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Debt and Economic Growth of Pakistan; Role of Uncertain Economic and Political Conditions

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Abstract

This study is an attempt to investigate the role of political instability and economic uncertainty on debt and economic growth for the data span of 1975 to 2016 in Pakistan. We extract economic uncertainty by using Generalized Autoregressive Conditionally Heteroskedastic (GARCH) model. We explore the relationship between debt and economic growth simultaneously with Generalized Method of Moments (GMM) approach. The deep-rooted relation of political and economic uncertainty with debt and growth recommends immediate fiscal and public policy adjustments to minimize the harms of higher debt-GDP ratio and slow economic growth. This study results in the changing fiscal behavior with political shifts and confirms "the positive theory of debt", by Alesina and Tabellini (1989 and 1990), recommending stable political environment with consistent economic policies for Pakistan.

Keywords: *Debt, Growth, Political Instability, Economic Uncertainty, Pakistan*

JEL Classification codes: *H63, O40, P16, D81*

1. Introduction

Debt, if used prudently, can assure welfare and growth and if recklessly, can hamper growth and can result in disaster. Time and again, public authorities are forced to gauge their adopted measures and their compatibility with sustainability of debt. Sustainability of fiscal policy is the basic requirement to mitigate the adversaries associated with debt. A sustainable fiscal policy is the one where the fiscal indicators reacts actively to the changing inflow of debt (Bohn, 1998) Debt has always been on the top of the list and has always been projected as a crisis in reference to the economic problems of Pakistan. We observe the seriousness of public authorities by formulating the Medium-Term Debt Strategy (2013/2014, 2015/2016) to tackle the ever-mounting debt stock, but their strategies are limited to the paper work only. Accordingly, Alesina and Tabellini (1990) argues that debt is used as an instrument to affect the

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policies of successor. It is, therefore, observed that the uncertain political history of Pakistan further worsens the situations as the accumulation and the distribution of debt are more political than economic in nature. Hence, the utility of borrowed funds is based on political gains instead of economic gains; ignoring the economic costs of those political decisions.

This study focusses on the debt-growth nexus simultaneously, and the relationship is controlled for the uncertain political and economic environment for Pakistan. This relation stands unique because it incorporates the model which is open to political and economic shocks. The results for debt-growth nexus can be generalized for any growing economy facing political and economic shocks. Capturing the uncertain economic conditions through GARCH with political instability completes the relation for Pakistan. The resultsobtained are reliable with the use of GMM-HAC as final estimation procedure. The result confirms that debt is used as political instrument and that political and economic uncertainty explain the variations in the relationship significantly for Pakistan.

Is the higher debt to GDP ratio one of the constraints to economic growth? The recent debate results with strong evidences that it is "debt" which compels the government to reduce its current expenditure which results in slower growth. The increasing debt stock and the slower growth rate double the harms. Consensus exists that growth in public debt should not be considered as sustainable if it exceeds from the growth in country aggregate output (i.e. GDP growth rate). Public-private partnership and consolidated fiscal efforts, in this regard, can ensure the sustainable debt burden and higher economic growth (Makin, 2005). This argument was further strengthened by Tanner and Samake (2008) claiming that primary surplus is helpful in making the debt sustainable.Where the primary surplus/deficit is defined as the budgetary balance less interest payment on debt.

The recent growth in debt stock in Pakistan has alarmed many to address and to reassess the issue of debt. There is continuous decline in exports and investments level together with currency crisis and political instability in Pakistan. The major question that needs to be addressed to know how to maintain the debt to sustainable levels when economic growth is not sufficient enough to absorb the shocks incurred by debt. It will compel Pakistan to face hazardous situation both politically and economicallyif the debt servicing burden, created by the current inflows, is not properly and timely addressed. Debt, being more political than economic issue is just because of the fact that it doesn't allow one to play freely and in accordance to one's domestic needs. Strangling of economic freedom may result in economic destabilization, reduction in employment, reduction in growth, and augmentation in poverty. Further, misuse of the external burdens and the revision of the loans create trust deficit. In addition,

the hike in the recent domestic borrowings is considered as a real threat to the economy of Pakistan.

Historically, Pakistan's gross public debt was Rs. 6126bn till June 2008.By the end of FY 2012-13, the gross payable amount rose to Rs. 14318bn showing the annual compound growth rate of 19 percent. In the years from 2013 to June 2016, the gross amount shows the increase of 9.75% with an amount of Rs 19678bn. The net debt to GDP ratio was 53.1 percent in year 2008 increasing to 60.2 percent at the end of FY, 2013. From 2013 to June 2016 this ratio had displayed record stability. The figures guide us that debt stock is consistently growing with the growth of economy and is stable, but it is large enough to get evaluated. The growth in Pakistan public debt in the first nine months of fiscal year 2015-16 was recorded as 10.28 percent (GoP, 2016) much higher as compared to the GDP growth rate registered as 4.71 percent. Mahmood, Arby and Sherazi (2014) claim that Pakistan is facing serious episodes of unstable debt because of imbalanced fiscal condition.

