

## **Impact of Fiscal Deficit and Government Debt on Interest Rate in Pakistan**

**Najia Shakir<sup>1</sup>, Sami Ullah<sup>1\*</sup>, Salim Ullah Khan<sup>1</sup> and Muhammad Qasim<sup>1</sup>**

<sup>1</sup>*Department of Economics, University of Peshawar, Peshawar, Pakistan.*

### **Authors' contributions**

*This work was carried out in collaboration among all authors. Author NS designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript with the guidance and support of author SUK. Authors SU and MQ managed and refined the first draft, remove unnecessary materials and prepare the paper for publication. All authors read and approved the final manuscript.*

### **Article Information**

DOI: 10.9734/SAJSSE/2019/v3i230101

#### Editor(s):

(1) Dr. Olcay Çolak, Associate Professor, Department of Economics, Faculty of Economics and Administrative Sciences, Uşak University, Turkey.

#### Reviewers:

(1) Prof. Tchouassi Gérard, University of Yaoundé II, Cameroon.  
(2) Nnamdi Chinwendu, Nwaeze, Abia State University, Uturu, Nigeria.  
Complete Peer review History: <http://www.sdiarticle3.com/review-history/43163>

**Original Research Article**

**Received 07 May 2018**  
**Accepted 30 July 2018**  
**Published 02 April 2019**

### **ABSTRACT**

The current study was conducted in the year 2014 in Pakistan to investigate the impact of fiscal deficit and government debt on the interest rate. Data on selected macroeconomic variables like fiscal deficit, government debt, GDP per capita, money supply and volume of trade etc. from the year 1990 to 2012. The study also has tried to find out that how the interest rate in the country is affected by the government debt and fiscal deficit. Augmented Dickey-Fuller test was run to address the stationary issue in the data, and then Ordinary Least Square (OLS) model test was run to check the relationship among the variables. Two models were set in the study. In the first model, the relationship of GDP per capita, money supply, total debt servicing and volume of trade showed a significant relationship with the fiscal deficit, while in the second model the relationship of inflation, fiscal deficit, money supply, government debt and public debt showed a significant relationship with the interest rate. Policy makers are advised to focus on the increase of DGP/Capita and export volume. In order to sustain the rate of inflation, the government may regulate the money supply and public borrowing.

**Keywords:** *Fiscal deficit; government debt; GDP per capita; ADF; interest.*

## 1. BACKGROUND OF THE STUDY

The bond linking macroeconomic factors and fiscal deficit like interest rate, GDP growth, the volume of trade and government debt, among others, is the broadest areas of debate in the field of developmental and economic research in developing and developed economies. To define the fiscal deficit or budget deficit, there have been used so many terminologies in economic literature. The conventional deficit is primary deficit plus interest that is paid on internal and external debt, while the operational deficit is referred as a conventional deficit that is adjusted for inflation [1]. The current research study deals with a deficit that is obtained from the difference between government revenues and government expenditures. This deficit is calculated as a difference among government's expenditures and government's total revenues, excluding the interest payments on the debt by the government. This is an everlasting headache for the countries that are under developing and it also has a negative impact on the economies of the under-developing countries. The main factors that are responsible for the fiscal deficit of Pakistan include total debt servicing by the country, per capita GDP, monetary supply and volume of trade. Thus the current study has taken these macroeconomic factors into consideration. In order to analyze the effect of macroeconomic variables on the fiscal deficit, the period from 1990 to 2012 is taken to represent an exact picture of the existing connections. The present study also attempts to find out the impact of interest rate on fiscal deficit and government debt with evidence from 1990 to 2012. From the previous research studies, it is clear that the impact of fiscal deficit and government debt has faced a lot of controversies. Thus, the current study tends to find out the research gap and find out the right direction of the relationship between the stated variables exists.

To most of the questions, the answers are still not explored fully in the context of Pakistani economy like how far is the fiscal deficit sensitive to taxes and government's expenditures; supply of money and growth of Gross Domestic Product (GDP) and also which one among these variables is more crucial in causing the variations in fiscal deficit or budget deficit? How different segments of the economy and its planning prospects are getting affected by changes in fiscal deficits or budget deficit? How considerably the interest rate shows sensitivity to the changes in government debt and budget deficit? The

current research study discloses the stated issues as well as also tends to find the connections through which the interest rate is affected by government debt and fiscal deficit.

For a number of years, Pakistan has to experience the problem of large fiscal deficits. Since 1990s Pakistan is facing a budget deficit or fiscal deficit of round about 6% of yearly [2]. In order to fill this resource gap the government debt both internally and externally increases. With the fiscal deficit, the primary macroeconomic variables are mostly and strongly affected, and as a result, the economic growth of a country is affected badly. The problem of fiscal deficit arises when the public expenditure exceeds public revenue. In developing economies of the third world countries, the growth of government of expenditure is understood that it could help the country in its development and growth of the economy. In accordance with the famous law called as "Wagner Law", the public expenditure of a country is increased by the process of industrialization of that country. Based on this view [3] have also taken into account the need of high public expenditure essentially because of the fact that it has a key role in the uplifting of the welfare of the nation and boosting economic growth. The large fiscal deficit affects the economy of the country adversely as it could be the source to discourage national savings and so may investment in the long run. Thus, large fiscal deficits may result in greater external borrowing. Thus, the rise in the external borrowing by the government and fall in the national savings will give birth to inflation, the supply of money and disparities in interest rate (domestic) that will stop the private sector from investment in the country. The getting away of the private sector organizations from the country will give birth to the unemployment issue in the country. When the level of investment in the country is reduced, the demand for factors of production (labor) particularly reduced which has an adverse effect on the employment level in the country. The low level of employment will lead to the reduced domestic output; results in the issues of balance of payments (BOP) especially problems of trade deficit, and thus consequently the wellbeing of the whole society is affected. Continuing the discussion on the same line of reasoning, due to the government debts, the economy of a country is disclosed sometimes to the serious consequences. For all of the reasons and for the enhancement of the well-being of the people;

attainment of the position to borrow less or not debt and attainments of steadiness of real interest rates for the purpose to support the activities of the production and attract, motivate and inspire the private investors in the country, it is important to find out the impact of fiscal deficits and government debt on interest rate.

## 2. OBJECTIVES OF THE STUDY

The current research study has the following aims and objectives.

- i. To find out key macroeconomic variables as factors of fiscal deficit or budget deficit in Pakistan.
- ii. To investigate the impact of fiscal deficit and government debt on the interest rate.

## 3. LITERATURE REVIEW

Abel [4] has investigated the impact of the budget deficit or fiscal deficit on the trade deficit. He has found that deficit financing through issuance of bonds and securities may tend the interest rate to rise, when the interest rates are high, they attract foreign inflow to the country, the foreign inflow trend improves the domestic currency's foreign exchange value (low Exchange Rate), the lower exchange rate discourages net exports and finally causes Trade Deficit.

Ahmad [5] in their study found that money supply is not exogenous; but, it is dependent on the position of fiscal deficit and international reserves. The deficit belongs to the public sector have an adverse reputation because, among other things, it is usually understood that sooner or later the government will use the alternate way that is money creation.

Ahmad [6] have shown a long run relationship between the fiscal deficit and money supply in Pakistan's perspective after studying the association of inflation, government deficit and money supply.

Bhalla [7] has found a relationship between the interest rate and fiscal deficit and concluded that in the interest rate floors presence there was found no relationship to flow from greater fiscal deficits to elevated interest rates after observing fiscal deficit and interest rates in India.

Patnaik [8] has conducted a research study and declared that fiscal deficit has a positive relationship interest rate with the constant money

supply. The researcher has given a link to the increase in the interest rate with the rise in demand for money which indirectly affects the fiscal deficit of a country.

Abel [9] in his study fit the VAR model with the use of unemployment, inflation and interest rate of the United States. They have suggested that there is a one-way relationship among interest rate and inflation, while unemployment and unemployment only determine the inflation rate is caused by interest rate in the economy.

Gaber [10] had observed in his study that the in the large fiscal deficits financing (sales of bonds) leads the real interest rate to the crowding out of private investment. Laubach [11] has surprisingly argued that, because of the floor on interest rates, the relationship does not run from high fiscal deficits to high-interest rates in the Indian economy.

Laubach [12] has conducted a research study and found that there is a significant impact of fiscal deficit on interest rates. The study that he has conducted revealed an increase of 25 basis points in long-run interest as a result of 41 percent rise in estimated deficit- to -GDP ratio. The research study also showed that interest rate rises by about 54 basis points in response to a percentage point of estimated debt-to- GDP ratio.

Bernice [13] has studied the effect of interest rate on temporary tax cuts. In the study, the researcher has used a model called the overlapping-generations model excluding production. Unlike of the previous studies the present research study considers the interest rate determination in a full-fledged general equilibrium setting that might be used to conduct numeral simulations and could also be calibrated.

