge on balance of payment and is serviced from additional borrowing, foreign exchange earnings and reserve drawdown. Both types of debt involve bank and nonbank borrowings.

## **1.2. Problems of Debt**

Macro variables which affect the changes in stock of public debt comprise the interest rates, budget deficits, exchange rates, and GDP growth. Debt ratio will increase when the real interest rate surpasses the real GDP growth, when the primary budget is in deficit, and due to the depreciation of exchange rate. Budget deficits apply upward pressure on the interest rates so the large amounts of government borrowing can "crowd out" the private investment. Deficits lead to small business investment, in other words if there is fewer investment now then upcoming living standards will be lesser and there will be sluggish growth in the future and lower future wages. The extraordinary interest rates crowd out the private sector which results in the lesser investment in long run. This leads to higher amount of deficits, needing borrowing from the foreign countries, which generates current account deficits. If government drives into the debt to spend in productive capacity such as training, capital goods, or new technology, the economy will grow more rapidly than the load of debt. The deficit can always be financed through 'monetization' i.e. creating money, if to finance the deficit markets be unsuccessful to buy sufficient gilt. This creation of money creates inflation. Creation of money to pay off debt will not work except if there is a proportionate increase in the economic activity with the

amount of created money, otherwise, inflation may get eviler. Consumption offers only short-term boost, while Investment provides long-term economic growth. Consequently, we avert funds from discretionary programs, by moving into debt to pay for the consumption so, this result shows that our capability to produce services and competitive goods is not rising fast. Greater real long-term interest rates has negative effects for consumption of durables, investment as well as for interest-sensitive sectors, like housing. Too much debt harms the government's ability to convey basic facilities to its citizens. If the debt is used in moderation and wisely then it obviously improves the welfare of society. Other interest rates in the economy go higher because of the higher interest rates on government bonds and then reduce investment and spending. The cost of paying interest payments will also increase due to these higher interest rates.

### **1.3. Overview of Public Debt in Pakistan**

Pakistan GDP growth rise on average in 1970s to 1980s from 5 percent to 6.5 percent respectively. In 1990s the growth rate dropped to 4.4 percent joined to the overall fiscal deficit 6-7 percent of GDP that undesirably affected the debt ratios. In 1980 Public debt reached 54.4 percent of GDP. But in 2000 it reached 103 percent of GDP. In 1990 the debt servicing liability continuously rise and nearly 43 percent of total revenues consumed to fund debt servicing and it reached to almost 63 percent in 2000.

Likewise, the current account imbalance which was persistent, basically instrumental in determination of debt servicing and external debt ratios throughout 1980s-1990s. Even though the economic reforms carried a main shift in the trade policies and stress was laid on the trade liberalization, so far the exports to GDP ratio was around 12 to 14 percent of GDP regardless of enormous depreciation of Pakistani rupee and the trade to GDP ratio remained low. Therefore the thing that pushed up the external debt to GDP ratio in 1980 from 39.8 percent to 57.5 in 2000 was the tireless current account deficit of 4 to 5 percent of GDP. In 1980 and 2000

the ratio of external debt to foreign exchange earnings enlarged from 204 percent to 334 percent respectively, whereas the ratios of debt service payment to GDP rose from 3.2 percent to 4.7 percent and foreign exchange earning to GDP rose from 16.5 percent to 27.3 percent.

The key factors which impact the external and public debt ratios during the first half of 2000s enhanced to some point, i.e. on average the 5.3 percent was the growth rate of GDP, the fiscal deficit declined to 4.6 percent and current account deficit dropped to 2.55 percent of GDP also a declining movement was recorded in the interest rates and inflation. Therefore the declining trend in the important determinants of sustainability of debt impact the public debt ratios rising trend which dropped in 2000 from 102 percent of GDP to 74.6 percent in 2005. On the other hand, since 2001-02 onwards, after a decline in debt to GDP ratios, opposing movement in the current account deficit and fiscal deficit, in the second half of 2000s high interest rate, slow speed of GDP growth and unclear exchange rate situation led to a problem of external and public debt ratios. By 2007 after gradually declining Public debt to GDP ratio 67.9, revealed deterioration signs and in 2008 it increased to 68.5 percent. In 2007 the public debt to revenue ratio has also enlarged from 380.2 to 393.6 percent in 2008. Likewise after reaching a low level of 169 percent in 2006 the external debt to export of goods and services reached to 174 percent in 2008.

The main factors behind the increase in public debt over 1980-1990s were stagnant government revenues and high real cost of borrowing. The real cost of borrowing was negative (1.9 percent) in 1990 because of the high inflation. But in the second half it sharply rose to 5 percent. During the period 2000- 2007 the growth rate was highest and the country's ability to carry debt was enhanced. Funds were used efficiently to finance the infrastructure development and also the structural reforms which delivered further stimulus to growth. At the end of FY02 the public debt to GDP ratio stood at nearly 80 percent which dropped by the end of FY06 to 56 percent. This percentage was 61.5 in FY05 and it was 56 in FY06. This shows a reduction in debt to 5.5

percentage points as a percentage of GDP which is more than the 2.5 percentage points which is compulsory by FRDL Act 2005. The reasons for the reduction in public debt to GDP by 2000 to 2007 were: In end FY99 Pakistan reduced its public debt burden from 100.3 percent of GDP to 56 percent of GDP in end FY06 in line for successive high growth rates and reliable debt reduction strategy. The lower speed of growth in debt is somewhat a result of lower current account deficits and average fiscal deficit related to 1990s-99. In 2000 Government had arranged a high level debt committee and low cost of debt servicing empowered the government to increase the spending on poverty and social sector related expenditures as well as on the public sector development program (PSDP).

The reasons for the increase in total public debt (2008-2014) were: The extraordinary oil price and commodity price shocks and to check the challenges insufficient policy response resulted from a flow in current account and fiscal deficit. Depreciation of Pakistani rupee vs US dollar at the end of 2006-07 value of rupee depreciated from 60.63 to 66.10 by the end of June 2008. The reasons for high public debt in 2009-10 were: bigger demand on government budget for reason of war on terror and security, revenue shortfall due to high cost of doing business, lower GDP growth than expected, severe energy shortages. Due to the natural disasters FY2010 higher security related expenditures were made. Wholesale subsidies on oil, food and fertilizers to look after the vulnerable sections from the worldwide commodity shock, electricity. In FY12 the reason for higher debt was the higher demands on the government budget for the interest servicing, security and subsidies and the hostile movement of exchange rate on the external debt. In 2013-14 Government primarily depend on domestic borrowing and there was the absence of enough external inflows. Moreover the unavailability of sufficient external funding and the large fiscal deficits were the reasons behind the large amount of public debt.

#### 1.4. Sustainability of Debt

*“Debt sustainability is generally defined by IMF and World Bank as the ability of a country to meet its current and future debt servicing obligations without recourse to debt rescheduling or accumulation of arrears and without compromising growth”.*<sup>3</sup>

*“Debt sustainability is an important indicator of the achievement of the Millennium Development Goals (MDGs) by 2015”.*<sup>4</sup>

*It is also an important indicator of Fiscal Responsibility and Debt Limitation (FRDL) Act, 2005. Which requires: Ensure “that within a period of ten financial year, beginning from the first July, 2003 and ending on thirtieth June, 2013, the total public debt at the end of the tenth financial year does not exceed sixty percent of the estimated gross domestic product for that year and thereafter maintaining the total public debt below sixty percent of gross domestic product for any given year.”*<sup>5</sup>

Mahmood, Rauf, & Ahmad (2009) reports traditional debt ratios and derive the necessary and sufficient conditions for external and public debt. These conditions are:

“The necessary condition for debt to be sustainable holds, if interest rate is less than the growth rate of GDP i.e.  $r_t < g_t$ . On the contrary if  $r_t > g_t$  the debt ratio is unsustainable and it will not stabilize so long as interest rate is greater than GDP growth. While the required sufficient condition is to keep the debt to GDP ratio constant i.e. average primary surplus is positive i.e.  $b_t > 0$ .”

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<sup>3</sup> Zakaria Benethelin, Ndove Titus and Tjipe Tjiveze (2004), Central Government Debt Sustainability, WP 1/2004. Bank of Namibia Research Department, Namibia.

<sup>4</sup> United Nations: United Nations Millennium Declaration, Resolution Adopted by the General Assembly, New York, 18 September 2000.

