Inflation, Money Supply and Budget Deficit Nexus: A Case Study of Pakistan

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Abstract

Inflation, money supply and budget deficit are very important macroeconomic variables. In this study, it is tried to find out relationship among these variables. For this purpose the annual data ranging from 1980 to 2015 has been taken. Augmented Dicky Fuller (ADF) unit root test suggest that data is non-stationary at level. So interdependence of every variable on other two variables is checked through OLS and Granger Causality test. The bi-directional causality is found between inflation and money supply while unidirectional causality is run from budget deficit to inflation. Similarly the causality is run unidirectional from budget deficit to money supply. It is suggested that the government is needed to control the expenditure or increase revenues to minimize the volume of budget deficit as it is the cause of inflation.

Keywords: ADF, Granger Causality, Macroeconomy, OLS, Pakistan.

Introduction

For the development of any country the government should have to stabilize inflation for the stability of growth and macroeconomic determinants. According to theoretical and empirical studies like Malik and Chaudhary (2001), Khan and Qasim (1996), Chaudhary and Ahmad (1996) investigated negative relationship between inflation and output which suggested that both very high and very low inflation is harmful for any economy.

Moinuddin (2009) explained that the "Inflation" occasionally is measured to an increase in price of certain goods and also the services. Scholars agreed that inflation occurs when money supply growth rate is higher than the economy growth rate (e.g. Akcay, Alper and Ozmucur, 1996, Chimobi and Igwe, 2010). Various studies have examined the possibility of a relationship between deficit financing and the general price level. According to Anyanwu (1997) budget deficit refers to government expenditure exceeding government revenue over a period of time. When a deficit is involved, it is important to find remedy for financing such deficits so as to eradicate its negative effects. The growth and persistence of developing countries in recent times has brought the issues of budget deficits into focus. Therefore, Afzal and Saima (2012) investigated that this is major alarm for policy makers and politicians. The Inflation create macroeconomic instability, discourages the savings and create problems in international markets.

During the 90s era of Pakistan, considerable assignment faced that the State Bank of Pakistan was to control prices in a limit along with stability in the economy. 14% inflation were recorded in between 1973 to 1980 but afterward the inflation were control around 7.2% and during the period of 1990s it reached 10% but again decrease to 4.6% during the period of 1998 to 2003. In scenario of Pakistan the main causes of inflation is that money supply, fiscal imbalances and fiscal deficits. Pakistan has faced huge fiscal deficits during the last decade. Being a manifestation of the fiscal indiscipline, these deficits are caused increase in inflation[1]. Different economists like Khan and Qasim (1996), khan and Hussain (2005), Agha and Khan (2006), attempted to concentrate on different issues to relate with this debate. Finally this debate based on the relationship among inflation, fiscal deficit in the long run scenario of Pakistan.

The study is organized as: In section two extensive literatures will be reviewed. Section three consists of data and methodology. Section four presents results and discussion. While the last section, consists of summary, conclusion and policy recommendations.

Literature Review

Awe and Shina (2012) investigated the underlying hypothesis in Nigerian economy. They used the annual data from 1980 to 2009. The variables which are used in this research are the budget deficit, Government Debt, inflation and Money Supply. This research showed that there is a positive nexus between the inflation and budget deficit in the Nigerian economy. The study suggests that Government should cut down the present level of her spending in form of the dropping level of her budget deficit to decrease the rate of inflation.

Habibullah, Cheah, and Beharom (2011) investigated the Inflation and budget deficit relationship in 13 Asian developing countries. They used annual data from the 1950 to 1999 for these selected countries. By applying sound statistical techniques they found that it is the deficit that leads to inflation in a sample countries of Asia.

Rosa (2011) elaborated the nexus between inflation and budget deficit in Portugal. He used the time series data from the period of (1954 - 19950). He used the variables like indirect exchange rate, rate of variation of the unit labor costs in firms, effective nominal, Government general balance in GDP, changing in prices of import in external currency, rate of changing in the nominal stock of money (M2) correct by growth rate of the real GDP. The result showed that the main reasons of the changing in inflation in the time period of 1954 to 95 are due to the foreign inflation and also effective exchange rate in the Escudo.

Saeidi, and Valizadeh (2012) examined the causes of inflation in Iranian economy. Their sample period were selected from 1979 to 2006. The variables which used in this research are Inflation, Budget deficit and war (used as Dummy Variable). The statistical techniques which used are linear regression, correlation coefficients, Watson Camera test correlation coefficients, Fischer test, T statistics. Variance analysis, and other techniques. Their results suggested that budget deficit is mainly responsible for both unemployment and inflation.