Hussain [14] inspected the impact of fiscal deficit on output growth in Ghana from 1970 to 2000. It was apparent that deficit hampers growth. The population area for this study was Ghana. Moreover, the theory explanation supports that deficit has a negative impact on growth. A time series analysis was carried out with specific attention given to the causal relationship between deficit and growth in the framework of the Granger Causality Test. The results of the study provided the evidence regarding the relationship between output growth and deficit.

Khan et al. [15] has investigated his study which was based on Pakistan economy and has examined the correlation between the inflation fiscal deficit or the budget deficit. In the study that he has conducted the change in inflation to fiscal deficit through seignior age is shown and has concluded that the 1 percent rise in fiscal deficit or budget deficit causes 0.447% rise in the seignior age that tends to rise the inflation by 1 of 0.51 percent.

Hassan and Kalim [16] analyzed in critical manner the short-run impact of budget deficits on interest rate, output, inflation, unemployment, the balance of payments, private and public investment and international reserves on the basis of yearly data collected for the period from 1960 to 2005. Their study found that money supply is positively related to international reserves. The demand of money depends on income. The relationship of output is found positive with public and private investment, the balance of trade and government spending, while its relationship is found negative with the interest rate. Exports and imports are found extremely sensitive to exchange rate as well as to their relative prices. Thus, their study concluded that budget deficit can be the source of causing higher trade deficits, higher inflation, higher interest rates, and higher unemployment rate along with the low level of investment and lower growth.

Khan et al. [17] in their study has considered the political, economic and institutional factors that contribute to fiscal deficit or budget deficit by taking the panel of 25 countries for a time span considered from 1980-2006. Their results concluded that the main determinants of fiscal deficit or budget deficit are increased inflation and political instability.

Mahmood et al. [18] in his research study reveals an important part of the deficit financing. High-interest rate and high debt are the 1<sup>st</sup> impacts of budget deficit and then it results as portfolio crowding out. The government assumes the multiplier effect while spending i.e. through the expenditures of the government and taxes they have the opportunity to have an influence on aggregate demand of economy. However, in reality, it results in crowding our effects i.e. the change in the aggregate demand of an economy is smaller than a change in expenditures of the government. The researcher after this describes that how because of the budget deficit, the trade deficit exists. After the rise of the deficit, the government is legally bound to issue a huge

number of bonds (securities) to finance the deficit. When the interest rate of a country is high, the foreign, as well as the domestic investors, will be attracted. In this case, the high demand for domestic currency declines the exchange rate and the lower exchange rate leads to the discouragement of the exporters and gives encouragement to the importers since the imports become cheaper.

Kalim and Hassan [19] observed that the total debt servicing indicates that if a country is paying its debt heavily along with the interest then governments have fewer amounts available to invest on social sector development, infrastructure and to address real macroeconomic problems (i.e., unemployment, low rate of economic growth, trade imbalance and inflation etc.). Thus this could be expected that increasing total debt servicing increases fiscal deficit.

Chaudhary and Aslam [20] they have conducted a study on to find out the relationship among the inflation and interest rate in Pakistan. The results obtained from the study indicated that unemployment, inflation and interest rates are co-integrated. The study also showed that unemployment rate and interest rate are both inversely associated with the inflation in the economy. In the current study, the data on inflation is collected from the [globeconomy.com](http://globeconomy.com) and its relationship is checked with the interest rate of Pakistan.

## 4. RESEARCH METHODOLOGY

To achieve the objectives of the research and test the hypothesis taken the study then follows certain descriptive and inferential techniques. The ADF test is applied to the data in order to address the stationarity issue in the data. Ordinary Least Square (OLS) Method is then applied for the purpose to estimate the coefficients.

### 4.1 Collection of Data

For the current research study, the data is collected from secondary sources, since the nature of the data is secondary. The data on (GDPPC) Per Capita GDP, (FDG) Fiscal Deficit, (VTR) Volume of Trade, (TDS) Total Debt Servicing and M2 (Money Supply), (INT) interest rate, (FD) public debt and (I) inflation is attained from different web sites i.e., State Bank of Pakistan, Economic Survey of Pakistan, global economy website and International Monetary

Fund (IMF). The data for the analysis purpose is covering the period of 23 years i.e., from 1990 to 2012.

## 4.2 Variables of the Study

The current study is based on the variables that are explained one by one below.

### 4.2.1 Fiscal deficit

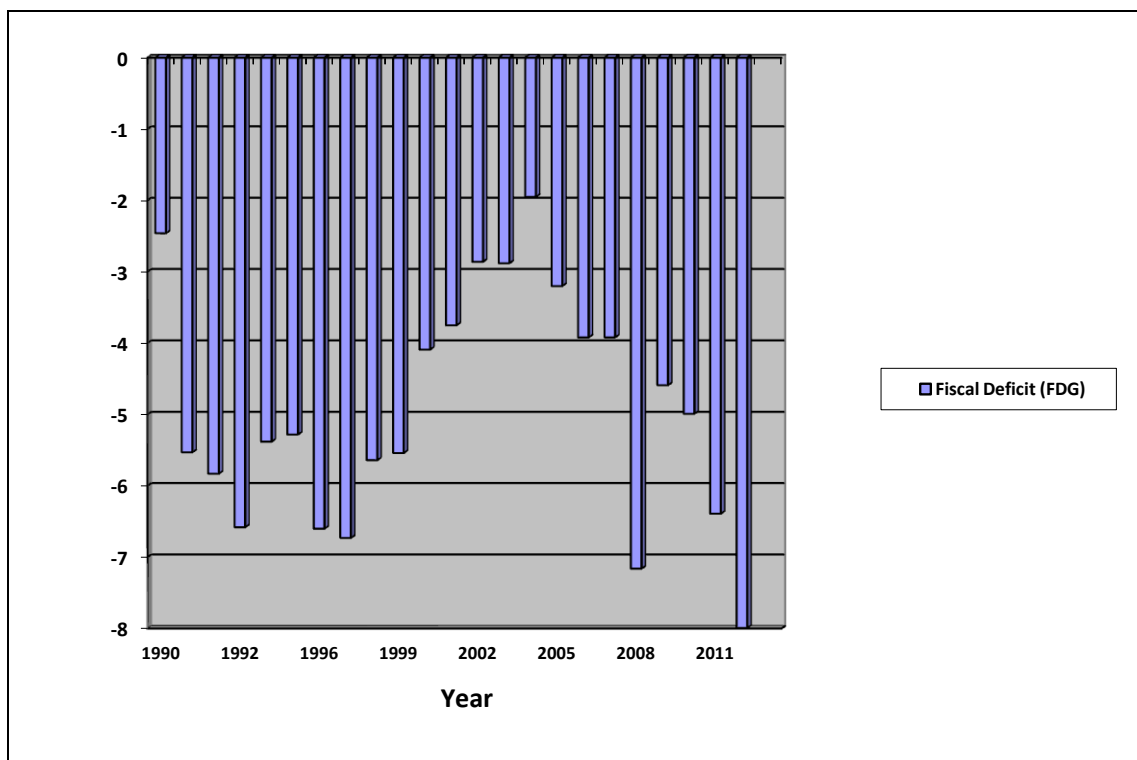
Fiscal deficit generally represents the situation whereby the expenditures of the government are greater than that of its income. It opens up the room for deficit financing through both internal and external sources. It stimulates overall debt burden in the country and high debt burden will ultimately take a country into the vicious circle of foreign dependence.

The following graph shows fiscal deficit (LCU Bill Rs) for the year 1990 to 2012. The graph, in most, depicts a rising trend in the fiscal deficit of the country, however, the sharp decline in the period 2000 to 2006 that can be witnessed from the Fig. 1 is attributed to foreign financial assistance that the country had from foreign countries and international organizations for certain reasons.