<sup>5</sup> Ensure “that in every financial year, beginning from the first July, 2003, and ending on the thirtieth June 2013, the total public debt is reduced by no less than two and a half percent of the estimated gross domestic product for any given year.” (Debt Policy Statement 2006-07)

### **1.5. Objective of the Study**

The study aims to find out the sustainability of debt in Pakistan. This paper mainly focus in finding the sufficient condition of debt sustainability. By using the methodology of accounting approach, government budget constraint is used to derive the necessary and sufficient conditions for sustainable debt. Pakistan has currently 63 percent Debt to GDP ratio. But according to FRDL 60 percent is required. So this paper finds that debt to GDP ratio constant at 60 percent. We further do analysis for 50 percent and 40 percent debt to GDP ratio. Real GDP growth id measured at 9 percent inflation. Moreover we use different thresholds for fiscal deficit such as 5, 4.5, 4, 3.5, and 3 percent. Main findings of this study is that it finds out the GDP growth both nominal and real, which are needed to reach the sustainability of debt in Pakistan since 2025. Moreover this paper discuss the long run and short run impact of this sustainability.

### **1.6. Significance of the Study**

This study is different from previous studies, as it focus on the sufficient condition of debt sustainability. While the previous studies have yet not find out this thing. So, currently Pakistan is facing a crises of debt and this is one of the most worth considerable issue in current situation. This study would benefit several areas of fiscal policy. First of all, the study would be able to discuss the impact on total expenditure allocated to other sectors. The research would provide the growth related short term impacts when debt to GDP ratio stabilize. It will provide the idea for the allocation of budget and expenditures in such a way that it increase GDP.

### **1.7. Organisation of the Study**

Organisation of the paper is such that, after the introduction Section 2 explains literature review, Section 3 provides the methodology adopted in measuring the debt sustainability i.e. the accounting approach which uses the government budget constraint to find out the necessary

and sufficient condition, Section 4 reports the results for public debt sustainability sufficient condition. The summary and conclusions are stated in the 5th section of the thesis.

## **SECTION 2**

### **LITERATURE REVIEW**

The studies that include public debt sustainability became a central issue in economic policy particularly after 1980s.

The topic of debt dynamics and debt sustainability has been studied in the literature in two approaches, i.e. the Accounting approach and the Present Value approaches (Cuddington, 1996). Though the initial point of both the approaches includes the government budget constraint, the accounting approach involves the usage of derived necessary and sufficient conditions for evaluating the debt sustainability problem, while the present value budget constraint approach assesses debt sustainability with the help of econometric testing of the strength of the present value of the budget constraint or else Non-Ponzi game (NPG) conditions. Empirical evidence concerning the use of this methodology to check the stationarity of discounted debt series and budget deficit is limited and the existing literature delivers mixed results. For example, (Hamilton & Flavin, 1986) accounts stationarity of both series, while (Wilcox, 1989) and (Trehan & Walsh, 1988) report weak proof of discounted debt series sustainability. Likewise, (Luporini, 1999) report mixed outcomes about the stationarity of the discounted debt series of Brazil.

Contessi (2012) finds that the main factors which contributes to make a country's debt sustainable or unsustainable. This article discusses the simple algebra of debt sustainability in a general case and how the recent experience of five peripheral European countries can be understood in the framework of this study. Spain, Greece, Italy, Ireland and Portugal are compared with five further G-7 countries: Germany, France, Japan, the United States and the United Kingdom. This paper use the simple textbook debt to GDP sustainability analysis in closed economy here government debt is entirely issued in the domestic country and there is



no external factor included. He uses government annual budget constraint and uses the final equation for comparison among the cases when debt to GDP ratios are sustainable versus explosive. Where the key variable is  $\varphi_t = \frac{1+r_t}{1+g_t}$ . When the real interest rate exceeds the growth rate of GDP. Other things remains same, the debt-to-GDP ratio will increase continuously till the overall balance ( $B_t + i_t D_{t-1}$ ) is big enough to counter balance the interest growth differential. This paper also illustrate the evolution of debt to GDP ratio graphically. Analysis displays that the differences among the five peripheral countries can be established under a traditional decomposition of the factors which affect sustainability of government debt and explains why markets are concerned about these specific peripheral countries jointly.

Hamilton & Flavin (1986) uses several test of sustainability by using the same methodology of them, or by including different tests. They applies test of stationarity over the discounted debt factor by using dickey-fuller test for unit root as well as restricted and generalized flood-Garber tests for stationarity. The basic idea is that any debt will be sustainable in the long run if its discounted factor is stationary. They applied these methodologies on the US data from 1960 to 1981, they have found that government must promise to balance its budget in expected present value terms in order to be able to issue interest bearing debt.

Mehmood & Rauf (2012) analyses the debt sustainability issue in Pakistan. They used the present value budget constraint approach. They used two empirical approaches to test the validity of PVBC. The first methodology is to apply unit root test on the series of discounted debt; where the stationarity shows sustainability. The second approach involve using co-integration test. Besides these tests they used the dynamic OLS estimator technique. The empirical analysis showed that when PVBC approach was used, public debt was found to be unsustainable throughout the period 1971 to 2011. On the other hand, when the accounting approach for debt sustainability was used, while it confirmed unsustainability for the period

prior to 2000s. In 2000s debt was sustainable and in 2011 it again turned unsustainable. In this paper the debt analysis of Pakistan has established that the public debt is not sustainable.

Mehmood, Rauf, & Ahmed (2009) examines the public and external debt sustainability in Pakistan. This paper adopts two approaches. The first one is based on traditional threshold debt ratios which are widely used in the literature. For this they used the traditional debt indicators approach (Gray, 1998) express the debt servicing and debt stock as a ratio of selected indicators, then these indicators are used to compare with the benchmark thresholds. In this paper the traditional threshold public debt indicators include the ratio of public debt to GDP and public debt to revenue. Whereas, the present value based debt ratios of external debt to GDP, to foreign exchange earnings and to export of goods and services are used as an indicators of external debt. He reports the results in the table.

**Table 1: Sustainable Debt Thresholds**

Institutions	PV Debt/ Exports	PV Debt/ Revenue	Additional Criteria
HIPC (2004)	150	250	Debt servicing / Exports ratio is 15-20%
DRI	140	151	Debt Servicing / Exports ratio is 12% and Debt Servicing / Revenue ratio is 13 %
IMF	180	201	PV/GDP is 42% and Debt Servicing/Revenue is 30%
World Bank (2004)	190	189	[PV/Exports is 220% and PV/GNI is 80 %]* [Also Debt stock/GDP is 50%, Debt stock/ Exports is 275%, Debt Servicing/Exports is 30%]**
CIPA Index	Poor/medium/ strong	Poor/medium/ Strong	Debt servicing as 15, 20 and 25 % of exports for poor, medium and strong institutions
	100/150/200	200/250/300	Debt servicing as 25, 30 and 35 % of revenue for poor, medium and strong institutions

The second approach is based on theoretical models which derive the debt sustainability conditions for external and public debt separately from the accounting approach which derive

the necessary and sufficient condition. In this section they identifies the key factors that are responsible for public and external debt sustainability. The necessary condition for public debt sustainability is  $r_t < g_t$ . And the sufficient condition is required to keep debt/GDP ratio constant. The following results were carried out.

**Table 2: Public Debt Sustainability Conditions**

Decade	r	G	ps	$\mu h_{t-1}$	s	$r < g$	$s > 0$	Conclusion
1970s	-9.8	4.8	-6.1	0.8	-5.2	$r < g$	$s < 0$	Unsustainable
1980s	-1.4	6.6	-3.5	-0.1	-3.6	$r < g$	$s < 0$	Unsustainable
1990s	-1.2	4	-1.3	0.1	-1.2	$r < g$	$s < 0$	Unsustainable
2000s	1.6	5	2	0.2	2.2	$r < g$	$s > 0$	Sustainable
FY 2007	-1.9	6.4	-1.5	1.1	-0.4	$r < g$	$s < 0$	Unsustainable

The necessary condition for external debt sustainability is  $r_t * < g_t$  which means that real foreign interest rate must be less than GDP growth. They find that for the entire period this condition is met and the real foreign interest rate has mostly remained negative and low comparative to GDP growth that was on average 5 percent. It means GDP growth and interest rate were not as much of significant in external debt accumulation and raising the debt ratios. The sufficient condition is to keep the debt to GDP ratio constant and the current account balance is positive.