D'Erasmo, Mendoza and Zhang (2016) explained public debt sustainability asthe predictable path of public debt must be consistent with the government revenues and expenditures. It is termed as the fiscal solvency condition in literature. For the realization of fiscal solvency condition, the future primary surpluses must be large enough to pay back the debt i.e. principal and interest (Krueger, 2002). According to Fiscal Policy Statement of Pakistan (2015-16), total taxes and expenditure as a % of GDP increased by 0.69 percent and 2.5 percent respectively and are considered as a real threat to sustainability of debt. The regime of high unsustainable public debt leads to deleterious growth (Checherita & Rother, 2012) after a certain threshold level and hence a determined approach to debt reduction through fiscal consolidation is the need of the time.

This study explains the debt and growth nexus in reference to the role of uncertainty. We incorporate as why the uncertainty (economic as well as political) explains the relation more than any other previous study?Some of the literature focused on the performance of debt to uncertain economic conditions (Penalver& Thwaites, 2006; Catão&Kapur, 2006; Kletzer, 1997) while other gauged the relation separately with political instability(Van &Weder, 2009; Tabassam, Hashmi &Rehman, 2016). This study also controls the other macroeconomic determinants of debt and explains the relation simultaneously to avoid the endogeneity and simultaneity bias.Further, the GARCH based uncertainty measure provides an edge from all the previous studies framing risk as a macroeconomic determinant. After an introduction, the rest of the study follows: section 2 as review of literature from the past while section 3 accounts model and methodology. Results and discussion are reported in section 4, followed by conclusion and policy implication in section 5.

2. Literature Review:

Undermining the role of risks and uncertainties in case of economic policies may lead to the results which are not according to the predictable path. Some of the major macroeconomic indicators like interest rate, primary balance, and growth are more volatile in uncertain economic situations. The mentioned indicators were incorporated by Penalver and Thwaites(2006) to assess the role of uncertainties in debt dynamics. Their study directs the policy makers to react strongly and immediately to any mishap during the uncertainties so that the path of sustainability can be maintained. While assessing the debt intolerance, Catão and Kapur(2006) found that countries with higher uncertainties were more exposed to default risk hence the debt was more intolerant than the countries where the risk to default was less. Mendoza and Oviedo (2004) termed governments as "tormented insurer", under extreme pressure of mitigating the uncertainties in government revenue and volatility in financial market. They further considered the debt as "liability dollarization" which implies that uncertainty in exchange rate would affect the revenues and the ability of the government for the repayment of debt services and thus distress the debt dynamics. Mendoza and Oviedo (2006) conducted an extended analysis of the very phenomena and validated the same result of 2004.

The highly volatile economic situations not only affect the economy as an aggregate, but it also affects the investment decision of indebted firms. Bo and Sterken (2002) found that cross effect of interest rate uncertainty and debt on investment is positive. Similarly, Sutherland and Hoeller (2012) argued that debt accumulation can help in smoothing the economic performance, but economy is more open to negative shocks in future and relationship between debt level and macroeconomic volatility does not reveal strong, robust links with GDP. Mendoza and Oviedo (2009) carried out a study in order to assess the effect of macroeconomic uncertainty over the debt sustainability in Latin American nations. Like their previous contributions, they provided the conclusion that the higher the uncertainty; the higher the risk to default.

Dealing with uncertain economic conditions Kletzer (1997) argued that any change in policy concerning the future debt depends on the current shock to the economy. Tabassam et al. (2016) maintained that due to disruption of the economic activities by the terrorism in Pakistan, the GDP is badly affected. These uncertainties changed the decision of risk avert foreign investor to invest in the hostile economic environment which eventually deterred growth. Amador (2003), on the argument of Bulow and Rogoff (1989) that countries with rich asset market cannot commit to pay their debt hence unable to borrow, added that political uncertainty, hindering the ability to save, force the government to reschedule the default occurred.

Alesina and Tabellini (1989 and 1990) also show that debt is misused because of the political instability. They provided a model of "positive theory of fiscal policy and debt in a democracy" with a claim that alternate regimes and political shifts also change the decision about major fiscal policies. In democratic countries, with frequent shifts, policymakers tend to phrase their future fiscal policies (with debt as major policy tool) in consideration to the next government. Van and Weder (2009) stated that presidential regimes might produce more uncertainty, but the absence of default on debt in non-democratic regimes provides more economic freedom, efficient policies, least instability, ensuring growth and sustainability. According to Aisen and Veiga (2013) that politically fragmented countries should try to mitigate the worsening situation with introduction of growth oriented and politically tolerable economic policies. Pakistan's political culture is fragile and open to economic shocks. There is the need for consideration of non-economic determinants while devising the monetary and fiscal policies for Pakistan (Khan &Saqib, 2011; Ali & Rehman, 2015).

The literature reviewed leads us to the conclusion that political decisions are equally important along with economic policies as far as the nexus between debt and growth is concerned. The volatile economic conditions have deep rooted relations with debt. Furthermore, we observe that no recent study has been allocated for Pakistan which considers the relation between debt and growth in presence of uncertain economic and political conditions. It is also evident from the empirical evidences from the past that none considered GARCH based uncertainty measure while constructing the model of debt. Similarly, it guides us to reassess the sustainability while framing the relation controlling for all other important determinants of debt and growth. Similarly, Haavelmo (1943) claims that macroeconomic variables supposed to operate simultaneously and must be estimated in a system rather one by one. We offer a simultaneous framework of debt and growth to avoid the misleading results.