### 4.2.2 Interest Rate (INT)

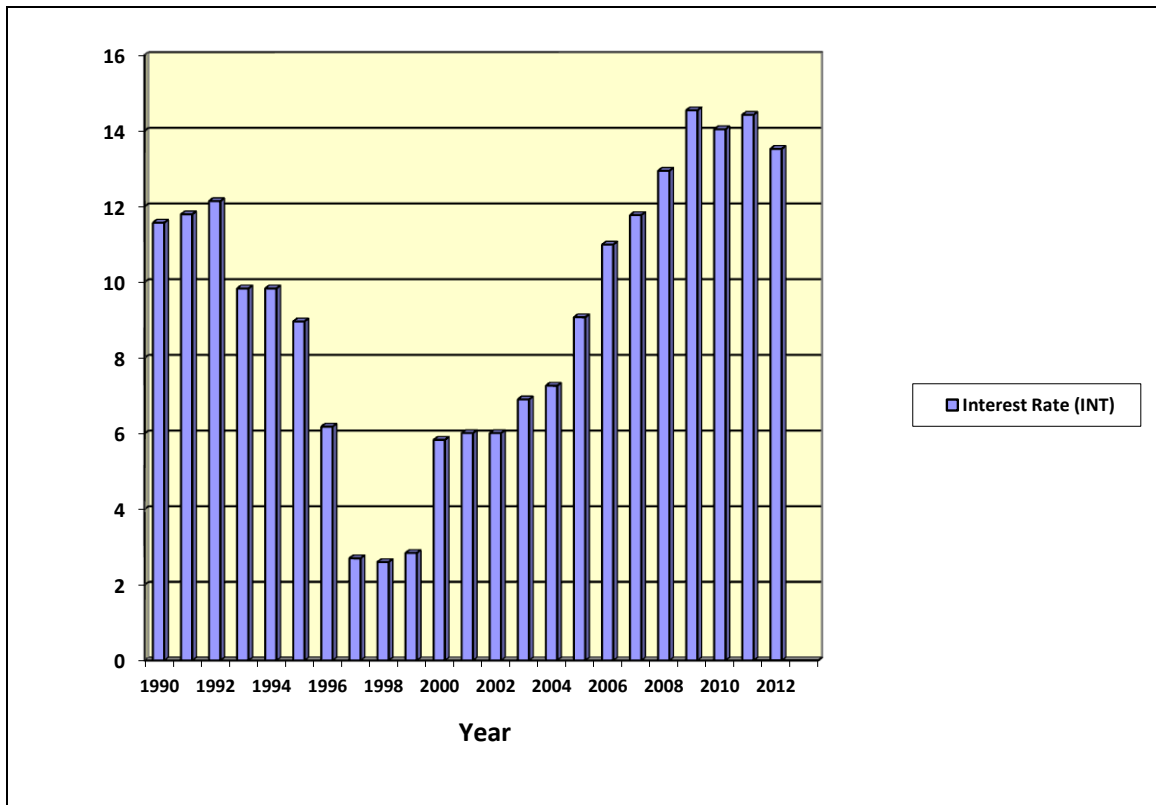
From an economic perspective, interest can be viewed as either the compensation received for deferring consumption, e.g., putting money in a savings account rather than spending it or the cost of consuming when resources are not available, e.g., using a credit card to make a purchase rather than first saving the money. The interest rate is an important element of the economy of a country. Interest rate directly affects the behavior of the consumer, which simply means that interest rate could affect the consumption and savings. In the current study, the inflation is a dependent variable of the model 2. The interest rates are affected in a country due to fiscal deficit, government debt, inflation, public debt and money supply [21].

The following graph shows lending interest rate (%) for the period 1990 to 2012. The lending interest rate shows a sharply declining trend from 1995 to 1997, however, it comes out to be a little stable in the period 1997 to 1999, whereas shows a fairly upward rising trend since then. As a whole, the tendency in fluctuation is both rising and falling in the whole period of 1990 to 2012.



**Fig. 1. Fiscal deficit (FDG)**

Source: World Development Indicators (<https://finances.worldbank.org/countries>)



**Fig. 2. Interest rate (INT)**

Source: Economic survey (Various Issues), Annual Reports of SBP (Various Issues)

#### 4.2.3 GDP per capita

The total output produced inside the country is generally referred as gross domestic product (GDP) and dividing that total production by the number of peoples residing inside the country then refers to the gross domestic product per capita (GDPPC) the GDPPC shows the relative performance of the countries and is usually helpful while comparing one country with other regarding the performance.

The following graph shows the GDP per Capita for the period 1990-2012. It is evident from the Fig. 3 that GDP per capita has experienced a lot much variation with both upward and downward trends. It plainly describes the ups and downs in the economy experienced by the country in the period 1990-2012.

#### 4.2.4 Total Debt Servicing (TDS)

This variable is measured by taking the ratio of total debt servicing (TDS) to real gross domestic product (GDP). This variable of the study depicts that if a country is paying heavily its debt along with the interest then it is obvious that the governments have fewer amounts accessible in

order to spend on the development of social sector, infrastructure and to address real problems like unemployment, inflation, trade imbalance and low rate of growth of economy etc. It is expected that increasing total debt servicing increases fiscal deficit [22]

It can be observed from the following graph that the volume of total debt servicing is very meager and not substantial enough alleviate the burden of debt and supplement a fall in fiscal deficit and therefore boost the economic growth of the country.

#### 4.2.5 Volume of Trade (VTR)

This variable is measured by taking the ratio of volume of trade to the real GDP. In the country where the exports are greater than the imports, the variable VTR is usually had a negative relationship with the fiscal deficit. Conversely, in the case of Pakistan, it is presumed that international trade will have a positive impact on the fiscal deficit. The prime reason for this positive impact is that the trade balance of Pakistan with the exception of one year has remained negative throughout the history of

Pakistan and imports are always in excess of exports.

It can be observed from the following graph that the volume of total debt servicing is very meager and not substantial enough alleviate the burden of debt and supplement a fall in fiscal deficit and therefore boost the economic growth of the country. The following graph shows the variation in the variable from 1990 to 2012.

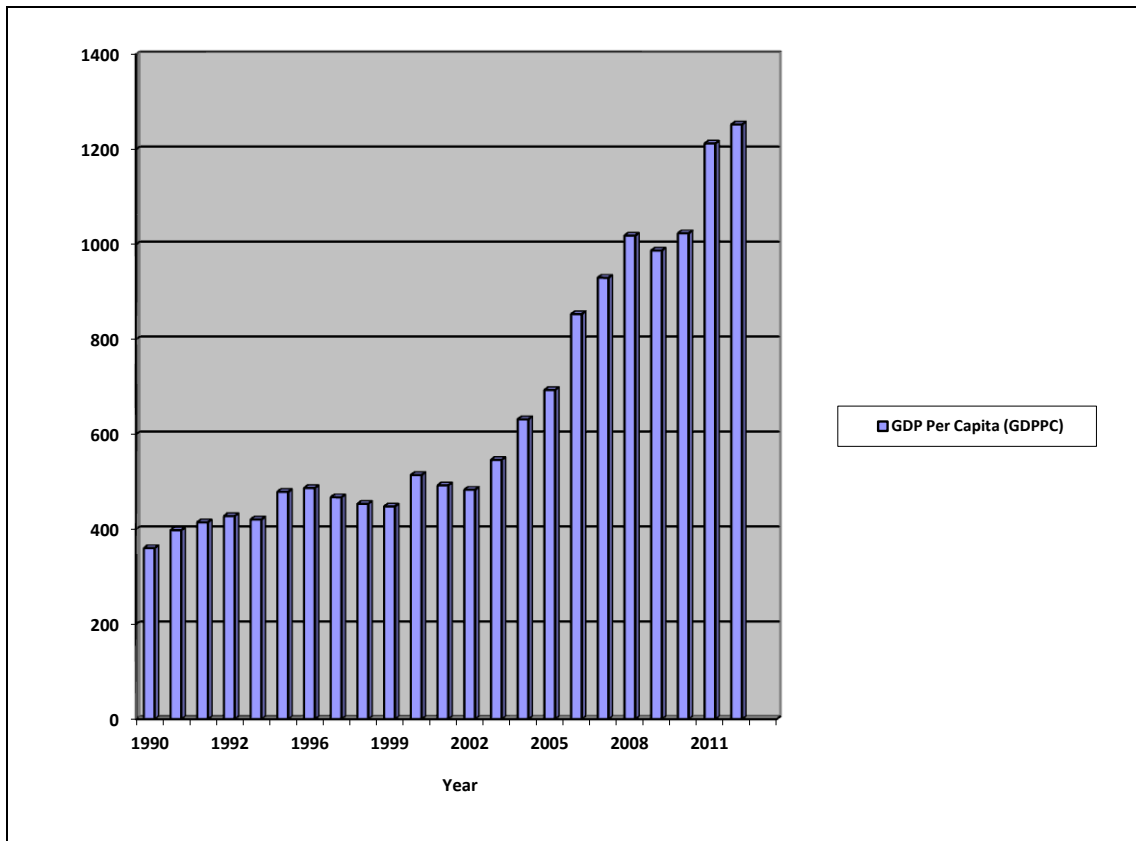
#### 4.2.6 Money supply (M2)

It represents a measure of money supply that is composed of checking deposits and cash (M1) and also near money. The near money in this sense is composed of M2 money market, savings deposits and mutual funds, which are not much liquid and not as appropriate as the medium of exchange but is able to be converted into checking deposits or cash. In Pakistan, the broad money supply as share of GDP is considered the important factor of fiscal deficit. The variable is calculated by dividing monetary asset on real GDP and is utilized as a proxy for

money supply (MS). It is further presumed that the monetary asset as a share of real GDP would decrease fiscal deficit in the country.