**Table 3: External Debt Sustainability Conditions**

Decades	Rate of Interest	Growth of GDP	Primary CAB	Conditions for Debt Sustainability		Outcomes
	Real	Real	% of GDP	$r^* < g$	pcab	
	$r^*$	G	pcab			
1970s	-10.7	5.5	-4.1	$r^* < g$	pcab < o	Unsustainable
1980s	-3.5	7.1	-1.2	$r^* < g$	pcab < o	Unsustainable
1990s	-3.6	4.4	-1.1	$r^* < g$	pcab < o	Unsustainable
2000s	0.9	4.7	4.5	$r^* < g$	pcab > o	Sustainable
2005	-2.9	6.4	0.4	$r^* < g$	pcab > o	Sustainable

This paper conclude that since the last three decades, public and external debt sustainability levels have been far away from the debt sustainability levels. Results shows that both the debt sustainability conditions and sustainable threshold indicators are similar and disclose that throughout the decades of 1970s to 1990s the public debt and external debt was unsustainable. While, the debt situation was better in the first half of 2000s, but started to decline in the second half of 2000s.

Mahmood, Rauf, & Ahmad (2009) look at the debt dynamics and its problem over the three decades in Pakistan. Results shows that the increasing level of current account and fiscal deficit, high interest payments and exchange rate rise and fall are central variables which are accountable for increasing public debt ratio and the debt burden. In 1990s and 2000s primary balances largely contributed to the growth in public debt ratios, interest element was insignificant whereas the role of exchange rate has stayed significant. Increase in the external debt was due to exchange rate depreciation and primary current account balance, however the factor of interest rate was slightly responsible for increase in external debt to GDP ratio.

Bilquees (2003) explains the repercussions of high deficits. Correct management of the budget deficit is essential for the strength of economy. High deficits worsen macro indicators like

savings, interest rate, investment, current account deficit, growth, etc. in Pakistan high deficits are due to the complete negligence of domestic resource mobilization. It explains that in Pakistan impact of constantly rising budget deficit on the public debt, can be clarified through three gap models which are the revenues-expenditure gap; the trade gap; and the saving-investment gap. The revenue-expenditure constraint affects both the saving-investment and the trade gaps. The primary deficits are accountable for greater budget deficits, which leads to greater external as well as domestic borrowings due to greater government consumption as compared to its resources. Exchange rate depreciation occurs because of too much external borrowing with inadequate repayment capacity, and as a result the exchange rate put a very strong effect on the debt ratio. Primary budget deficits also put forth a positive effect on debt ratio. Though, the primary budget is surplus after mid- Nineties. The debt ratio is not affected by the interest-growth differential because the interest rates, both real and nominal, have every time been controlled and therefore remained less than the growth rate. The residuals put forth both negative and positive effects on the ratio, but it is not sure what are these residuals.

Pasha & Ghaus-Pasha (2000) is composed on different sections. One section identifies the macro determinants for the rate of debt accumulation rate in economy. Here they use the basic debt accumulation equation. According to which the variations in debt to GDP ratio is affected by: whether the primary budget is in surplus or deficit; the amount to which the domestic real interest rate goes beyond the growth rate of economy. If  $r$  is smaller than  $g$ , this will put a downward force on debt to GDP ratio; the amount to which external real interest rate goes beyond the real GDP growth rate; the amount of capital loss on the external debt due to real exchange rate depreciation. If there is a depreciation of nominal exchange rate which surpasses the difference among world and domestic rate of inflation so the debt to GDP ratio will rise. Another section discusses the reasons for the comparatively rapid rise in the debt to GDP ratio during the decade of 80s and 90s. Magnitudes of debt burden are shown in table, it appears that

the comparatively large size of primary budget deficit at above 3 percent of GDP per annum was the main reason for rapid rise in the 80s whereas during 90s it was 0.5 percent of the GDP. Real interest rate on domestic debt was higher in 80s as compare to 90s. The low inflation rate indicates higher real interest rate in 80s. But this negative factor was cancel out by the significantly greater GDP growth rate. The real exchange rate depreciation appears to be higher in 80s thus contributing to greater capital losses on external debt.

**Table 4: Magnitudes of Debt Burden**

<b>Factor</b>	<b>80s</b>	<b>90s</b>
Primary Budget Deficit (-) / Surplus (+) as % of GDP	-3.2	-0.5
Nominal Interest Rate on Domestic Debt (%)	9.5	11.7
Nominal Interest Rate on External Debt (%)	2.8	3.9
Rate of Nominal Exchange Rate Depreciation (%)	8.2	9.4
Rate of Domestic Inflation (%)	7.3	9.8
Real Interest Rate on Domestic Debt (%)	2.2	1.9
GDP Growth Rate (%)	6.1	4.6

Next section is on sustainable debt which shows that the objective is to bring down the debt to GDP or debt to revenue ratio from its present level. Then next section gives the strategy for reduction of debt burden. The main elements of the strategy was to reach primary budgetary surpluses, decrease the real interest rate on domestic debt, increase the GDP growth rate, preserve exchange rate stability. Next section tells about alternative scenarios which indicates that struggles should be made to lower down the debt to GDP ratio between 65 and 70 percent. Two scenarios were set among which one tries to get a target debt to GDP ratio of 75 percent in 2007-08. The second scenario tries to get 65 percent target debt to GDP ratio. Along with these targets there were also some assumptions.

Rais & Anwar (2012) this paper uses OLS simple techniques and data from 1972 to 2010. It discusses the problem of twin deficit and its repercussions in socio-economic perspective. This

paper uses econometric model in which they use three models: external debt model, domestic debt model, and growth model. These models capture impact of external and domestic debt on output growth. Domestic debt model shows that domestic debt is a function of investment, consumption expenditures and domestic saving. External debt model shows that external debt is a function of investment, government consumption expenditures, exports, imports, subsidies, taxes, national saving and changes in stock. While the growth model shows that growth is a function of domestic debt to GDP ratio and external debt to GDP ratio. The results of domestic and external debt model shows that all signs are according to theory while the growth model shows that both domestic and external debt ratios have negative relationship with growth. This negative relation shows that both debts are not efficiently used and well managed.

Kemal (2001) describes the debt accumulation and its effects on poverty and growth in Pakistan. This study shows that domestic and external debt accumulation and debt servicing disturb the poor adversely. Outcomes of the study shows that although in Pakistan debt burden as a percent of GDP go beyond South Asian countries but still it is not extraordinary to go for debt write off. It means that Pakistan has ability to service the debt.

## SECTION 3

### METHODOLOGY

To access the debt sustainability of Pakistan this paper uses the accounting approach in which the annual budget constraint of government is used. This method is usually used by IMF and World Bank. This paper tries to examine the sufficient condition of debt sustainability by using this methodology and also aims at suggesting policy in short run and long run to keep debt to GDP ratio sustainable at certain level. This section shows simple debt-to-GDP analysis.

The annual budget constraint of the government involve that the expenditures i.e. government purchases,  $G_t$  plus interest on privately held outstanding debt must be funded by three sources of revenue: taxes, new borrowing from the private sector, and changes in the stock of money. Here we take another source of financing that is privatization receipts.

$$G_t + i_t D_{t-1} = T_t + (D_t - D_{t-1}) + (M_t - M_{t-1}) \quad (1)$$

If tax will increase then government current expenditures then government will enjoy primary surplus, on the other hand if tax receipts decrease then current expenditures, the government will runs primary deficit.

From equation 1:

$$D_t = G_t - T_t + i D_{t-1} + D_{t-1} - (M_t - M_{t-1})$$

Primary balance can be written as  $B_t = G_t - T_t$ . Consequently  $B_t > 0$  recognizes a primary deficit.

$$D_t = B_t + (1 + i_t) D_{t-1} - (M_t - M_{t-1})$$

The budget constraint of the government can be simplified to show that the year-to-year alteration in nominal government debt is the sum of three factors: the interest paid on



outstanding debt, the primary deficit, and the changes in money supply. Greater interest rate and drop in tax receipts incline to increase a country's debt.

So, the annual budget constraint of the government can be written as:

$$D_t = (1 + i_t)D_{t-1} + B_t - \Delta M_t \quad (2)$$

$$D_t = D_{t-1} + (B_t + iD_{t-1}) - \Delta M_t \quad (3)$$

Here  $(B_t + iD_{t-1})$ , is the overall balance i.e. the primary balance minus interest payments on the outstanding debt, the fiscal surplus (if positive) or deficit (if negative). The surplus reduces the outstanding debt while the deficit increases  $D_t$ .