3. Model, Data and Estimation Methodology:

3.1. Model

According to the neoclassical school of thought, the purpose of debt in growth model is to finance the government expenditure which includes both consumption as well as capital goods. The government tends to mobilize the high capital intensive projects by acquiring debt. We use the neoclassical version of debt-growth nexus with slight modifications in accordance to the need of the study. To serve the purpose, we rely on the Lucas (1988), Romer (1990), Dellas and Galor (1992) and Oryema (2009);the neoclassical production function is given as:

$$Y = F(KL) \quad (1)$$

The production function can be written as $Y = Lf(k)$ by assuming linear homogeneous of degree one. The per capita form is given as:

$$y = f(k\ 1) = f(k) \tag{2}$$

Where $y = YL^{-1}$ and $k = KL^{-1}$.

At any time t, the exogenous determination of labor force is given as $L_t = L_0 e^{nt}$ with as growth rate of labor force. Assuming $S=I$, The national savings are:

$$S = s.F(KL) \tag{3}$$

Where "s" the fixed proportion of output saved. From saving-investment relation, growth in capital stock is given as saving less depreciation of capital stock (depreciation rate & is assumed to be constant). Thus

$$\frac{dK}{dt} = \dot{K} = 1\delta K = s.F(KL) - \delta K \tag{4}$$

Or in per capita form, the growth in capital stock is

$$\frac{\dot{K}}{L} = s.f(k) - \delta k \tag{5}$$

To make all terms to be in per capita form, the capital labor ratio K/L is differentiated with respect to time we obtain

$$\frac{d(K/L)}{dt} \equiv \dot{k} = \frac{\dot{K}}{L} - nk \Leftrightarrow \frac{\dot{K}}{L} = \dot{k} + nk \tag{6}$$

The dynamic path of capital-labor ratio is obtained by substituting the (6) in (5):

$$\dot{k} = s.f(k) - \delta k - nk = s.f(k) - (\delta + n)k \tag{7}$$

In steady state k=0 implying the so that

$$s.f(\bar{k}) = (\delta + n)\bar{k} \tag{8}$$

The above relation of Solow (1956) shows that savings, depreciation in capital, and changes in labor force affectthe capital-labor ratio, influencing the per capita output and hence growth.

For poor countries, $\bar{k}$ may be due to the low level of savings. An access to the financial markets with an opportunity to obtain loans. This would be achievable if interest rate (r) is less than the marginal product of capital in the domestic economy. Most likely the investment could increase with the borrowed funds. The investment function is:

$$I = S + eB = s.F(LK) + eB \tag{9}$$

Where *B* stands for borrowings with *e* stands for exchange rate. The productive capacity of the economy could be increased with proper utilization of borrowed funds. The debt augmenting Solow-Swan model is now:

$$Y^D = F\left(KLH\right) \tag{10}$$

The government has no choice to impose taxes on the accumulated public debt. The new level of savings $\tilde{s}$ with an increased tax is the sum of: S_p as new level of savings by firms, S_h as savings of households, S_g as saving by government. And

$$S_p = s_p\left(\left(1-\tau_p\right)\varnothing_p Y^D - reB_p\right) \tag{11}$$

With τ_p as taxes, $\varnothing_p$ as firms' share in total output and B_p is the debt incurred by firms. The household savings are:

$$S_h = s_h\left(1-\tau_h\right)\varnothing_h Y^D \tag{12}$$

Where τ_h as taxes on household $\varnothing_h$ as households' share in total output. And

$$S_g = s_g\left(\left(1-C_g-H_g-K_g\right)\left[\left(\tau_p\varnothing_p+\tau_h\varnothing_h\right)Y^D+ntr\right]-reB_g\right) \tag{13}$$

Where C_g is government expenditures incurred on consumer goods, H_g spending on health, K_g is government spending on capital goods and is B_g government acquired debt. The national income, now, is given as:

$$Y = Y^D - reB \tag{14}$$

The national savings are

$$\breve{S} = S_p + S_h + S_g = \breve{s}.\left(Y^D - reB\right) \tag{15}$$

Where $\left(\breve{s} = s_p + s_h + s_g\right)|\tau$. The capital per labor growth is determined by substituting equation (15) in (5):

$$\frac{\dot{K}}{L} = \breve{s}.\left(\frac{F\left(KLH\right)}{L} - \frac{reB}{L}\right) - \delta k \tag{16}$$

Or in small case letters,

$$\frac{\dot{K}}{L} = \left[\breve{s}\left(f\left(kh\right) - rd\right)\right] - \delta k \tag{17}$$

The new path of capital per labor given in (7) after the substitution of (17) is:

$$\dot{k} = \breve{s}.\left(f\left(kh\right) - rd\right) - \left(n+\delta\right)k \tag{18}$$

At the steady state $\dot{k} = 0$:

$$\hat{k} = \check{s}.\left(f\left(kh\right) - rd\right)(n+\delta)^{-1} \tag{19}$$

With debt, the steady state growth rate of capital labor ratio is:

$$\frac{\dot{k}}{k} = \frac{\check{s}.\left(f(kh) - rd\right)}{k} - \left(n+\delta\right) \tag{20}$$

Given the assumption of constant growth in all variables (s,n,δ) the per capita GDP would grow at constant rate at steady state.