Chaudhary and Ahmad (1995) examined the situation of money supply, budget deficit and inflation in Pakistan. They used the annual data from the period 1973-92, and 1982–92. In this study the relationship among fiscal deficit, inflation and money supply is analyzed. The results support for a significant nexus between budget deficit and inflation. The conclusion of this research is that the implementation of monetary policy may be resolute by the central bank but the policy is greatly dependent on the fiscal decisions made by the govt. In order to manage inflationary force, government requirements to cut the mass of budget deficit.

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[1] See for example Chaudhary and Ahmed (1996).

Devapriy and Ichihashi (2012) analyzed that how the budget deficit is affected the inflation in the economy of Sir Lanka. They analyzed the data from the period of 1950 to 2010. The variables which are used the real exchange rate, inflation, money supply, interest rate, budget deficit, Treasury note and borrowing. The techniques which are used like vector autoregressive model and Granger causality test to investigate the nexus between budget deficits and inflation, with the special emphasis to recognize the inflation in economy of Sri Lanka. The results showed that the domestic deficit have a significant and positive relationship with inflation. The results propose bi-directional causality among the inflation and domestic financing. Foreign borrowing has not significant impact on inflation. So, it is suggested that the monetary and fiscal authorities should shift from long run to short run or medium run deficit-financing credit instruments in the future.

Tiwari et. al., (2012) examined the fiscal deficit and inflation relationship in the case of India. The data which are used from the period of 1971 to 2009. Money supply measured through M3 (Broad money), the inflation measured through consumer price index (CPI) of all the level, government expenditure which are measured by the total expenditure of central govt. They used Granger-causality, VECM and VAR. The results shows that the govt. expenditure a lot of more propelling strength for financial deficit development as compared to its investment-inducing spending programmers. Decrease in fiscal deficit may consist 'crowding out' and thus improve investment which connected with increase in yield and production help to control the inflation.

Mukhtar and Zakaria (2010) examined that the inter-links between inflation, budget deficit, and money supply in the case of Pakistan. They used quarterly data for the period of 1960 to 2007. They found that inflation in Pakistan is because of money supply and support the idea of Friedman (1956) who claimed that inflation is purely a monetary phenomenon. On the other hand the study also found that budgetary deficit has no role in inflation in case of a country like Pakistan. Furthermore, the study also found that money supply is independently affected inflation and it has no relevance with budget deficit.

Data and Methodology

To test the underlying hypothesis of interlinks between inflation, budget deficit and money supply, a quantitative methodological framework is employed. The quantity theory of money argued that price level is determined by quantity of money in the economy and thus has significant effects on overall economic activity, Bakare & Adesanya (2014). The price level fiscal theory suggest that price in economy is primarily determined by the expenditure and revenue balances and monetary policy has no role to play in it, Woodford (2003). The New Keynesian approach resolves the relationship among inflation money supply and budget deficit through aggregate supply and aggregate demand method with a dynamic stochastic general equilibrium.

Model Specification

This paper follows the empirical work of Akcay et, al., (1996) and Ezeabasili et, al., (2012). On the basis of the foregoing analysis, the modified structural model relevant to this paper is specified as follows:

$$BD = \alpha_0 + \alpha_1 \inf + \alpha_2 Ms + W_1 \qquad (1)$$

$$\inf = \alpha_0 + \alpha_1 BD + \alpha_2 Ms + W_2 \qquad (2)$$

$$Ms = \alpha_0 + \alpha_1 BD + \alpha_2 \inf + W_3 \qquad (3)$$

Where BD is budget deficit, inf. is consumer price index used as a proxy for inflation, Ms is money supply measured as M2 ratio GDP. The data for above mentioned three variables have been taken from Economic Survey reports[2]. This is the secondary Time Series data collected from 1981 to 2015.

Analysis and Results

Analyses of result as are discussed in three sub-sections: (1) Unit root test analysis (2) Granger Causality analysis, and (3) Ordinary Least Square method.

Table 1: Results of Unit Root Test.

Variables	Probability Value (level)	5% Critical Value	Order of Integration
BD	-3.18[*]	-2.96	I(0)
Inf	-3.52[*]	-2.96	I(0)
Ms	-6.13[*]	-2.96	I(0)

*Rejection of null hypothesis of unit root at 5%.

The unit root test ADF (Dickey and Fuller, 1979) results shows that budget deficit (BD), consumer price index (CPI), and money supply (m2) are stationary when variables are defined in levels. The null hypothesis of non stationary factor was clearly discarded at the 5% level of significance and this suggests that all used variables are integrated at level.

Table 2. Results of Granger Causality Test:

Null Hypothesis:	Obs	F-Statistic	Prob.
Ms does not Granger Cause inf	28	7.91780	0.0024
Inf does not Granger Cause Ms		9.70301	0.0009
BD does not Granger Cause inf	28	5.76097	0.0094
inf does not Granger Cause BD		3.33128	0.0536
BD does not Granger Cause M2	28	4.68896	0.0196
M2 does not Granger Cause BD		0.18377	0.8333

I have applied granger causality test with lag of 2 suggested by SIC and set hypothesis that if M2 does not granger cause inflation then it will be our null hypothesis but if M2 does granger cause inflation then the study will accept alternative hypothesis. It is known that the F-value should be greater than 4 and Probe value should be less than 0.05 than accept alternative hypothesis is accepted. The rule of thumb is that, here M2 is granger causing inflation. This means that alternative hypothesis is accepted and in reaction inflation is also causing M2. So the results are showing that there is bidirectional causality that exist between inflation and money supply.