The arrangement of government debt is inclined toward shorter maturities. Shorter-maturity debt generally carries lower interest rates and continuing short-term debt is inexpensive than issuing longer-term debt. When the average maturity of the debt is short, it is expected that an adverse interest rate rise (because either monetary developments or seeming riskiness of the sovereign) will be essential to refinance the debt at rollover. This explains why a substitute measure of the nominal interest rate (at t) is the existing yield rate on bonds with maturities close to the period of the outstanding debt. Such a rate would apply if all present debt were amortized and reissued with a maturity equal to the period of the debt. Describe  $A_t$  as the amount of principal payments (amortization) at time t. Extracting from changes in  $M_t$ , debt service in t is the sum of debt amortization  $A_t$  and interest payments  $i_t D_{t-1}$ . Current debt can be divided into new debt and existing debt in every period.

$$D_t = D_{t-1} - A_t + A_t + i_t D_{t-1} + B_t \quad (4)$$

This equation is necessary for understanding the rollover risk concluded by maintaining a structure of short maturity. Supposing that entire debt is repaid in each and every period and is rolled over ( $A_t = D_t - 1$ ), then the rate for each of the maturities in which the new debt is

issued in  $t$ , the fresh debt will hold new interest. The whole debt will be more expensive to service in the future if debt subscribers need a greater return. Consequently, to reduce the risks implied by debt rollover countries incline to issue bills and bonds with various maturities.

Consider taking the ratio of debt ( $D_t$ ) to nominal GDP ( $P_t Y_t$ ) to show a connection between these variables to the size of the economy, and reorganizing the equation as follows:

From equation 2, take the ratio of all the terms in the equation to nominal output.

$$\frac{D_t}{P_t Y_t} = \frac{(1+i_t) D_{t-1}}{P_t Y_t} + \frac{B_t}{P_t Y_t} - \frac{\Delta M_t}{P_t Y_t} \quad (5)$$

$$= (1+i_t) \frac{P_{t-1} Y_{t-1}}{P_{t-1} Y_{t-1}} \frac{D_{t-1}}{P_t Y_t} + \frac{B_t}{P_t Y_t} - s_t \quad (6)$$

$$= (1+i_t) \frac{P_{t-1} Y_{t-1}}{P_t Y_t} \frac{D_{t-1}}{P_{t-1} Y_{t-1}} + \frac{B_t}{P_t Y_t} - s_t$$

In order to simplify the equation, we assume that the output growth is constant and represent nominal growth rate of output or GDP by  $g$ , so  $\frac{P_{t-1} Y_{t-1}}{P_t Y_t}$  can be written as  $\frac{1}{(1+g_t)(1+\pi_t)}$ .

$$dt = \frac{(1+i_t)}{(1+g_t)(1+\pi_t)} d_{t-1} + b_t - s_t \quad (7)$$

Where  $s_t = \frac{\Delta M_t}{P_t Y_t}$  represents seignorage in real terms. Here we also take privatization receipts as a source of financing budget deficit. To reorganize this ratio we use the information that the nominal growth rate of GDP ( $\gamma_t$ ) can be decomposed into two components a real component whose growth rate is  $g_t$  and a price component whose growth rate (inflation) is  $\pi_t$ :

$$(1+g_t)(1+\pi_t) = (1+\gamma_t) \quad (8)$$

Similarly, the nominal interest rate can be decomposed into a real component  $r_t$  and inflation  $\pi_t$ :

$$(1+r_t)(1+\pi_t) = (1+i_t) \quad (9)$$

$$(1 + r_t) = \frac{(1 + i_t)}{(1 + \pi_t)}$$

$$r_t = \frac{(1 + i_t)}{(1 + \pi_t)} - 1$$

$$r_t = \frac{(1 + i_t - 1 - \pi_t)}{(1 + \pi_t)}$$

The assumption that both  $i_t$  and  $\pi_t$  are small,  $r_t = i_t - \pi_t$  when the real interest rate is close to as:

$$r_t = \frac{(i_t - \pi_t)}{(1 + \pi_t)}$$

So, equation 7 becomes:

$$d_t = \frac{(1+r_t)}{(1+g_t)} d_{t-1} + b_t - s_t \quad (10)$$

Now let,  $\frac{(1+r_t)}{(1+g_t)} = \varphi_t$  and is called “discount factor”. So the Equation (10) can be solved as follows:

$$d_1 = \varphi_1 d_0 + b_1$$

$$d_2 = \varphi_2 d_1 + b_2$$

$$= \varphi_2 [\varphi_1 d_0 + b_1] + b_2$$

$$= \varphi_2 \varphi_1 d_0 + \varphi_2 b_1 + b_2$$

$$d_3 = \varphi_3 d_2 + b_3$$

$$= \varphi_3 [\varphi_2 [\varphi_1 d_0 + b_1] + b_2] + b_3$$

$$d_3 = \varphi_3 \varphi_2 \varphi_1 d_0 + \varphi_3 \varphi_2 b_1 + \varphi_3 b_2 + b_3$$

$$d_4 = \dots$$

$$d_t = \varphi_t \varphi_{t-1} \varphi_1 d_0 + \varphi_t \varphi_{t-1} b_1 + \varphi_t \varphi_{t-1} \varphi_{t-2} b_2 + b_t$$

$$d_t = d_0 \prod_{i=1}^t \varphi_i + \sum_{i=1}^t b_i \prod_{j=i+1}^t \varphi_j \quad (11)$$

Equation (10) permits comparison of different cases when debt-to-GDP ratios are volatile versus when they are sustainable. The key variable is  $\frac{(1+r_t)}{(1+g_t)} = \varphi_t$ , is  $\varphi_t$  greater than 1 when the real interest rate is larger than the growth rate of GDP. Other things remain same, the debt-to-GDP ratio will constantly increase unless the overall balance (b) is huge enough to equalize the interest growth differential. By persistently running large enough primary surpluses, or even small enough deficits, a government can attain this result.

Although the following analysis assumes  $s_t = 0$ , but here we discuss a common interpretation of seigniorage, seigniorage as an inflation tax.

$$\begin{aligned} s_t &= \frac{\Delta M_t}{P_t Y_t} = \frac{M_t}{P_t Y_t} - \frac{M_{t-1}}{P_t Y_t} \\ &= m_t - \frac{M_{t-1}}{P_t Y_t} \frac{P_{t-1} Y_{t-1}}{P_{t-1} Y_{t-1}} \\ &= m_t - \frac{M_{t-1}}{P_{t-1} Y_{t-1}} \frac{P_{t-1} Y_{t-1}}{P_t Y_t} \\ &= m_t - m_{t-1} \cdot \frac{P_{t-1} Y_{t-1}}{P_t Y_t} \\ &= m_t - m_{t-1} + m_{t-1} - m_{t-1} \cdot \frac{P_{t-1} Y_{t-1}}{P_t Y_t} \end{aligned}$$

$$\begin{aligned}
&= \Delta m_t + m_{t-1} \left[ 1 - \frac{1}{(1 + g_t)(1 + \pi_t)} \right] \\
&= \Delta m_t + m_{t-1} \left[ \frac{(1 + g_t)(1 + \pi_t) - 1}{(1 + g_t)(1 + \pi_t)} \right] \\
&= \Delta m_t + m_{t-1} \left[ \frac{1 + g_t + \pi_t + g_t \pi_t - 1}{1 + g_t + \pi_t + g_t \pi_t} \right] \\
&= \Delta m_t + m_{t-1} \left[ \frac{g_t + \pi_t}{1 + g_t + \pi_t} \right]
\end{aligned}$$

This equation shows that seignorage comes from two sources. First one is equal to the change in real monetary base holding relative to GDP. Central bank has monopoly to issue monetary base.  $\Delta m_t$  will be zero if economy is in the steady state. So the source of seignorage is useless.

Second component is

$$m_{t-1} \left[ \frac{g_t + \pi_t}{1 + g_t + \pi_t} \right]$$

When economy is in steady state, this can be nonzero. To keep real money holding constant, representatives in the economy need to increase their nominal assets by an amount  $g_t + \pi_t$ , counterbalancing real growth rate of income and inflation.

Assume that the real income is in steady state i.e.  $g_t = 0$ .

$$s_t = \frac{\pi_t}{1 + \pi_t} m_{t-1} \cong \pi_t m_{t-1}$$

In this equation inflation can be reflected as the product of the tax rate  $\pi_t$  times the tax base of  $m_{t-1}$ , outstanding real stock of monetary base. Because money do not pay interest, its real value is depreciated by inflation.

Seigniorage shows a substitute way to finance expenditure comparative to issuing debt which bears interest. The large share of government expenditure that can be financed by an interest-free liability can be due to the larger quantity of money issued by the government relative to nominal GDP.

### 3.1. Sustainability Conditions

There are two conditions of debt sustainability.

**a) Necessary Condition:** The necessary condition for debt to be sustainable holds  $r_t < g_t$  when debt ratio is sustainable. On the other hand if  $r_t > g_t$  then debt ratio is unsustainable and it will not become stable as long as interest rate is greater than GDP growth. Its economic implication is that when interest payments are greater than the growth rate of GDP it means that interest payments are consuming a significant part of the resources and GDP growth is not large enough to counterbalance so, the Debt to GDP ratio remains unsustainable. The only way to make it sustainable is to increase the GDP growth of the country.