The GDP in subsequent period of debt payment in (14) could be re-written in per capita term as:

$$\frac{Y}{L} = \frac{Y^D}{L} - \frac{reB}{L} \equiv y = f\left(kh\right) - rd \tag{21}$$

Differentiating 20 w.r.t time

$$\dot{y} = f_k\dot{k} + f_h\dot{h} - r\dot{d} - \dot{r}d \tag{22}$$

Substituting (18) in (22) yields

$$\dot{y} = f_k\left[\check{s}.\left(f\left(kh\right) - rd\right) - \left(n+\delta\right)k\right] + f_h\dot{h} - r\dot{d} - \dot{r}d \tag{23}$$

The growth rate in GDP per capita in presence of debt could be attained by dividing (23) with y:

$$\frac{\dot{y}}{y} = \frac{f_k}{y}\left[\check{s}.\left(f\left(kh\right) - rd\right) - \left(n+\delta\right)k\right] + \frac{f_h\dot{h}}{y} - \frac{r\dot{d}}{y} - \frac{\dot{r}d}{y} \tag{24}$$

This implies that capital productivity (f_k), Savings (š) and productivity of human capital (f_h) positively affect the GDP growth in per capita. On the other hand, debt stock (d), debt servicing with changing interest (rd), changing debt stock with interest remaining unchanged (rd), growth in labor force (n), depreciation (δ) and real interest rate (r) worsen the condition of GDP per capita. Relying on the above model, the general econometric specification of Debt-Growth nexus is given as:

$$gdp_t = \beta_0 + \beta_1 b_t + \beta_2 X_t + \mu_t \tag{25}$$

Where is the growth of economy in per capita, is the public debt accumulated by the government and is the set of control variables which better serves the objectives of the study with as white noise error term. While considering the sustainability of debt, economic growth is one of the major component. Taking the thread from Barro (1979), and re-arranging the equation for the growth as key determinant by following Burney and Ahmed (1988), Chowdhury (1994), Forslund, Lima and Panniza(2011) and Ouhibi, Zouidi and Hammami (2017), the equation for debt is given as:

$$b_t = \alpha_0 + \alpha_1 gdp_t + \alpha_2 X_t + \varepsilon_t \quad (26)$$

Subramanian and Satyanath (2004) argue that political instability and failure in democratic structure of the country explain the uncertainty in macroeconomic conditions of the country. Similarly, Alesina and Tabellini (1990) provide the "positive theory of debt" and argue that debt is used more as political instrument to affect the fiscal decision of the successive government. Political bias may push the government towards levels of debt that are at the limit of what they can repay, and therefore, at the limit of what borrowers can lend.

Cooray, Dzhumashev and Schneider (2017), Mauro (1995), Mo (2001), Davoodi and Tanzi (2002), Brunetti, Kisunko and Weder (1998) Campos, Lien and Pradhan (1999) and Mauro (1996) with many others find that political structure, institutional setup, corruption and other non-economic determinants have significant role in overall economic feedback of the country. It can influence the foreign direct investment, capital inflows, and productive capacity of the economy. Apart from this, Gupta, De Mello and Sharan (2001) and Davoodi and Tanzi (2002) argue that increasing government expenditures increases the government's borrowing. Apart from the political instability, the study incorporates economic uncertainty as another control variable for better consideration of the political and economic environment of the country.

For growth, the provision of timely funds for more capital intensive projects with higher cost is only possible either with foreign direct investment or the debt by government. Here, the inflow of debt has two-way causation. One, it influences growth by increasing the government expenditures; second, increase in government expenditure is only possible if financed by borrowings. Sinha, Arora and Bansal (2011) find that debt to GDP ratio could be decreased increasing the government spending. We thus incorporate government expenditure as another major determinant for growth and debt.

Other control variables are included to avoid the omitted variable bias. More specifically these includes government revenue to GDP ratio by following Kaufmann (2010) and Schneider, Buehn and Montenegro (2011) and gauging the effect of interest payments on the debt to GDP ratio (Kaufmann, 2010). Reinhart and Rogoff (2010) believe that increasing interest payments on debt thereby increases the stock of debt and there are more chances of deteriorating economic conditions if growth is not in line with payment on debt; tax revenues can reduce the burden of debt (Cooray et al., 2017). Similarly, Schneider et al. (2011) are of the view that countries with more corruption could find it more difficult to raise tax revenues, resultantly could increase the debt. We opt for simultaneous structure of equation because of the close theoretical linkage between debt and growth. The discussion on the major determinants

guides us to estimate the following two equations simultaneously:

$$gdp_t = \beta_0 + \beta_1 b_t + \beta_2 \tau_t + \beta_3 g_t + \beta_4 eru_t + \beta_5 pol_t + \varepsilon_t \quad (27)$$

And

$$b_t = \alpha_0 + \alpha_1 gdp_t + \alpha_2 \tau_t + \alpha_3 i_t + \alpha_4 g_t + \alpha_5 eru_t + \alpha_6 pol_t + \mu_t \quad (28)$$

Where eru_t the exchange rate uncertainty is included as the proxy to capture the macroeconomic uncertainty, is the political instability in a country, i_t is the interest payments by a country, while π_t and g_t is the tax revenue to GDP ratio and government expenditures to the ratio of GDP.