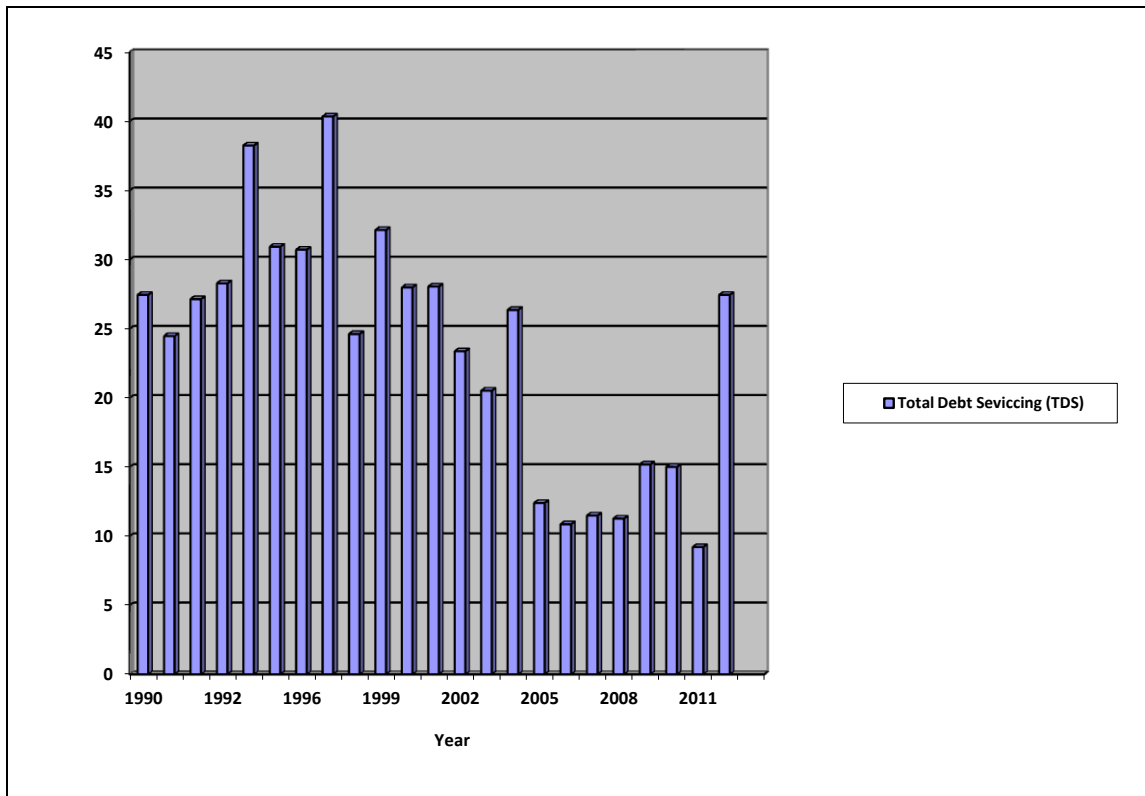
Chaudhary and Naveed [23] in their study showed long-term relationship of money supply and fiscal deficit after studying the association of inflation, government deficit and money supply Pakistan's framework. Patnaik [24] has declared that at continuous supply of money and fiscal deficit are positively related with the interest rate of a country. In his study he has connected this rise in the interest rate with the rising demand for money that puts an effect on the fiscal deficit.

The following graph shows Money and quasi money (M2) (current LCU Bill Rs) for the year 1990 to 2012. The Fig. 6 provides enough evidence for the loose monetary policy followed in the country. Since 1990 the country has witnessed a sharp upturn in terms of monetary growth, and a continuous upward trend in the supply of money can be observed in the period 1990 to 2012 as evident from the following figure.



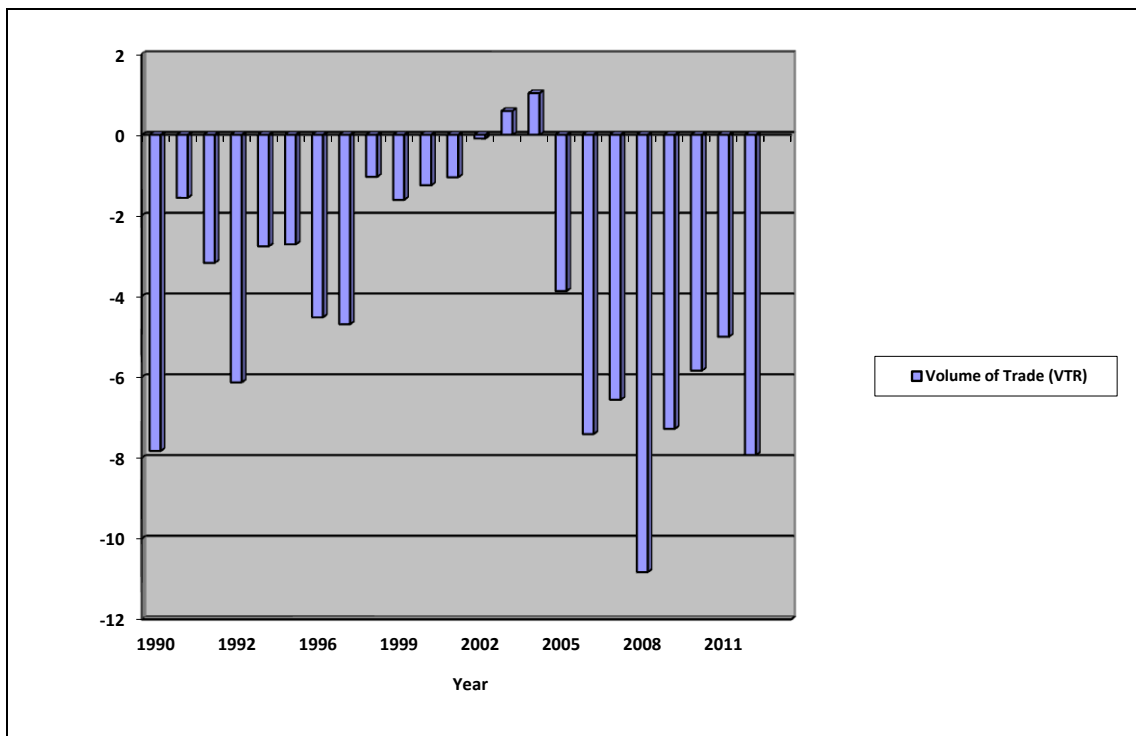
**Fig. 3. GDP per capita (GDPPC)**

Source: World Development Indicators (<http://data.worldbank.org/country/pakistan>)



**Fig. 4. Total debt servicing (TDS)**

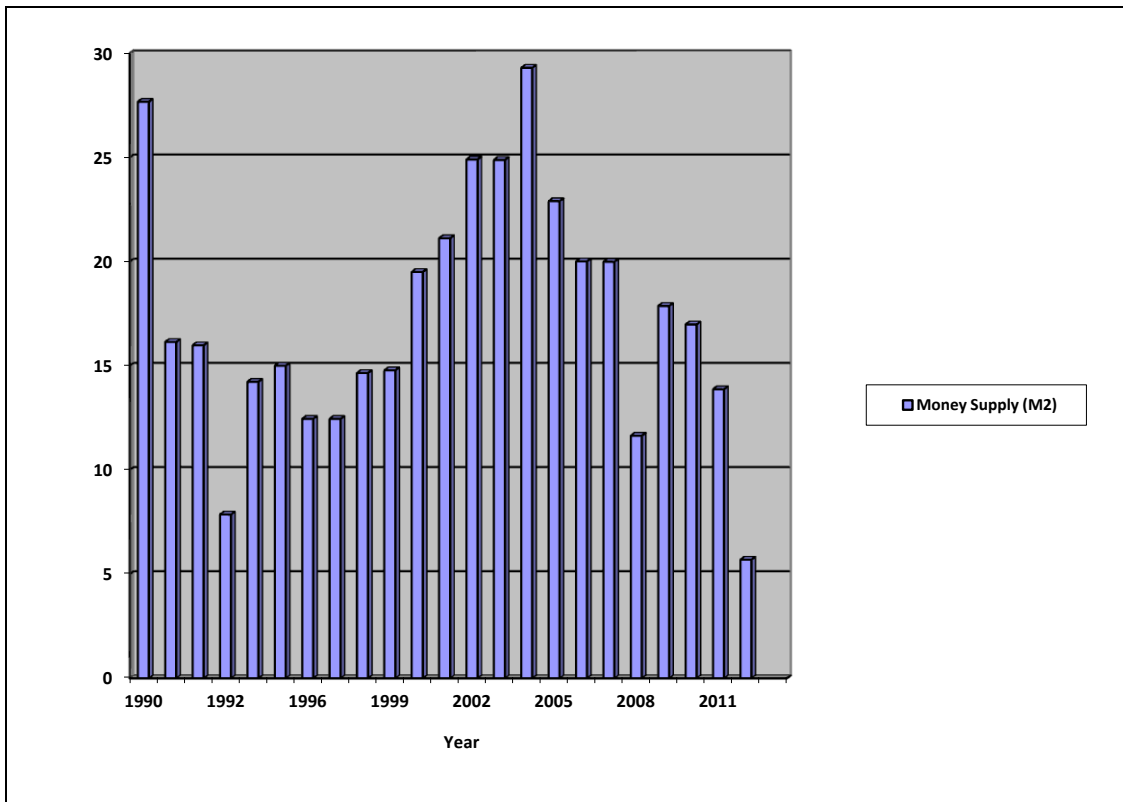
Source: Economic survey (Various Issues), Annual Reports of SBP (Various Issues)



**Fig. 5. Volume of trade (VTR)**

Source: World Development Indicators (<https://finances.worldbank.org/countries>) and Pakistan Bureau of Statistics (Price Statistics (<http://www.pbs.gov.pk/content/price-statistics>))





**Fig. 6. Money supply (M2)**

Source: World Development Indicators (<http://data.worldbank.org/country/pakistan>)

#### 4.2.7 Public Debt (PD)

Public debt (also known as government debt, sovereign debt and national debt) is the debt payable by the central government of the country. The results regarding the public debt and fiscal deficit have been found controversial as many of the researchers have mentioned so. According to the opinion of some authors the level of public debt needed is dependent upon the size of the fiscal deficit (FD) strongly. Thus we consider this view valid; the consequence is causation runs in the direction from fiscal deficit to public debt [25,26,27]. In Nigerian economy the relationship between the debt and fiscal deficit had found significant and positive in both long as well as in the short run. The results obtained indicate that 1% rise in public debt caused an increase of 1.85% in the fiscal deficit.