**b) Sufficient Condition:** The sufficient condition requires that the debt to GDP ratio remains constant or primary balance should be positive. The economic implication says that Debt to GDP remains constant when there is a constant GDP growth. If government of Pakistan want to keep the debt to GDP ratio constant at 60 percent, it need to reduce 3 percent to make this ratio constant.

## **SECTION 4**

### **RESULTS AND DISCUSSION**

Our analysis is divided into three scenarios. Since the ultimate goal is to calculate GDP growth needed to maintain debt-GDP ratio level at same level therefore, we did our analysis for debt to GDP ratio at 60 percent, 50 and 40 percent. Each target is then further seen at different levels of fiscal deficit. Fiscal deficits targets are taken using threshold level of fiscal deficit mentioned in (Onwioduokit, 2012), i.e., 5 percent for West African countries, long term target of 3.5 percent, which was the announced by the Finance Minister Ishaq Dar in the Budget 2015-16, to achieve by 2018 and (Johnson, 2001) estimated the threshold level at 3 percent for EU countries. Besides these three values we have also calculate the debt sustainability level GDP growth rate for 4.5 percent and 4 percent. Moreover, 9 percent rate of inflation is used to adjust annual GDP deflator to calculated real value of GDP growth, which is in accordance with the (Mubarik, 2005) estimates of threshold level of inflation in Pakistan. As the study aims to estimate the sufficient condition of sustainable debt we needed to collect data on Budget Deficit, Interest Payments, Total Debt, and GDP Currents at market price and Constant factor cost. The data is collected for the year 2010-2014 from Pakistan Economic Survey and Handbook of Pakistan.

#### **4.1. Fixing Debt to GDP Ratio at 60 Percent**

As discussed above the results of one scenario i.e. 60 percent and 5 sub scenarios are given below. Interest payments are calculated by using the average rate of interest in 2014. Average rate of interest is calculated by dividing total interest payments by total accumulated debt.

#### 4.1.1. If Fiscal Deficit is 5 Percent

Table 5 is calculated by fixing budget deficit at 5 percent level, fixing debt to GDP ratio at 60 percent, and 9 percent annual inflation. This table shows that if 60 percent level is achieved in 2015 then there is a need to have nominal GDP growth rate as high as 12.95 percent and real growth rate by 6.34 percent which is a difficult task and cannot be achieved in a year thus it is good to reach at 60 percent level in three years by reducing total debt to GDP ratio by one percent in each year.

Nevertheless, the important findings are that when 60 percent level is achieved, then in order to maintain the debt-GDP ratio with 5 percent level of fiscal deficit and no change in interest payments rate, 15.6 percent growth in nominal GDP and 6.05 percent growth in real GDP is needed. It is noteworthy to mention that total debt will keep on increasing but Debt to GDP ratio remains the same.

**Table 5: Fiscal Deficit 5 Percent at Debt to GDP Ratio 60 Percent**

<b>Years</b>	<b>Total Debt</b>	<b>GDP Current Growth Rate</b>	<b>GDP Constant Growth Rate</b>
2015	17666414	15.91	6.34
2016	20421782	15.60	6.05
2017	23606895	15.60	6.05
2018	27288780	15.60	6.05
2019	31544914	15.60	6.05
2020	36464863	15.60	6.05
2021	42152159	15.60	6.05
2022	48726483	15.60	6.05
2023	56326181	15.60	6.05
2024	65111176	15.60	6.05
2025	75266337	15.60	6.05

#### 4.1.2. If Fiscal Deficit is 4.5 Percent

Table 6 is calculated by fixing budget deficit at 4.5 percent level, fixing debt to GDP ratio at 60 percent, and 9 percent annual inflation. This table shows that if 60 percent level is achieved in 2015 then there is a need to have nominal GDP growth rate as high as 15.08 percent and real



growth rate by 5.58 percent which is a difficult task and cannot be achieved in a year thus it is good to reach at 60 percent level in three years by reducing total debt to GDP ratio by one percent in each year.

Nevertheless, the important findings are that when 60 percent level is achieved, then in order to maintain the debt-GDP ratio with 4.5 percent level of fiscal deficit and no change in interest payments rate 14.76 percent growth in nominal GDP and 5.29 percent growth in real GDP is needed. It is noteworthy to mention that total debt will keep on increasing but Debt to GDP ratio remains the same.

**Table 6: Fiscal Deficit 4.5 Percent at Debt to GDP Ratio 60 Percent**

<b>Years</b>	<b>Total Debt</b>	<b>GDP Current Growth Rate</b>	<b>GDP Constant Growth Rate</b>
2015	17539404	15.08	5.58
2016	20128802	14.76	5.29
2017	23100480	14.76	5.29
2018	26510876	14.76	5.29
2019	30424760	14.76	5.29
2020	34916463	14.76	5.29
2021	40071290	14.76	5.29
2022	45987140	14.76	5.29
2023	52776366	14.76	5.29
2024	60567907	14.76	5.29
2025	69509737	14.76	5.29

#### **4.1.3. If Fiscal Deficit is 4 Percent**

Table 7 is calculated by fixing budget deficit at 4 percent level, fixing debt to GDP ratio at 60 percent, and 9 percent annual inflation. This table shows that if 60 percent level is achieved in 2015 then there is a need to have nominal GDP growth rate as high as 14.25 percent and real growth rate by 4.81 percent which is a difficult task and cannot be achieved in a year thus it is good to reach at 60 percent level in three years by reducing total debt to GDP ratio by one percent in each year.

Nevertheless, the important findings are that when 60 percent level is achieved, then in order to maintain the debt-GDP ratio with 4.5 percent level of fiscal deficit and no change in interest payments rate, 13.93 percent growth in nominal GDP and 4.52 percent growth in real GDP is needed. It is noteworthy to mention that total debt will keep on increasing but Debt to GDP ratio remains the same.

**Table 7: Fiscal Deficit 4 Percent at Debt to GDP Ratio 60 Percent**

<b>Years</b>	<b>Total Debt</b>	<b>GDP Current Growth Rate</b>	<b>GDP Constant Growth Rate</b>
2015	17412395	14.25	4.81
2016	19837938	13.93	4.52
2017	22601359	13.93	4.52
2018	25749724	13.93	4.52
2019	29336656	13.93	4.52
2020	33423246	13.93	4.52
2021	38079098	13.93	4.52
2022	43383508	13.93	4.52
2023	49426823	13.93	4.52
2024	56311970	13.93	4.52
2025	64156216	13.93	4.52

#### **4.1.4. If Fiscal Deficit is 3.5 Percent**

Table 8 is calculated by fixing budget deficit at 3.5 percent level, fixing debt to GDP ratio at 60 percent, and 9 percent annual inflation. This table shows that if 60 percent level is achieved in 2015 then there is a need to have nominal GDP growth rate as high as 13.41 percent and real growth rate by 4.05 percent which is a difficult task and cannot be achieved in a year thus it is good to reach at 60 percent level in three years by reducing total debt to GDP ratio by one percent in each year.

Nevertheless, the important findings are that when 60 percent level is achieved, then in order to maintain the debt-GDP ratio with 3.5 percent level of fiscal deficit and no change in interest payments rate, 13.10 percent growth in nominal GDP and 3.76 percent growth in real GDP is

needed. It is noteworthy to mention that total debt will keep on increasing but Debt to GDP ratio remains the same.

**Table 8: Fiscal Deficit 3.5 Percent at Debt to GDP Ratio 60 Percent**

<b>Years</b>	<b>Total Debt</b>	<b>GDP Current Growth Rate</b>	<b>GDP Constant Growth Rate</b>
2015	17285385	13.41	4.05
2016	19549191	13.10	3.76
2017	22109480	13.10	3.76
2018	25005081	13.10	3.76
2019	28279908	13.10	3.76
2020	31983628	13.10	3.76
2021	36172410	13.10	3.76
2022	40909783	13.10	3.76
2023	46267593	13.10	3.76
2024	52327097	13.10	3.76
2025	59180192	13.10	3.76

#### **4.1.5. If Fiscal Deficit is 3 Percent**

Table 9 is calculated by fixing budget deficit at 3 percent level, fixing debt to GDP ratio at 60 percent, and 9 percent annual inflation. This table shows that if 60 percent level is achieved in 2015 then there is a need to have nominal GDP growth rate as high as 12.58 percent and real growth rate by 3.28 percent which this is a difficult task and cannot be achieved in a year thus it is good to reach at 60 percent level in three years by reducing total debt to GDP ratio by one percent in each year.