We found Generalized Autoregressive Conditional Heteroskedastic (GARCH) to be the most widely used technique to model the time varying volatility in high frequency data. The generalized ARCH model: the GARCH (p,q) model given by Engle (1982) and Bollerslev (1986), is specified as follows:

$$y_t = f\left(x_t; \delta\right) + e_t \quad (29)$$

where

$$e_t \Big/ \Psi_{t-1} \sim D\left(0, h_t^2\right)$$

and

$$h_t^2 = \alpha_0 + \sum_{i=1}^{q} \alpha_i \varepsilon_{t-1}^2 + \sum_{i=1}^{p} \delta_i h_{t-1}^2 \quad (30)$$

Where $f(x_t; \delta)$ is conditional mean and x_t is matrix of explanatory variables while δ is vectorof parameters. Error e_t term has D-distribution and is conditional on information available till point of time t-1 i.e. Ψ_{t-1}. In other words, error term has zero mean and time changing variance h_t^2. Equation 30 explains the GARCH process i.e. GARCH (p, q).

3.2. Data

The study aims to clarify the role of political and economic instability in favoring the increase of public debt over time. To achieve this result, we used historical data from the period 1975 – 2016. The detailed procedure of data extraction for macro-economic (exchange rate) uncertainty via GARCH (p, q) model is given section 4. Other major sources of data are; World Development Indicators (WDI) by World Bank, International Financial Statistics (IFS) by International Monetary Fund and different annual economic surveys of Pakistan. The data for political uncertainty is taken from the "Freedom House". Countries are rated as politically "Free", "Partly

Free" and "Not Free" by the scores allotted to each of the country in the world. We fabricated dummy by taking '1', if Pakistan is rated as "free" or "partly free" and '0', if it is rated as "not free" in a certain year.

3.3. Methodology:

Why Simultaneous Estimation?

According to Haavelmo (1943), if the variables are supposed to be operating simultaneously, they should be estimated as a system and not one by one. Estimating each equation separately violates the restrictions imposed by other variables (equations) in the system; hence, generating misleading results. Looking into the structure of our model (simultaneous framework) it is clear that we cannot follow Ordinary Least Square (OLS) method for final estimation and analysis.

Why Generalized Method of Moments?

Whenever the explanatory variables are correlated with combined error term i.e. OLS estimates became redundant and meaningless with the presence of endogeniety. It leads us to follow alternative method of using Instrumental Variable Approach (IV). We prefer Generalized Method of Moment (GMM) because the estimates are free from small sample bias. GMM deals with the problem of heteroskedasticity (Greene, 2003), presence of endogeniety and serial correlation (Carkovic& Levine, 2005). GMM works efficiently with cross-sectional, time-series and with panel data for consistent estimates.

4. Estimation Results and Discussion:

We incorporate the volatility in exchange rate as proxy of exchange rate uncertainty and extract the conditional variance series from the fitted GARCH (1, 1) model to serve the purpose. GARCH not only takes into account the predictable element, but also incorporates the unpredictable elements in the model and hence provides better

Table 1: Descriptive Statistics

Descriptive Analysis	Reer	Lreer	DLreer
Mean	73.494	4.253	0.0011
Min	38.399	3.648	-0.057
Max	117.78	4.768	0.076
Standard Deviation	20.338	0.308	0.0144
Skewness	-0.239	-0.706	0.890
Kurtosis	-0.754	-0.590	4.553

measure for uncertainty in the form of conditional variance (Arize, Osang & Slottje 2000 and Bah & Amusa, 2003).

Table1 depicts the data behavior through major descriptive statisticsof exchange rate *(reer),* log of exchange rate *(Lreer)* and log difference of an original exchange rate series *(DLreer).* All these measures are in monthly frequency from the original source because the GARCH model required the high frequency datafor much reliable estimates (McClain, Humphreys & Boscan 1996). Our data is negatively skewed with smaller tails for raw and log form of data but the log-differenced data behaves positively skewed with heavy tail.

4.1.GARCH Process- Stepwise Fitting

As we stated earlier, the GARCH process requires higher frequency of data. We are limited to rely the large monthly sample of 1975-M1 to 2016-M12. The GARCH model requires the presence of ARCH effect in the series chosen for the final model. We tested for the presence of ARCH effect by applying the LM-ARCH test with the null of series having "no ARCH". The first column of table2 shows the result of LM-ARCH test for the raw series of real effective exchange rate (*reer*). The middle and last column furnish the results of modified data i.e. log transformed (*Lreer*) and

Table 2: LM-ARCH Test

	reer	**Lreer**	**DLreer**
ARCH 1-2	64946	115260	8.4846
	[0.0000]	[0.0000]	[0.0000]
ARCH 1-5	26752	46846	3.7535
	[0.0000]	[0.0000]	[0.0000]
ARCH 1-10	13086	22402	2.0128
	[0.0000]	[0.0000]	[0.0000]

Prob of rejecting the null of "No Arch Effect" is given in parenthesis.

differenced log transformed (*DLreer*). The LM-ARCH test confirms the presence of ARCH effect in the raw series and log and differenced-log modified series of real effective exchange rate.