On second data set budget deficit is causing inflation but in reaction inflation is not granger causing budget deficit. This result leads to unidirectional granger cause that run from budget deficit to inflation. At last the third data set reviews that BD cause M2 but in return M2 is not granger causing BD. It leads to unidirectional granger causality between budget deficit and money supply. The economic interpretation of granger trace test will be that M2 and CPI causes each other and there is some relationship among them and BD does causes inflation but inflation in return does not cause BD. At last third findings illustrates that BD is a reason of M2.but M2 is not cause of BD.

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[2] Various issues

OLS Results

Table 3: Dependent variable: Budget Deficit (BD)

VARIABLE	COEFFICIENT	STD-ERROR	T-STAT	PROB.
C	-4.201531	1.471236	-2.855783	0.0085
M2	0.032970	0.034350	0.959823	0.3463
CPI	0.004125	0.007740	0.532922	0.5988
BD(-1)	0.598556	0.181344	3.300659	0.0029
R-SQUARED=0.480771		D.W=2.16065		

The results in above table confirm the findings of Granger causality which states that the causality run from budget deficit to money supply and inflation while there is no causality that run from inflation and money supply to budget deficit. The results depicted in table 3 above suggested that although there is positive relationship between money supply and budget deficit but statistically this relationship is insignificant and same is the case with inflation which has although positive but statistically insignificant impacts on budget deficit. These findings are in line with the study of Sahin (2019), who found similar results for Turkey. The results of R square suggested that 48% variation in Y are explained by our independent variables and the value of D.W suggested that there is no autocorrelation in the selected model.

Table 4: Dependent Variable Money Supply (Ms)

VARIABLE	COEFFICIENT	STD- ERROR	T-STAT	PROB.
C	43.37574	8.529722	5.085246	0.0000
BD	-1.421896	0.984342	-1.444514	0.1610
inf	0.202998	0.046985	4.320523	0.0002
M2(-1)	-0.600499	0.207407	-2.895264	0.0078
R-SQUARED=0.450352		D.W=2.141268		

Table 4 presented the possible effects of our independent variables on dependent variable which is money supply. It is clear that money supply is positively and statistically significantly affected by inflation. The results suggested that with every 1% increase in inflation the money supply in economy is increased by 20%. Budget deficit is statistically insignificant while the value of R square suggested that 45% variations in money supply are explained by our independent variables of the model which is free of autocorrelation suggested by D.W. test results.

Table 5: Dependent Variable (inf)

VARIABLE	COEFFICIENT	ST- ERROR	T-STAT	PROB.
C	-22.18752	3.003232	-7.387881	0.0000
M2	0.337426	0.052849	6.384729	0.0000
BD	-1.046063	0.298179	-3.508171	0.0017
inf (-1)	1.108406	0.013506	82.06478	0.0000
R-SQUARED=0.997881		D.W=2.074003		

We adopted OLS on data set and the outcome illustrates that under OLS trace test R square is showing significance of the subject model. Here R square is 0.997881 which show that our dependent variable consumer price index is significantly dependent on independent variables. While on the other side DW statistic (2.074003) is showing that the model has no auto correlation. According to the results if all independent variables stay constant at zero then inf will dip down up to 22.18752 units. While if M2 increase by one unit then our inf increase by 0.032970, and if BD increase by one unit then our CPI decreases by 1.108406.

Conclusion and Policy Implications

This study attempted to analyze inflation, money supply and budget deficit nexus in case of Pakistan. The study took the data from 1980 to 2015 and the taken data were scrutinized by the application of ADF test to check the stationarity while Granger causality and OLS are applied to found the direction of causality and the contribution of individual variable in affecting the other one in a selected period. The results of the Granger causality suggested bi-directional causality between inflation and money supply which support the Friedman hypothesis that inflation is always and everywhere a monetary phenomenon. While from budget deficit to inflation and budget deficit to money supply the causality is unidirectional. The findings of the study stressed on the control of budget deficit and inflation which will ultimately control money supply in the economy. There is a need of sensible fiscal management which will help the government in controlling the budget deficit in Pakistan. By sensible fiscal management the author means that there is a need of relooking and revising of the tax system that has to be relaunched by the government in order to bring effectiveness in fiscal affairs. Furthermore, it is suggested that the government should control the debt services which in current makes it difficult to efficiently manage the fiscal affairs.

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