#### 4.2.8 Inflation (I)

The general rise in the overall price level in a country is referred to as inflation. The inflation is referred to such condition in the economy in which the supply of money is greater as compared to its demand. Due to inflation in the country, the value of monetary items and money

is reduced. Inflation reduced the value of currency. A situation in which because of high prices, the power of an ordinary man decreases to purchase. Davidson et al. [28] have conducted a study on the relationship among the inflation and interest rate in Pakistan. The results obtained in their study indicated that interest rate, inflation rate and unemployment rate are co-integrated. The research further reported that the unemployment and interest rate are negatively related to the inflation both. In the current study, the data on inflation is collected from the [globeconomy.com](http://globeconomy.com) and its relationship is checked with the interest rate of Pakistan.

The graph for inflation rate is given below where a rising trend can be observed in both.

#### 4.2.9 Government Debt (GD)

The government debt represents the borrowings of the government in order to make sure the financing of the planned expenditure. If the government's budget is in surplus, then the government should avoid increasing its total debt. The government uses the bonds and securities as tools to borrow money. In order to finance expenditure by the local governments,

agencies or specific departments, they may issue their own bonds. The government of a developing country with low credit ratings may need to negotiate loans from foreign institutions, governments such as the overseas bank creditors or World Bank rather than issuing paper.

Kalim and Hassan [29] have specified in their study that an estimated growth deficits-GDP ratio of 1% in the government caused in increasing growth of long-term rates of interest by 0.4 to 0.6 % points. Their study finds that the estimated and simulated interest rate effects of the debt of the government tend to be less. Though, a rise in consumption of the government and debt leads to a larger effect. In the current study the relationship between interest rate and government debt is to find out.

### 4.3 Analytical Model

The analytical model shows the relationship between the independent variables and the dependent variables of the study. In the current

study, there are 2 analytical models used. Both of the models are multiple regression models. The models are illustrated one by one below:

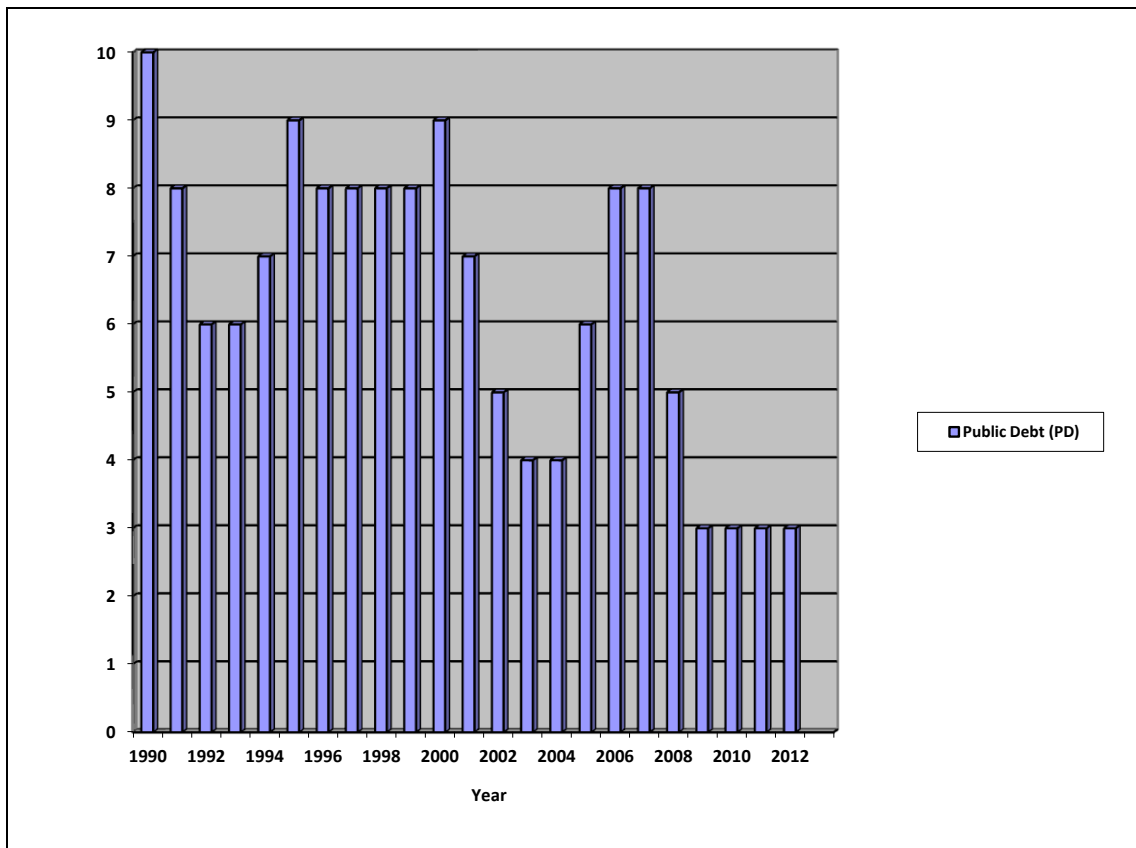
#### 4.3.1 Model 1

The first analytical model estimated the impact of major macroeconomic variables on fiscal deficit (FDG) for the period from 1990 to 2012. In the model below, the fiscal deficit is a dependent variable and the total debt servicing, GDP-per capita, money supply and volume of trade are the independent variables.

$$FDG = \alpha + \beta_1 GDPPC + \beta_2 TDS + \beta_3 VTR + \beta_4 M2 + \epsilon_i \quad (1)$$

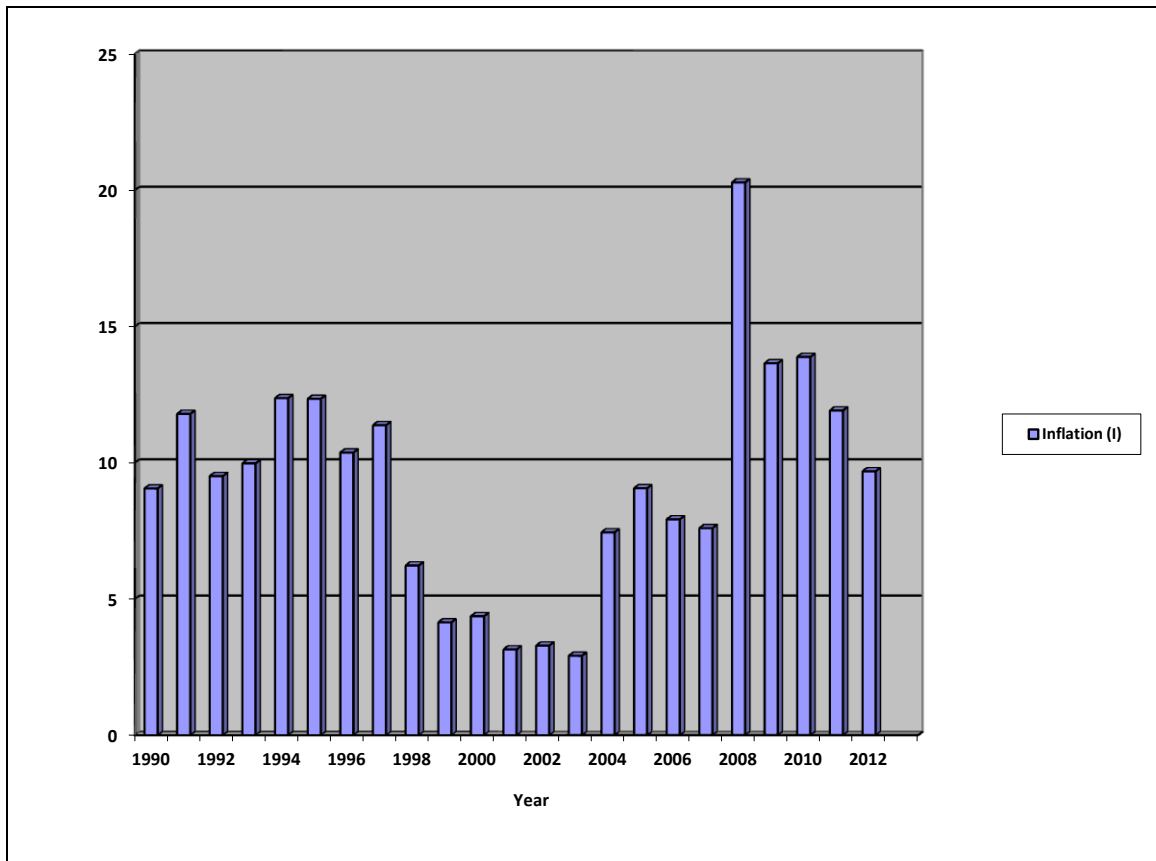
Whereas:

- FDG = Dependent Variable
- GDPPC, TDS, VTR, M2 = Independent Variables
- $\alpha$  = Intercept
- $\beta_1, \beta_2, \beta_3, \beta_4$  = Coefficients
- $\epsilon_i$  = Error term



**Fig. 7. Public Debt (PD)**

Source: Economic survey (Various Issues), Annual Reports of SBP (Various Issues)



**Fig. 8. Inflation (I)**

Source: World Development Indicators (<http://data.worldbank.org/country/pakistan>)

**4.3.2 Model 2**

The second model has interest rates (INT) as a dependent variable, while fiscal deficit (FDG) and government debt (GD) as independent variables of the study. It is also believed that inflation and money supply to have an important effect on the interest rates. Therefore, in the current study inflation rate (I) and money supply (MS) are incorporated as important independent variables.

$$INT = \alpha + \beta_1FDG + \beta_2GD + \beta_3I + \beta_4PD + \beta_5MS + \epsilon_i \quad (2)$$

Whereas:

- INT = Dependent Variable
- FDG, GD, USINT, I, MS = Independent Variables
- $\alpha$  = Intercept
- $\beta_1, \beta_2, \beta_3, \beta_4$  = Coefficients
- $\epsilon_i$  = Error term

**4.3.2.1 Data analysis**

Variance inflation factor (VIF), augmented ducky fuller test (ADF) and OLS models were

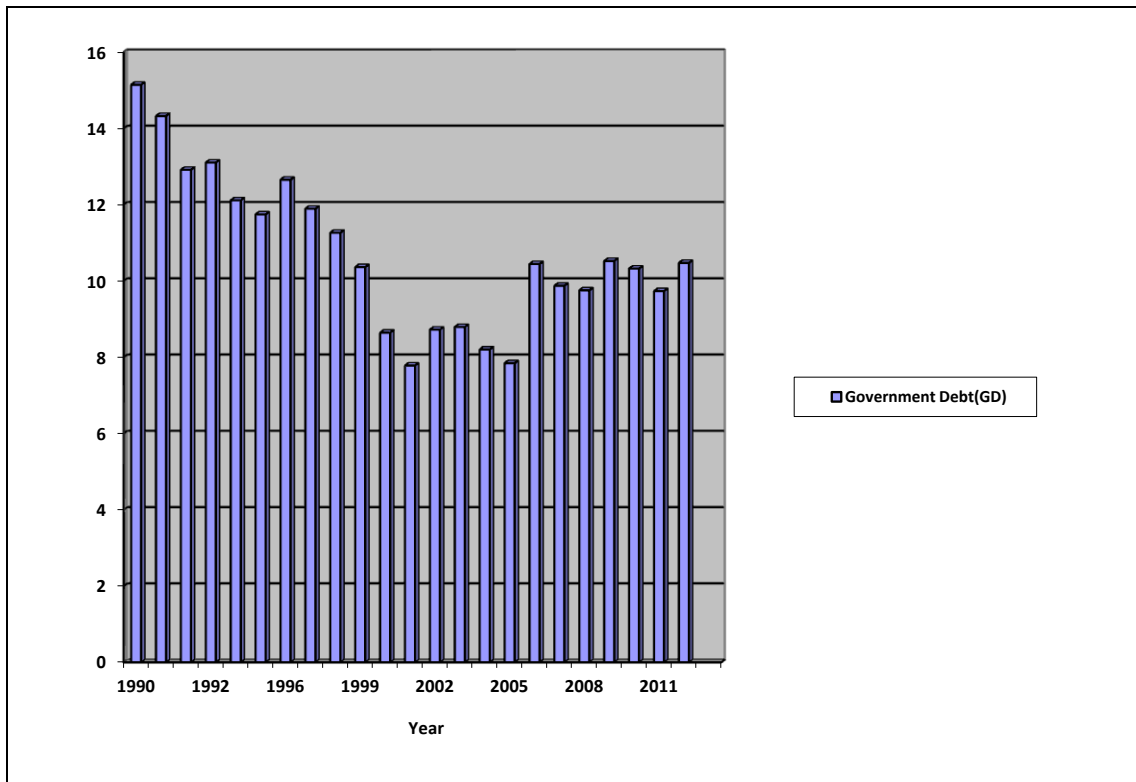
used for data analysis. The following are the tests and their respective interpretations.

**Augmented dickey fuller (ADF) analysis:** The Table 1 shows the ADF test for the variables of the study in order to check the stationarity in the data. The test is applied using the statistical software Gretel. The results and explanation of the test are as below:

**Table 1. Augmented dickey-fuller (ADF) stationarity test**

Variable	p-value	Lag order for ADF test
FDG	0.001126	0
GDPPC	0.01136	0
M2	0.000727	0
INT	0.04208	0
I	0.000633	0
VTR	0.0014	0
TDS	0.000105	0
PD	0.02708	5

Source: Author



**Fig. 9. Government debt (GD)**

Source: Provincial Bureaus of Statistics and Federal Academy of Educational Planning and Management Islamabad Pakistan. (Annual Pakistan Education Statistics Reports, AEPAM, Islamabad)

For the variables above, all of the null hypothesis are rejected since the p-values for fiscal deficit (FDG), GDP per capita (GDPPC), money supply (M2), interest rate (INT), inflation (I), volume of trade (VTR), total debt servicing (TDS) and public debt (PD) are 0.001, 0.011, 0.00, 0.042, 0.00, 0.00, 0.00 and 0.02 respectively, which are less than the significant level 0.05. Since, it could be said that the data is stationary and is valid for the analysis.

**Ordinary Least Square (OLS) for model 1:** The first model shows the relationship between the fiscal deficit and gross domestic product total debt servicing, per capita, money supply and volume of trade. The model is explained and analyzed as under and it could be written statistically as:

$$FDC = \alpha + \beta_1GDPPC + \beta_2TDS + \beta_3VTR + \beta_4M2 + \epsilon_i \quad (3)$$

**Variance Inflation Factors (VIF):** Variance Inflation Factor (VIF) is used to detect the multicollinearity in the model. According to a rule of thumb, if the value of VIF is greater than 10, it will indicate that there is multicollinearity problem

in the data. Multi-collinearity means that two or more variable in the model has perfect collinearity among them because of which the results are not appropriate and can't be interpreted in the way needed.

**Table 2. Variance inflation factor**

Standard value	GDPPC	TDS	VTR	M2
1.0>10	2.416	1.908	1.513	1.035

Source: Author

The Table 2 shows the VIF for different variables in the model. The VIF for GDP per capita, total debt servicing, volume of trade and money supply have the values 2.416, 1.908, 1.513 and 1.035 respectively. All of the variables have the VIF less than 10 and greater than 1, which means that there is no issue of multi-collinearity and the model is appropriate for further analysis.

**Heteroscedasticity:** The heteroscedasticity in a research study is a major issue of concern in the regression analysis because the presence of heteroscedasticity can produce invalid results for the statistical tests of significance that assume

that the variances of the variables are not changing over time [30]. The current model has no heteroscedasticity issue as its p-value is above the significance level i.e.,  $0.557 > 0.05$  and it could be said that the data is accurate for the analysis purpose.

**Ordinary Least Square (OLS) Model 1:**

Regression model is useful in order to find out the relationship among the independent and dependent variables of the study. The estimators of the Ordinary Least Square (OLS) model are said to be consistent when there is no perfect multicollinearity and the regressors are exogenous and optimal in class of the linear unbiased estimators when the errors are serially uncorrelated and homoscedastic. Under such kind of situations, method of ordinary least square (OLS) mean-unbiased estimation and minimum-variance when the errors have finite variances Davidson, et al. (1993). The Table 3 shows the results of model 1.

**Interpretation:** The Table 3 shows the results of the model 1. In the above results gross domestic product per capital (GDPPC) is an independent variable which has showed a significant impact on the fiscal deficit as its p-value is less than the significant level which is  $0.0428 < 0.05$ . The coefficient for this variable is 0.0019, which means that if there is one unit change in GDPPC, there will be 0.0019 change in fiscal deficit. The (+ve) sign of the GDPPC indicates that there is a positive relationship found between the two variables.