The P-values are given in the parenthesis and rejects the null of no-ARCH effect with chi-square test of autoregressive conditional heteroskedasticity. The test confirms the deep rooted ARCH effect for raw as well as modified series of exchange rate at all lag lengths.

Table 3: ADF-Unit Root Test

ADF Test-Stat	Reer	Lreer	DLreer	CV @ 5%
No Intercept and no trend	0.766278	1.54089	-10.9534***	-1.94093
Intercept and no trend	-1.70928	-2.04045	-11.0713***	-2.86229
Intercept and time trend	-0.30132	-0.28839	-11.3004***	-3.41127

Asymptotic critical values (CV), Davidson, R. and MacKinnon, J. (1993)

4.1.1. Stationarity testing

Confirming the presence of ARCH effect, we apply the test of unit-root on all the series in hand. The time series data will more likely to have a unit root with stochastic trend and will lead us to spurious estimates.

We employ the Augmented Dickey-Fuller (ADF) test of stationarity, with null given as "the series has unit root", is rarely rejected in time series data. We choose the stationary series of differenced-log of real effective exchange rate. The differenced log series rejects the null of having unit root for ADF test with some strong evidence noted in the table 3.

Table 4: GARCH(1, 1) Statistics and Model Diagnostics

Mean Equation		Variance Equation	
M	-0.000504	Ω	1.144***
	(0.000518)		(0.335)
AR(1)	-0.237***	ARCH(Alpha1)	0.581***
	(0.110)		(0.217)
MA(1)	0.481***	GARCH(Beta1)	0.126*
	(0.085)		(0.080)
Student(DF)	3.083***	Alpha(1)+Beta(1)	0.707
ARCH 1-2		0.3767	
		(0.6863)	
ARCH 1-5		0.31967	
		(0.9012)	
ARCH 1-10		0.25224	
		(0.9903)	

Standard Errors for Mean and Variance equations are in parenthesis

***,**,* shows p-value<0.01, 0.05 and 0.1 respectively.

P-Values for ARCH 1-2, 1-5, 1-10 are in parenthesis

Mean equations has ARMA (1,1) specifications and variance has GARCH(1,1) process.

4.1.2. GARCH-Mean and Variance equations

The GARCH model has two main equations: one is "mean" and other is "variance". The mean equation has ARMA (p, q) specifications. The decision to choose the AR and MA specifications is made by drawing the Autocorrelation function (ACF) and Partial Autocorrelation function (PACF) plot (Appendix). The clear peaks of ACF and PACF illustrate the suitability of ARMA (1, 1) specification for the mean equation. The other part including the residuals form mean equation is variance equation. The GARCH (p, q) takes the suitable value of 1 for both p and q. The reason for choosing the GARCH (1, 1) is the model diagnostics accepts thenull of "no ARCH" in mean at all the lag lengths.

The results for the mean equation and variance equation are furnished in table 4. The result depicts the mean, ARCH term; lagged squared residual from the mean equation and GARCH term; conditional variance at time "t-1" period. The reason for considering the conditional variance series as the most superior to all the previous measure is that it takes into account the information from the past from mean equation while extracting the conditional variance in GARCH model. We can claim the lag structure chosen after the ACF and PACF for the mean equation i.e. ARMA (1, 1) is efficiently working in our case. We know that ARCH term shows the information from the previous periods. Greater ARCH term than the GARCH means that news about volatility from previous periods explains more volatility than the news from last period. This implies that information from the previous periods explains more volatility than the last period. The GARCH term in our variance equation is weakly significant, showing the lesser information about volatility from the last period.

GARCH (1, 1) is performing well, but the conditional variance series is reliable if the model diagnostic results with no ARCH effect. We observe that no ARCH is left in mean after fitting the GARCH (1, 1) and series is used as a measure of economic uncertainty in the final econometric model of debt and growth.

4.2. Regression analysis and discussion

This study reports four simultaneous models, in table 5, containing final two equations identified in section 3. We opt to introduce the important determinants stepwise. The reason for doing so is to revisit the previous approach of modeling all the variables at once. Another reason for not going at once is to report the results with and without the uncertainty in our modeled equations. The analysis start with GMM-HAC for the Heteroskedasticity Autocorrelation Corrected standard errors in GMM (1).

We observe that without controlling the model for uncertain economic (eru_t)