Nevertheless, the important findings are that when 60 percent level is achieved, then in order to maintain the debt-GDP ratio with 3 percent level of fiscal deficit and no change in interest payments rate, 12.26 percent growth in nominal GDP and 2.99 percent growth in real GDP is needed. It is noteworthy to mention that total debt will keep on increasing but Debt to GDP ratio remains the same.

**Table 9: Fiscal Deficit 3 Percent at Debt to GDP Ratio 60 Percent**

<b>Years</b>	<b>Total Debt</b>	<b>GDP Current Growth Rate</b>	<b>GDP Constant Growth Rate</b>
2015	17158376	12.58	3.28
2016	19262562	12.26	2.99
2017	21624790	12.26	2.99
2018	24276706	12.26	2.99
2019	27253834	12.26	2.99
2020	30596058	12.26	2.99
2021	34348148	12.26	2.99
2022	38560369	12.26	2.99
2023	43289148	12.26	2.99
2024	48597833	12.26	2.99
2025	54557537	12.26	2.99

#### **4.1.6. Economic Implication of 60 Percent Debt to GDP Ratio**

Debt to GDP ratio stands at 63 percent. To decrease three percent there is a need of higher level of growth; 12.95 percent nominal GDP growth and 6.34 percent real GDP growth, which is close to impossible. Therefore, reducing it one percent per year and achieve the target of 60 percent in three years would be more feasible.

Long run impact on growth deals with two things (i) when the debt to GDP ratio stabilizes then there is no need for extra spending on interest payments and growth in national income is used to serve development expenditures instead of debt (ii) the projects which can be beneficial for growth may not set up during the time of debt retirement, thus long run growth may suffer and long run impact will be negative.

Fiscal deficit plays important role in shaping the overall debt positions. Following table 10 shows that with different level of fiscal deficit, 60 percent level of debt to GDP ratio can be achieved but accumulation of total debt will be alarming. Currently, almost 100,000 per capita is our debt which will be more than doubles in the year 2025.

**Table 10: Total Debt in 2025**

<b>Fiscal Deficit</b>	<b>Total Debt</b>
5	75266337
4.5	69509737
4	64156216
3.5	59180192
3	54557537

Moreover, as table 11 shows, for higher the fiscal deficit higher GDP growth is needed to maintain the debt-GDP ratio at 60 percent level, therefore lower the fiscal deficit higher possibility will be to finance development expenditures as well redistribute the impact of growth.

**Table 11: GDP Growth needed to maintain Debt to GDP ratio at 60 Percent**

<b>Fiscal Deficit</b>	<b>Nominal GDP Growth</b>	<b>Real GDP Growth</b>
5	15.60	6.05
4.5	14.76	5.29
4	13.93	4.52
3.5	13.10	3.76
3	12.26	2.99

## **4.2. Fixing Debt to GDP Ratio at 50 Percent**

As discussed above the results of one scenarios i.e. 50 percent and 5 sub scenarios are given below. Interest payments are calculated by using the average rate of interest in 2014. Average rate of interest is calculated by dividing total interest payments by total accumulated debt.

### **4.2.1. If Fiscal Deficit is 5 Percent**

Table 12 is calculated by fixing budget deficit at 5 percent level, fixing debt to GDP ratio at 50 percent, and 9 percent annual inflation. The table shows that if 50 percent level is achieved in

2015 then there is a need to have nominal GDP growth rate as high as 19.10 percent and real growth rate by 9.26 percent. If it is decline by 13 percent in one year then this is a difficult task and cannot be achieved in a year thus it is good to reach at 50 percent level in thirteen years by reducing total debt to GDP ratio by one percent in each year or by declining 2-3 percent per year.

Nevertheless, the important findings are that when 50 percent level is achieved, then in order to maintain the debt-GDP ratio with 5 percent level of fiscal deficit and no change in interest payments rate, 17.26 percent growth in nominal GDP and 7.58 percent growth in real GDP is needed. It is noteworthy to mention that total debt will keep on increasing but Debt to GDP ratio remains the same.

**Table 12: Fiscal Deficit 5 Percent at Debt to GDP Ratio 50 Percent**

<b>Years</b>	<b>Total Debt</b>	<b>GDP Current Growth Rate</b>	<b>GDP Constant Growth Rate</b>
2015	15126224	19.10	9.26
2016	17737512	17.26	7.58
2017	20799594	17.26	7.58
2018	24390294	17.26	7.58
2019	28600867	17.26	7.58
2020	33538324	17.26	7.58
2021	39328150	17.26	7.58
2022	46117492	17.26	7.58
2023	54078899	17.26	7.58
2024	63414709	17.26	7.58
2025	74362190	17.26	7.58

#### **4.2.2. If Fiscal Deficit is 4.5 Percent**

Table 13 is calculated by fixing budget deficit at 4.5 percent level, fixing debt to GDP ratio at 50 percent, and 9 percent annual inflation. This table shows that if 50 percent level is achieved in 2015 then there is a need to have nominal GDP growth rate as high as 18.10 percent and real growth rate by 8.34 percent. If it is decline by 13 percent in one year then this is a difficult task

and cannot be achieved in a year thus it is good to reach at 50 percent level in thirteen years by reducing total debt to GDP ratio by one percent in each year or by declining 2-3 percent per year.

Nevertheless, the important findings are that when 50 percent level is achieved, then in order to maintain the debt-GDP ratio with 4.5 percent level of fiscal deficit and no change in interest payments rate, 16.26 percent growth in nominal GDP and 6.66 percent growth in real GDP is needed. It is noteworthy to mention that total debt will keep on increasing but Debt to GDP ratio remains the same.

**Table 13: Fiscal Deficit 4.5 Percent at Debt to GDP Ratio 50 Percent**

<b>Years</b>	<b>Total Debt</b>	<b>GDP Current Growth Rate</b>	<b>GDP Constant Growth Rate</b>
2015	14999215	18.10	8.34
2016	17438584	16.26	6.66
2017	20274676	16.26	6.66
2018	23572010	16.26	6.66
2019	27405600	16.26	6.66
2020	31862659	16.26	6.66
2021	37044583	16.26	6.66
2022	43069260	16.26	6.66
2023	50073749	16.26	6.66
2024	58217400	16.26	6.66
2025	67685478	16.26	6.66

#### **4.2.3. If Fiscal Deficit is 4 Percent**

Table 14 is calculated by fixing budget deficit at 4 percent level, fixing debt to GDP ratio at 50 percent, and 9 percent annual inflation. This table shows that if 50 percent level is achieved in 2015 then there is a need to have nominal GDP growth rate as high as 17.10 percent and real growth rate by 7.43 percent. If it is decline by 13 percent in one year then this is a difficult task and cannot be achieved in a year thus it is good to reach at 50 percent level in thirteen years by

reducing total debt to GDP ratio by one percent in each year or by declining 2-3 percent per year.

Nevertheless, the important findings are that when 50 percent level is achieved, then in order to maintain the debt-GDP ratio with 4 percent level of fiscal deficit and no change in interest payments rate, 15.26 percent growth in nominal GDP and 5.75 percent growth in real GDP is needed. It is noteworthy to mention that total debt will keep on increasing but Debt to GDP ratio remains the same.

**Table 14: Fiscal Deficit 4 Percent at Debt to GDP Ratio 50 Percent**

<b>Years</b>	<b>Total Debt</b>	<b>GDP Current Growth Rate</b>	<b>GDP Constant Growth Rate</b>
2015	14872205	17.10	7.43
2016	17142197	15.26	5.75
2017	19758664	15.26	5.75
2018	22774491	15.26	5.75
2019	26250633	15.26	5.75
2020	30257350	15.26	5.75
2021	34875624	15.26	5.75
2022	40198800	15.26	5.75
2023	46334469	15.26	5.75
2024	53406644	15.26	5.75
2025	61558268	15.26	5.75

#### **4.2.4. If Fiscal Deficit is 3.5 Percent**

Table 15 is calculated by fixing budget deficit at 3.5 percent level, fixing debt to GDP ratio at 50 percent, and 9 percent annual inflation. This table shows that if 50 percent level is achieved in 2015 then there is a need to have nominal GDP growth rate as high as 16.10 percent and real growth rate by 6.51 percent. If it is decline by 13 percent in one year then this is a difficult task and cannot be achieved in a year thus it is good to reach at 50 percent level in thirteen years by reducing total debt to GDP ratio by one percent in each year or by declining 2-3 percent per year.