The results of total debt servicing (TDS) showed a significant relationship with the fiscal deficit as its p-value is less than the level of significance i.e.  $0.0282 < 0.05$ . The coefficient for this variable is 0.0198, which means that if there is one unit change in TDS, there will be 0.0198 changes in fiscal deficit. The (+ve) sign of the TDS indicates that there is a positive relationship found between the two variables. Since, this variable depicts that if country is paying its debt heavily along with interest payment then the governments have fewer amounts available to invest on development of social sector, infrastructure and to tackle with real problem like unemployment, inflation, trade imbalance and low rate of economic growth etc. [31]. For this reason both of the variables have found a positive relationship. The positive and significant relationship of debt servicing with fiscal deficit indicates that any increase in debt servicing will put a pressure on government treasure.

The third relationship in the Table 3 is between the volume of trade (VTR) and fiscal deficit (FDC). It has been found that there is a significant relation between the VTR and FDC as the p-value is less than the significant level i.e.,  $0.0349 < 0.05$ . Moreover, the relationship is found positive which means that if there is one unit change in VTR, there will be 0.2290 units change in the dependent variable. The positive relationship is showed in the data due to the positive sign of the coefficient. In case of Pakistan the imports are higher than its exports, which are not a sign of a profitable economy [32] for this reason in the current study it has found a positive impact of volume of trade with fiscal deficit. The results obtained support the results of Kalim and Hassan [33].

There is found a negative significant relationship between the money supply (M2) and fiscal deficit (FDC) as its p-value is 0.0010 and coefficient is -0.1062. The negative coefficient indicates the negative relationship between the money supply and fiscal deficit. It also means that if the value of money supply is increased by one unit, there will be 0.1062 units decrease in the dependent variable which is FDC. The variables have showed a negative relationship because rise in supply of money assists the government to finance its deficits/shortfalls and thus it has a negative impact on the fiscal deficit [34].

Moreover, the  $R^2$  (R-Square) of the model is 81.58% which shows that the independent variables explained about 81.58% of the change in the dependent variable. The rest of the 19.42% of the change in the dependent variable is due to the other factors that are represented by  $e_i$  in the model. Furthermore, the p-value of f-statistic is 0.000 which shows the significant impact of all of the independent variables of the study on the dependent variable of the model 1 and thus shows that there is a relationship between the explanatory and explained variables of the study.

**Ordinary least square (OLS) for model 2:**

The second model of the study shows the relationship between the interest rate proxied by domestic lending and money supply, fiscal deficit, government debt, Interest rate and international interest rate. The model is explained and analyzed as under and it could be written statistically as:

$$INT = \alpha + \beta_1FDG + \beta_2GD + \beta_3I + \beta_4PD + \beta_5MS + \epsilon_i \tag{4}$$

The Table 4 shows the VIF for different variables in the model. The VIF results for MS, FDG, GD, I and UNSIT are 1.217, 1.542, 2.097, 1.727 and 1.754 respectively. All of the variables have the VIF less than 10 and greater than 1, which means that there is no issue of multi-collinearity and the model is appropriate for further analysis.

**Heteroscedasticity:** In order to check the model for heteroscedasticity problem, the white test is used. The assumptions of the white test indicates that if the p-value of the test is less than 0.05 (level of significance), then there will be heteroscedasticity problem and vice versa. Hence, this problem does not exist in the model since the p-value is greater than 0.05 level of significance i.e., i.e., 0.358587 > 0.05.

The Table 5 shows the ordinary least square (OLS) regression test for the model 2. The dependent variable of the model is interest rate (INT) and all of the variables shown in the table are independent variable. There is found a significant relationship between fiscal deficit and interest rate as the p-value is less than the significant level i.e., 0.0334 < 0.05. The coefficient value is 0.3685, which means that there is positive relationship between the two variables. The coefficient shows that if there is one unit change in fiscal deficit, the interest rate

will be affected positively about 0.3685 units. This result further shows as the fiscal deficit or budget deficit increases, the interest rate due to this will also be increased in the country which signifies that in order to reduce the interest rate and make the economy of the country well stabilized, the government should reduce its fiscal deficit [35]. The results obtained from the study are in collaboration with the results of Bernice et al. [36].

The results of government debt (GD) showed significant relationship with the interest rate (INT) as its p-value is less than the level of significance i.e. 0.0495 < 0.05. Moreover, the relationship between the two variables is found positive since the coefficient sign is positive i.e., 0.9926. The positive relationship means that if the value of GD is increase by one unit, there will be 0.9926 units increase in interest rate. In short, according to this study, the increase of one variable will lead the other variable to increase. The results further signify that the government should reduce its debt level in order to reduce the interest rate in the country. The results obtained from the study are similar to that of Patnaik et al. [37] who also have found the relationship between government debt and interest rate and have concluded that both of the variables have positive relationship.

**Table 3. Ordinary least square (OLS)**

Variables	Coefficient	Std. error	t-ratio	p-value
GDP Per Capita	0.0019	0.0008	2.179	0.0428
Total Debt Servicing	0.0198	0.0135	1.202	0.0282
Volume of Trade	0.229	0.1003	2.281	0.0349
Money Supply	-0.1062	0.0272	-3.903	0.001
R <sup>2</sup> (%)	81.58			
F-Statistics	14.499 and			
P-Value	0			
Durbin-Watson	2.20843			

Source: Author

**Table 4. Variance inflation factor (VIF)**

Standard Value	MS	FDG	GD	I	PD
1.0>10	1.217	1.542	2.097	1.727	1.754

Source: Author

**Table 5. Ordinary least square model (OLS) for interest rate**

Variables	Coefficient	Robust Std. error	t-ratio	p-value
Fiscal Deficit	0.368547	0.609494	0.6047	0.0334
Government Debt	0.99263	0.469345	2.115	0.0495
Inflation	-0.825551	0.225911	3.654	0.002
Public Debt	1.10246	0.661469	1.667	0.0139
Money Supply	-0.102841	0.155753	-0.6603	0.0179

R<sup>2</sup> (%) = 61.00, F-Statistics 36.73 and p = 0.000, D-Watson = 1.87; Source: Author

The third relationship in the table is between I (inflation) and INT (interest rate). It has been found that there is a significant relation between inflation and interest rate as the p-value is less than the significant level i.e.,  $0.0020 < 0.05$ . Moreover, the relationship is found negative which means that if there is one unit change in inflation rate, there will be -0.8255 units change in the interest rate. The negative relationship is found because a rise in inflation rate in the country reduced the value of money i.e., inflation is a situation in an economy where the demand of money is fewer than its supply [38]. Thus, in such case the interest rate falls and the supply of money increases accordingly. Similar results are also found out by Hassan and Kalim [39].

The results of public debt (PD) showed significant relationship with the interest rate (INT) as its p-value is less than the level of significance i.e.,  $0.0139 < 0.05$ . Moreover, the relationship between the two variables is found positive since the coefficient sign is positive i.e., 1.1024. Furthermore, it is obvious that the public debt increases the demand for money. So, according to the law of demand and supply, the increased demand of money will tend to reduce its supply and in such case the interest rate will get high [40].

There is found a negative significant relationship between money supply (MS) and interest rate (INT) as the p-value is less than the level of significance i.e.,  $0.0179 < 0.05$ . Moreover, the relationship between the two variables is found negative since the coefficient sign is negative i.e., -0.102841. Furthermore, the result obtained supports the law of demand and supply. Interest rate means the price paid to borrow money. So if there is surplus amount of money available in the market, its value will be affected which will tend to reduced its price (interest rate) [41]. Moreover, simply it could be said that an increase in money supply reduced the interest rate in a country.

Moreover, the  $R^2$  (R-Square) of the model is 61.00% which shows that the independent variables explained about 61.00% of the change in the dependent variable. The rest of the 39.00% of the change in the dependent variable is due to the other factors that are represented by  $e_i$  in the model. Furthermore, the p-value of f-statistic is 0.000 which means that there is significant impact of all of the independent variables on the dependent variable of the model 2 and thus shows that there is a relationship between the explanatory and explained variables of the study.