Table 5: Estimation Results

	GMM(1)		GMM(2)		GMM(3)		GMM(4)	
Variables	b_t	gdp_t	b_t	gdp_t	b_t	gdp_t	b_t	gdp_t
	1	2	3	4	5	6	7	8
b_{t-1}	0.860***		0.943***		0.642***		0.678***	
	(0.034)		(0.092)		(0.063)		(0.076)	
gdp_t	-0.003		0.045**		0.063***		0.057***	
	(0.009)		(0.026)		(0.025)		(0.026)	
gdp_{t-1}		0.982***		0.974***		0.973***		0.969***
		(0.002)		(0.005)		(0.003)		(0.005)
b_t		-0.036***		-0.032		-0.029		-0.027
		(0.010)		(0.021)		(0.024)		(0.019)
τ_t			0.094	-0.023	0.211***	-0.024***	0.204***	-0.035***
			(0.078)	(0.015)	(0.083)	(0.009)	(0.072)	(0.013)
i_t			0.013		-0.128***		-0.117***	
			(0.027)		(0.028)		(0.028)	
g_t			0.626**	-0.071	-0.092	-0.066	-0.056	-0.068
			(0.361)	(0.093)	(0.256)	(0.070)	0.275	(0.059)
eru_t					140.042***		137.252***	-11.141***
					(33.794)		(33.573)	(6.182)
pol_t					0.028***		0.027***	0.001
					(0.005)		(0.005)	(0.001)
Constant	0.276***	0.206***	-1.574	0.417**	0.249	0.412***	0.152	0.451***
	(0.094)	(0.018)	(1.025)	(0.246)	(0.759)	(0.185)	(0.812)	(0.161)
S.E. of reg	0.030	0.007	0.031	0.007	0.027	0.007	0.026	0.007
J-Stat	0.233	0.233	0.247	0.247	0.119	0.119	0.087	0.087
Prob(J-Stat)	0.996	0.992	0.999	0.995	0.997	0.999	0.994	0.996
D-W stat	1.671	1.760	1.806	1.758	2.030	1.751	2.074	1.864
Q-Stat	45.962	45.962	45.570	45.570	46.127	46.127	44.540	44.540
Prob	0.556	0.5567	0.572	0.572	0.549	0.549	0.615	0.615
Ad.QStat	56.601	56.601	56.449	56.449	56.281	56.281	54.305	54.305
Prob	0.184	0.1847	0.188	0.188	0.192	0.192	0.246	0.246

and political conditions (pol_t), there is strong dynamic relation between debt to GDP ratio (b_t) to its past (b_{t-1}). We observe that debt ratio responds positively, with higher magnitude of 0.86 and 0.94. This implies that, ignoring the role of uncertainty in economy of Pakistan, the debt deeply relies on its past. Similarly, growth in per capita GDP (gdpt) is showing stronger relation with its own past (gdp_{t-1}) with higher magnitude of 0.98 and 0.97 respectively. The results obtained guide us to the conclusion that the current state of the economy relies on the trends in its past. The initial results obtained are consistent throughout the estimation procedure.

4.2.1. Debt-Growth under uncertainty context:

With an introduction of economic and political uncertainty into the first equation in column 5, we see some major shifts in the behavior of other determinants in both of the specifications. Tax revenues (π_t), being the silent spectator throughout the estimation procedure, strongly respond to the situation under uncertainty. We obtained positive relation between tax revenues and debt to GDP ratio with debt inflow as highly responsive to the previous commitments with the magnitude of 0.21. This implies that if the previous commitments are entertained efficiently, it encourages the donor to provide funds hoping that the country would follow the same pattern for future. It is not an exception in case of Pakistan; increase in revenues encourages more debt inflow to the country with an assurance that all the borrowings will be paid in future. On the other hand, taxes are negatively related to the growth in per capita income and deters growth in column 6 of GMM (3). We obtain smaller magnitude for this relation i.e. growth lowers by 2% with an increase in tax revenues. This confirms that the generated revenues financed the previous commitments rather expanding growth. It suggests that market should be let free with more economic freedom to operate with resources in hand and without crowding out the private investment. There is possibility that the increasing revenues are spent on projects carrying no growth effects.

Gross debt is the combination of debt accumulated, plus the total interest or debt servicing to be paid. Any part, if repaid, reduces the debt burden. Hence, the payment of interest strongly enters significant in our case with same magnitude of -0.12 in GMM (3) and GMM (4).Historically, Pakistan had to confront difficult situations economically and politically. The result for the model affirms our myopic expectation about uncertainty having deep-rooted relation with debt to GDP. Similarly, we argue that the more politically unstable a country is, the more is the inflow of debt. Our argument is supported by the final results obtained in the column 5 and 7 ending with almost same figure of 0.28. Pakistan is prone to the episodes of uncertain political conditions with tug of war between democratic and non-democratic forces. This shift of power not only affected the political scenario of Pakistan, but was found harmful

economically. We constructed the hypothesis that uncertain economic and political conditions deter growth and making it difficult for the economic managers to exercise the economy with limitations in hand. It also forces the public authorities to go for more borrowings with an aim of tackling the problem in short-run thus long-run solution to the problem remains unnoticed. The argument is supported by the result obtained in GMM (4) with all the potential determinants of debt-growth i.e. negative impact of uncertain economic condition on growth entered strongly significant while political instability is the insignificant determinant of GDP per capita. We obtained abnormally high number for the economic uncertainty and followBrzozowski (2006) and Osinubi and Amghionyeodiwe (2009). We ignore the magnitude because being uncertainty, the probability of occurrence of an event is unknown (Brzozowski, 2006), hence any value obtained makes no difference and we only interpret the direction. This might be due to the fact that, in Pakistan, uncertain political conditions are no more taken seriously as far as the economic conditions are concerned. As Alesina and Tabellini (1990) state that "*debt becomes an instrument to affect the preferences of the successor*" and if political governments do not envision the chances of their re-election, they opt for more borrowings. Thus overburdening the successive governments for political gains. This "*positive theory of debt*" is confirmed in our results.