Nevertheless, the important findings are that when 50 percent level is achieved, then in order to maintain the debt-GDP ratio with 3.5 percent level of fiscal deficit and no change in interest payments rate, 14.26 percent growth in nominal GDP and 4.83 percent growth in real GDP is needed. It is noteworthy to mention that total debt will keep on increasing but Debt to GDP ratio remains the same.

**Table 15: Fiscal Deficit 3.5 Percent at Debt to GDP Ratio 50 Percent**

<b>Years</b>	<b>Total Debt</b>	<b>GDP Current Growth Rate</b>	<b>GDP Constant Growth Rate</b>
2015	14745196	16.10	6.51
2016	16848350	14.26	4.83
2017	19251483	14.26	4.83
2018	21997382	14.26	4.83
2019	25134938	14.26	4.83
2020	28720013	14.26	4.83
2021	32816438	14.26	4.83
2022	37497150	14.26	4.83
2023	42845486	14.26	4.83
2024	48956672	14.26	4.83
2025	55939516	14.26	4.83

#### **4.2.5. If Fiscal Deficit is 3 Percent**

Table 16 is calculated by fixing budget deficit at 3 percent level, fixing debt to GDP ratio at 50 percent, and 9 percent annual inflation. This table shows that if 50 percent level is achieved in 2015 then there is a need to have nominal GDP growth rate as high as 15.10 percent and real growth rate by 5.59 percent. If it is decline by 13 percent in one year then this is a difficult task and cannot be achieved in a year thus it is good to reach at 50 percent level in thirteen years by reducing total debt to GDP ratio by one percent in each year or by declining 2-3 percent per year.

Nevertheless, the important findings are that when 50 percent level is achieved, then in order to maintain the debt-GDP ratio with 3 percent level of fiscal deficit and no change in interest

payments rate, 13.26 percent growth in nominal GDP and 3.91 percent growth in real GDP is needed. It is noteworthy to mention that total debt will keep on increasing but Debt to GDP ratio remains the same.

**Table 16: Fiscal Deficit 3 Percent at Debt to GDP Ratio 50 Percent**

<b>Years</b>	<b>Total Debt</b>	<b>GDP Current Growth Rate</b>	<b>GDP Constant Growth Rate</b>
2015	14618187	15.10	5.59
2016	16557042	13.26	3.91
2017	18753055	13.26	3.91
2018	21240331	13.26	3.91
2019	24057503	13.26	3.91
2020	27248325	13.26	3.91
2021	30862356	13.26	3.91
2022	34955728	13.26	3.91
2023	39592015	13.26	3.91
2024	44843229	13.26	3.91
2025	50790927	13.26	3.91

#### **4.2.6. Economic Implication of 50 Percent Debt to GDP Ratio**

Debt to GDP ratio stands at 63 percent. To decrease thirteen percent there is a need of higher level of growth; 19.10 percent nominal GDP growth and 9.26 percent real GDP growth, which is close to impossible. Therefore, reducing it one percent per year or by declining 2-3 percent per year and achieve the target of 50 percent would be more feasible

Long run impact on growth deals with two things (i) when the debt to GDP ratio stabilizes then there is no need for extra spending on interest payments and growth in national income is used to serve development expenditures instead of debt (ii) the projects which can be beneficial for growth may not set up during the time of debt retirement, thus long run growth may suffer and long run impact will be negative.

Fiscal deficit plays important role in shaping the overall debt positions. Following table 17 shows that with different level of fiscal deficit, 50 percent level of debt to GDP ratio can be

achieved but accumulation of total debt will be alarming. Currently, almost 100,000 per capita is our debt which will be more than doubles in the year 2025.

**Table 17: Total Debt in 2025**

<b>Fiscal Deficit</b>	<b>Total Debt</b>
5	74362190
4.5	67685478
4	61558268
3.5	55939516
3	50790927

Moreover, as table 18 shows, for higher the fiscal deficit higher GDP growth is needed to maintain the debt-GDP ratio at 50 percent level, therefore lower the fiscal deficit higher possibility will be to finance development expenditures as well redistribute the impact of growth.

**Table 18: GDP Growth needed to maintain Debt to GDP ratio at 50 Percent**

<b>Fiscal Deficit</b>	<b>Nominal GDP Growth</b>	<b>Real GDP Growth</b>
5	17.26	7.58
4.5	16.26	6.66
4	15.26	5.75
3.5	14.26	4.83
3	13.26	3.91

### **4.3. Fixing Debt to GDP Ratio at 40 Percent**

As discussed above the results of one scenarios i.e. 40 percent and 5 sub scenarios are given below. Interest payments are calculated by using the average rate of interest in 2014. Average rate of interest is calculated by dividing total interest payments by total accumulated debt.

#### 4.3.1. If Fiscal Deficit is 5 Percent

Table 19 is calculated by fixing budget deficit at 5 percent level, fixing debt to GDP ratio at 40 percent, and 9 percent annual inflation. This table shows that if 40 percent level is achieved in 2015 then there is a need to have nominal GDP growth rate as high as 23.87 percent and real growth rate by 13.64 percent. If it is decline by 23 percent in one year then this is a difficult task and cannot be achieved in a year thus it is good to reach at 40 percent level by reducing 5 percent total debt to GDP ratio a year for five years or by declining 2 percent per year.

Nevertheless, the important findings are that when 40 percent level is achieved, then in order to maintain the debt-GDP ratio with 5 percent level of fiscal deficit and no change in interest payments rate, 19.76 percent growth in nominal GDP and 9.87 percent growth in real GDP is needed. It is noteworthy to mention that total debt will keep on increasing but Debt to GDP ratio remains the same.

**Table 19: Fiscal Deficit 5 Percent at Debt to GDP Ratio 40 Percent**

<b>Years</b>	<b>Total Debt</b>	<b>GDP Current Growth Rate</b>	<b>GDP Constant Growth Rate</b>
2015	12586035	23.87	13.64
2016	15073452	19.76	9.87
2017	18052466	19.76	9.87
2018	21620232	19.76	9.87
2019	25893106	19.76	9.87
2020	31010442	19.76	9.87
2021	37139133	19.76	9.87
2022	44479056	19.76	9.87
2023	53269592	19.76	9.87
2024	63797428	19.76	9.87
2025	76405914	19.76	9.87

#### 4.3.2. If Fiscal Deficit is 4.5 Percent

Table 20 is calculated by fixing budget deficit at 4.5 percent level, fixing debt to GDP ratio at 40 percent, and 9 percent annual inflation. This table shows that if 40 percent level is achieved in 2015 then there is a need to have nominal GDP growth rate as high as 22.63 percent and real

growth rate by 12.49 percent. If it is decline by 23 percent in one year then this is a difficult task and cannot be achieved in a year thus it is good to reach at 40 percent level by reducing 5 percent total debt to GDP ratio a year for five years or by declining 2 percent per year.

Nevertheless, the important findings are that when 40 percent level is achieved, then in order to maintain the debt-GDP ratio with 4.5 percent level of fiscal deficit and no change in interest payments rate, 18.51 percent growth in nominal GDP and 8.73 percent growth in real GDP is needed. It is noteworthy to mention that total debt will keep on increasing but Debt to GDP ratio remains the same

**Table 20: Fiscal Deficit 4.5 Percent at Debt to GDP Ratio 40 Percent**

<b>Years</b>	<b>Total Debt</b>	<b>GDP Current Growth Rate</b>	<b>GDP Constant Growth Rate</b>
2015	12459025	22.63	12.49
2016	14765604	18.51	8.73
2017	17499206	18.51	8.73
2018	20738890	18.51	8.73
2019	24578345	18.51	8.73
2020	29128611	18.51	8.73
2021	34521283	18.51	8.73
2022	40912316	18.51	8.73
2023	48486542	18.51	8.73
2024	57463007	18.51	8.73
2025	68101314	18.51	8.73

#### **4.3.3. If Fiscal Deficit is 4 Percent**

Table 21 is calculated by fixing budget deficit at 4 percent level, fixing debt to GDP ratio at 40 percent, and 9 percent annual inflation. This table shows that if 40 percent level is achieved in 2015 then there is a need to have nominal GDP growth rate as high as 21.37 percent and real growth rate by 11.35 percent. If it is decline by 23 percent in one year then this is a difficult task and cannot be achieved in a year thus it is good to reach at 40 percent level by reducing 5 percent total debt to GDP ratio a year for five years or by declining 2 percent per year.

Nevertheless, the important findings are that when 40 percent level is achieved, then in order to maintain the debt-GDP ratio with 4 percent level of fiscal deficit and no change in interest payments rate, 17.26 percent growth in nominal GDP and 7.58 percent growth in real GDP is needed. It is noteworthy to mention that total debt will keep on increasing but Debt to GDP ratio remains the same.