## 5. CONCLUSION

Fiscal deficit has been in a topic of interest for many researchers for many years in the context of development and economic growth. The fiscal deficit has so many times referred as a bottleneck to the growth of developing economies. Pakistan is also one of the developing countries that faces problem of fiscal deficit for so many years. Due to the undesirable fiscal deficit, the country is putted to rely upon the debt burden both external and internal borrowing. The basic aim of the present study is due to this reason is to investigate the major factors that contribute in the fiscal deficit in Pakistan. It also assessed the ways in which interest rate is affects domestically by fiscal deficit, public debt and various other macroeconomic variables providing thereby to the government with considerable help to cope with this issue. For this reason the study focused to accomplish certain important objectives such as, to find out how the interest rate has been affected by fiscal deficit and government debt in Pakistan for the period of 1990 to 2012 and also to investigate the key macroeconomic variables as factors of fiscal deficit in Pakistan and to provide the government with valuable recommendations in dealing with the problem in Pakistan. To fulfill these objectives secondary data was collected from different sources for the purpose of analysis. There were two multiple regression models set for the study. The data was taken from 1990-2012. Augmented Dicky Fuller (ADF) test was used in order to identify the stationary problem in the data and OLS regression test was used in order to find out the estimates of the coefficients. The results obtained indicated that in the data there was no stationarity problem i.e., all of the data collected was stationary which means that there mean and variances were constant for time which is the requirement for the correct data. Variance Inflation Factor (VIF) was applied in order to find out the collinearity problem in the data, but there was not found any variables having collinearity between them i.e., all of the values of the VIF were  $< 10$  i.e., for GDP per capita, total debt servicing, volume of trade, money supply, money supply 2, fiscal deficit, government debt, Inflation and public debt have the values 2.416, 1.908, 1.513, 1.035, 1.217, 1.542, 2.097, 1.727 and 1.754 respectively and collectively for all of the data. After successfully passing through this test the data was then tested for heteroscedasticity problem. For heteroscedasticity the p-value should be significant. The current data showed

that the p-value for the first model was 0.557, which indicated that there is no heteroscedasticity issue; similarly the second model has the p-value 0.358587, which also indicates that there is no heteroscedasticity issue. The first OLS model indicated that Gross Domestic Product Per Capital (GDPPC) has showed a positive significant impact on the fiscal deficit (FD) as its p-value is less than the significant level which is  $0.0428 < 0.05$ , the results of total debt servicing showed significant relationship with the fiscal deficit as its p-value was less than the level of significance i.e.,  $0.0282 < 0.05$ , there is a significant relation between the volume of trade and fiscal deficit as the p-value is less than the significant level i.e.,  $0.0349 < 0.05$  and there is found a negative significant relationship between the money supply (M2) and fiscal deficit (FDC) as its p-value is 0.0010 and coefficient is -0.1062. The second model indicated that there is found a significant relationship among interest rate and fiscal deficit as the p-value is found less than the significant level i.e.,  $0.0334 < 0.05$ , the results of government debt (GD) showed significant relationship with the interest rate (INT) as its p-value is less than the significance level i.e.,  $0.0495 < 0.05$ , it has been found that there is a negative and significant relation between the interest rate and inflation as the p-value is found less than the level of significant i.e.,  $0.0020 < 0.05$ , the results of public debt showed significant relationship with the interest rate (INT) as its significant value (p-value) is found less than the significance level i.e.,  $0.0139 < 0.05$  and there is found a negative and significant relationship among money supply and interest rate as the p-value is less than the level of significance i.e.  $0.0179 < 0.05$ . The  $R^2$  of the first model is 81.58% and 61.00% was found of the second model. Furthermore, there is no autocorrelation issue in the second model and this is showed by the D-Watson test result i.e., 1.87.

### COMPETING INTERESTS

Authors have declared that no competing interests exist.

### REFERENCES

1. Aggenor PR, Montiel PJ, Development macroeconomics. MIT Press, Cambridge, MA; 1999.
2. Economic survey of Pakistan (2013-14). Finance Division, Govt. of Pakistan.
3. Gaber S. Economic implication from deficit finance. BERG working. "Goce Delov" University, Stip, Macedonia. 2010;69.
4. Abel A. Empirical investment equations: An interpretive framework. Carnegie-Rochester Series on Public Policy. 1980; 12:3991.
5. Ahmad H. Is inflation a fiscal phenomenon in Pakistan? Department of Economics. University of Warwick, Unpublished Report; 2007.
6. Ahmad H. Is inflation a fiscal phenomenon in Pakistan? Department of Economics. University of Warwick, Unpublished Report; 2007.
7. Bhalla S. This time, it is already different: A personal perspective. Deutsche Bank; 1995.
8. Patnaik P. On fiscal deficit and interest rate. Economic and Political Weekly. 2000; 36 (14):1160-1163.
9. Abel A. Empirical investment equations: An interpretive framework. Carnegie Rochester Series on Public Policy. 1980;12:3991.
10. Gaber S. Economic implication from deficit finance. BERG working. "Goce Delov" University, Stip, Macedonia. 2010;69.
11. Laubach T. New evidence on the interest rate effects of budget deficits and debt. Finance and Economics Series, 2003-12, Board of Governors of the Federal Reserve System; 2003.
12. Laubach T. New evidence on the interest rate effects of budget deficits and debt. Finance and Economics Series, 2003-12, Board of Governors of the Federal Reserve System; 2003.
13. Bernice SD. The long run-effects of fiscal deficit on economic growth in Ghana. 2005;1970-2000.
14. Hussain K. Monetary policy channels of Pakistan and their impact on real GDP and Inflation. Working paper number 41, Center for International Development at Harvard University; 2009.
15. Khan AQ, et al. An analysis of short-term effects of budget deficits on macroeconomic variables: Evidence from Pakistan (1960-2005). Department of Economics, Sarhad Journal of Agriculture. 2008;24:2.
16. Hassan S, Kalim DR. The role of key macroeconomic variables in fiscal. Deficit of Pakistan: An Empirical Analysis; 2013.
17. Khan AQ, et al. An analysis of short-term effects of Budget deficits on macroeconomic variables: Evidence from



- Pakistan (1960-2005), Department of economics, Sarhad Journal of Agriculture. 2008;24(2).
18. Mahmood Y, Bukhari R, Aslam M. Trade-off between Inflation, Interest and unemployment rate of Pakistan: A cointegration analysis. *Pakistan Journal of Commerce and Social Sciences*. 2013; 7(3):482-492.
  19. Kalim R, Hassan MS. What lies behind fiscal deficit: A case of Pakistan? *Transylvanian Review of Administrative Sciences*. 2013;40:96-113.
  20. Chaudhary M, Aslam, Naveed A. Money supply, deficit and Inflation in Pakistan. *Pakistan Development Review*. 1995;34: 945-956.
  21. Mahmood Y, Bukhari R, Aslam M. Trade-off between Inflation, Interest and Unemployment Rate of Pakistan: A Cointegration Analysis. *Pakistan Journal of Commerce and Social Sciences*. 2013;7(3):482-492.
  22. Kalim R, Hassan MS, What lies behind fiscal deficit: A case of Pakistan. *Transylvanian Review of Administrative Sciences*. 2013;40:96-113.
  23. Chaudhary M. Aslam, Naveed A. Money supply, deficit and inflation in Pakistan, *Pakistan Development Review*. 1995;34: 945-956.
  24. Patnaik P. On fiscal deficit and interest rate. *Economic and Political Weekly*, 2000;36 (14); 1160-1163.
  25. Gaber S. Economic Implication from deficit finance, BERG working. "Goce Delov" University, Stip, Macedonia. 2010;69.
  26. Gale WG. Orszag PR. Economic effects of sustained fiscal deficits. *National Tax Journal*. 2003;56:463–485.
  27. Ford, Robert, Douglas Laxton. World public debt and real interest rates. *Review of Economic Policy*. 1999;15(2):77-94.
  28. Davidson, Russell, Mackinnon, James G. Estimation and inference in econometrics. Oxford University Press; 1993. Available: ISBN 978-0-19-506011-9
  29. Kalim R, Hassan MS. What lies behind fiscal deficit: A case of Pakistan? *Transylvanian Review of Administrative Sciences*. 2013;40:96-113.
  30. Asteriou, Dimitros, Hall, Stephen G. *Applied Econometrics* (2<sup>nd</sup> ed.). Palgrave MacMillan. 2011;109–147. Available: ISBN 978-0-230-27182-1
  31. Kalim R, Hassan MS. What lies behind fiscal deficit: A case of Pakistan? *Transylvanian Review of Administrative Sciences*. 2013;40:96-113.
  32. *Economic survey of Pakistan (2013-14)*. Finance Division, Govt. of Pakistan.
  33. Kalim R, Hassan MS. What lies behind fiscal deficit: A case of Pakistan? *Transylvanian Review of Administrative Sciences*. 2013;40:96-113.
  34. Kalim R. Hassan MS. What lies behind fiscal deficit: A case of Pakistan? *Transylvanian Review of Administrative Sciences*. 2013;40:96-113.
  35. Ussher LJ. Do budget deficits raise interest rates? A survey of the empirical literature. *Journal of Monetary Economics*. 1998;12: 605-16.
  36. Bernice SD. The long run-effects of fiscal deficit on economic growth in Ghana. 2005;1970-2000.
  37. Patnaik P. On fiscal deficit and interest rate. *Economic and Political Weekly*. 2000;36(14);1160-1163.
  38. Mahmood Y, Bukhari R, Aslam M. Trade-off between Inflation, Interest and unemployment rate of Pakistan: A cointegration analysis. *Pakistan Journal of Commerce and Social Sciences*. 2013; 7(3):482- 492.
  39. Hassan S. Kalim DR. The role of key macroeconomic variables in fiscal deficit of Pakistan: An empirical analysis; 2013.
  40. Ford, Robert, Douglas Laxton. World public debt and real interest rates. *Review of Economic Policy*. 1999;15(2): 77-94.
  41. Bhalla S. This Time, It Is already different: A personal perspective. Deutsche Bank; 1995.

© 2019 Shakir et al.; This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

*Peer-review history:*  
 The peer review history for this paper can be accessed here:  
<http://www.sdiarticle3.com/review-history/43163>