4.3. Instruments reliability and misspecification diagnostic:

The Sargan J-statistics, with chi square (χ^2) distribution, test the over identification restriction under the null that "the instruments are exogenous or instruments are valid". We diagnose all the models for the validation of instruments and the results of J-stats which are strictly exogenous in all cases with higher p-values; hence, the null is accepted for the use of valid instruments. Despite reporting the DW-test (Durbin & Watson, 1950 and 1951),we cross check our models because it is claimed the DW-test is not applicable in the presence of thelagged dependent variable and it also gives first order serial correlation of the residuals. In series of equations estimated simultaneously, might be correlated serially at higher levels making DW-tests redundant. The portmanteau test computes multivariate Box-Pierce/Ljung-Box Q-Statistics with the null that "residuals are uncorrelated serially for higher orders". An insignificant p-value confirms that the residuals are serially uncorrelated up to a specified order defined through choosing lag length; 12 in our case. We also compute Adjusted Q-Statistics corrected for small samples. We get insignificant p-value for every specification for both Q and Adjusted Q-Statistics and the results are reported in bottom of table 05 suggesting that residuals are white noise.

5. Conclusion and Policy Implication

The study started with an objective of analyzing the relation of debt and growth.

Combing of literature suggested that there existed several gaps which need to be fulfilled for better understanding. This study tried to remove several methodological biases in previous literature for Pakistan and other likewise economically and politically struggling countries. The ever mounting debt and slower growth rates of Pakistan in recent years forced to revisit the nexus. We observed that in the recent past many structural changes were needed. We found that "*positive theory of debt*" given by Alesina and Tabellini (1990) was completely ignored for Pakistan which was confirmed in our study. Secondly, Mankiw and Elmendorf (1998) stated that debt crowds out the capital in long run and that higher debts meant higher interest payments and higher taxes. With the distribution of taxes equally on people of different ages, the amount of those interest payments may be reduced by each person's after-tax income. Each person responds to the increase in taxes by lowering the consumption.Our study confirms that tax is deterring the growth of an economy and that capital flight occurs whenever an economy is forced to go for higher debt which in result would reduce national consumption and capital accumulation and depress the long-term economic growth. Further, the emphasis on the political handling of government debt was gauged well enough in our study.

The fiscal policy is more politically motivated and according to Marris (1985) that uncertainty in economy would lead to capital outflow which produces further macroeconomic problems. It establishes the link between political and economic uncertainty in debt and growth context. Another major conclusion, which is in-line with the findings of Krugman (1991), emphasizes that currency crisis occurs with higher debt-GDP ratio when much of the debt is influenced or held by foreigners making it possible to influence the public policy. All in all, this study finds the significant role of political economic uncertainty in debt and growth framework. This study recommends the growth oriented tax revenues for the future payments, with stable political environment and greater certainty in macroeconomic indicators. Public and economic policy managers should immediately react to alter the deteriorating situation of debt and economic growth. Less political interference in economic decisions with consistency in policies (as far as debt-growth nexus is concerned) is much needed for Pakistan. Apart from all these measures, results direct the government to utilize the debt for growth and to tackle the economic problem with parallel political commitment. The consistent economic management and policies about debt and growth would lessen the burden on economy of Pakistan in successive fiscal years.

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Appendix 01

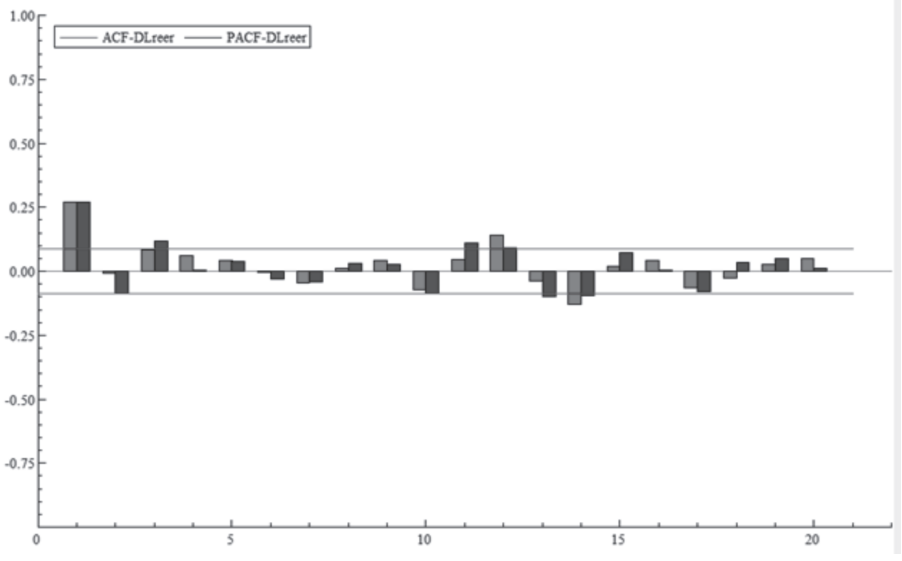

Figure 1: ACF and PACF of Exchange Rate