**Table 21: Fiscal Deficit 4 Percent at Debt to GDP Ratio 40 Percent**

<b>Years</b>	<b>Total Debt</b>	<b>GDP Current Growth Rate</b>	<b>GDP Constant Growth Rate</b>
2015	12332016	21.37	11.35
2016	14460931	17.26	7.58
2017	16957366	17.26	7.58
2018	19884770	17.26	7.58
2019	23317540	17.26	7.58
2020	27342920	17.26	7.58
2021	32063214	17.26	7.58
2022	37598388	17.26	7.58
2023	44089115	17.26	7.58
2024	51700357	17.26	7.58
2025	60625552	17.26	7.58

#### **4.3.4. If Fiscal Deficit is 3.5 Percent**

Table 22 is calculated by fixing budget deficit at 3.5 percent level, fixing debt to GDP ratio at 40 percent, and 9 percent annual inflation. This table shows that if 40 percent level is achieved in 2015 then there is a need to have nominal GDP growth rate as high as 20.12 percent and real growth rate by 10.20 percent. If it is decline by 23 percent in one year then this is a difficult task and cannot be achieved in a year thus it is good to reach at 40 percent level by reducing 5 percent total debt to GDP ratio a year for five years or by declining 2 percent per year.

Nevertheless, the important findings are that when 40 percent level is achieved, then in order to maintain the debt-GDP ratio with 3.5 percent level of fiscal deficit and no change in interest payments rate, 16.01 percent growth in nominal GDP and 6.43 percent growth in real GDP is

needed. It is noteworthy to mention that total debt will keep on increasing but Debt to GDP ratio remains the same.

**Table 22: Fiscal Deficit 3.5 Percent at Debt to GDP Ratio 40 Percent**

<b>Years</b>	<b>Total Debt</b>	<b>GDP Current Growth Rate</b>	<b>GDP Constant Growth Rate</b>
2015	12205006	20.12	10.20
2016	14159432	16.01	6.43
2017	16426827	16.01	6.43
2018	19057306	16.01	6.43
2019	22109012	16.01	6.43
2020	25649398	16.01	6.43
2021	29756717	16.01	6.43
2022	34521753	16.01	6.43
2023	40049830	16.01	6.43
2024	46463135	16.01	6.43
2025	53903422	16.01	6.43

#### **4.3.5. If Fiscal Deficit is 3 Percent**

Table 23 is calculated by fixing budget deficit at 3 percent level, fixing debt to GDP ratio at 40 percent, and 9 percent annual inflation. This table shows that if 40 percent level is achieved in 2015 then there is a need to have nominal GDP growth rate as high as 18.87 percent and real growth rate by 9.05 percent. If it is decline by 23 percent in one year then this is a difficult task and cannot be achieved in a year thus it is good to reach at 40 percent level by reducing 5 percent total debt to GDP ratio a year for five years or by declining 2 percent per year.

Nevertheless, the important findings are that when 40 percent level is achieved, then in order to maintain the debt-GDP ratio with 3 percent level of fiscal deficit and no change in interest payments rate, 14.76 percent growth in nominal GDP and 5.29 percent growth in real GDP is needed. It is noteworthy to mention that total debt will keep on increasing but Debt to GDP ratio remains the same.

**Table 23: Fiscal Deficit 3 Percent at Debt to GDP Ratio 40 Percent**

<b>Years</b>	<b>Total Debt</b>	<b>GDP Current Growth Rate</b>	<b>GDP Constant Growth Rate</b>
2015	12077997	18.87	9.05
2016	13861110	14.76	5.29
2017	15907469	14.76	5.29
2018	18255938	14.76	5.29
2019	20951120	14.76	5.29
2020	24044199	14.76	5.29
2021	27593920	14.76	5.29
2022	31667697	14.76	5.29
2023	36342898	14.76	5.29
2024	41708314	14.76	5.29
2025	47865844	14.76	5.29

#### **4.3.6. Economic Implication of 40 Percent Debt to GDP Ratio**

Debt to GDP ratio stands at 63 percent. To decrease twenty three percent there is a need of higher level of growth; 23.87 percent nominal GDP growth and 13.64 percent real GDP growth, which is close to impossible. Therefore, reducing it 5 percent total debt to GDP ratio a year for five years or by declining 2 percent per year and achieve the target of 40 percent would be more feasible.

Long run impact on growth deals with two things (i) when the debt to GDP ratio stabilizes then there is no need for extra spending on interest payments and growth in national income is used to serve development expenditures instead of debt (ii) the projects which can be beneficial for growth may not set up during the time of debt retirement, thus long run growth may suffer and long run impact will be negative.

Fiscal deficit plays important role in shaping the overall debt positions. Following table 24 shows that with different level of fiscal deficit, 40 percent level of debt to GDP ratio can be achieved but accumulation of total debt will be alarming. Currently, almost 100,000 per capita is our debt which will be more than doubles in the year 2025.



**Table 24: Total Debt in 2025**

<b>Fiscal Deficit</b>	<b>Total Debt</b>
5	76405914
4.5	68101314
4	60625552
3.5	53903422
3	47865844

Moreover, as table 25 shows, for higher the fiscal deficit higher GDP growth is needed to maintain the debt-GDP ratio at 40 percent level, therefore lower the fiscal deficit higher possibility will be to finance development expenditures as well redistribute the impact of growth.

**Table 25: GDP Growth needed to maintain Debt to GDP ratio at 40 Percent**

<b>Fiscal Deficit</b>	<b>Nominal GDP Growth</b>	<b>Real GDP Growth</b>
5	19.76	9.87
4.5	18.51	8.73
4	17.26	7.58
3.5	16.01	6.43
3	14.76	5.29

## SECTION 5

### SUMMARY AND CONCLUSIONS

The purpose of this study is to find out the sufficient condition for debt sustainability in Pakistan. As Pakistan is not in a position to meet the sustainability criteria agreed in the FRDL (2005) and debt has become a very sensitive topic for upcoming years. Previous studies only focus on the necessary condition of debt sustainability accounting approach. But this study finds the sufficient condition which states that debt to GDP ratio remains constant.

This paper use the methodology of accounting approach in which government budget constraint is used to derive the necessary and sufficient conditions. Then by using this equation derived from methodology for finding the sustainability of debt to GDP ratio for the year 2015 to 2025 using threshold levels of 60 percent, 50 percent and 40 percent with different levels of fiscal deficit, i.e., 5 percent, 4.5 percent, 4 percent, 3.5 percent, and 3 percent. Moreover, 9 percent rate of inflation is used to adjust annual GDP deflator to calculated real value of GDP growth, which is in accordance with the Mubarik (2005) estimates of threshold level of inflation in Pakistan.

Results show that for higher fiscal deficit higher GDP growth is needed to maintain the debt-GDP ratio. Therefore lower the fiscal deficit higher possibility will be to finance development expenditures as well redistribute the impact of growth. The total debt will increase by 2025 but we need a growth rate to maintain debt to GDP ratio each year. As it is currently at 63 percent so, we find that for debt to GDP ratio at 60 percent it is easier to achieve the target by reducing 3 percent in one year or by reducing 1 percent each year for three years. But for 50 percent it is near to impossible to reduce 13 percent in one year, this can be achieved by reducing 1 percent each year for thirteen years or by reducing 2-3 percent each year. Similarly for 40

percent reducing 23 percent in one year is not possible, so in order to reach this target there is a need to reduce 3 percent to 4 percent for 6 -8 years or 1 percent for 23 years.

Main conclusion which is drawn from the above analysis is that there is a need to maintain growth rate each year in order to each sustainable level of debt. When the fiscal deficit is high then higher growth rate is needed. If the government want to bring debt to GDP ratio at 50 percent it need more GDP growth both nominal and real as compared to 60 percent in order to maintain this level. Similarly, if it want to bring debt to GDP ratio at 40 percent then there is a need of more nominal as well as real GDP growth as compared to 50 percent. It is not possible for the government of Pakistan to rapidly increase the GDP growth in one year, rather it can be increased slowly in different years by small amount. Moreover the increasing GDP also means the country's ability to hold debt has been increased. But this can only leads to growth if these expenditures are serve for development purpose not for paying more interest payments.

Maintaining debt-GDP ratio at certain level implies that there is no need to retire debt further and growth in national income is used to serve development expenditures instead of using it for debt retirement. One of the important conclusion which we draw from the study is that the projects which can be beneficial for growth may not set up during the time of debt retirement, thus long run growth may suffer and long run impact will be negative. Therefore, it is better to select a threshold level, 60 percent in FRDL (2005) which maximises the use of government spending.

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