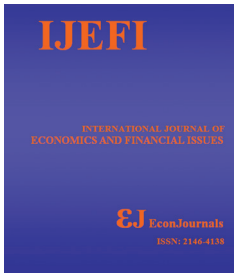

International Journal of Economics and Financial Issues

ISSN: 2146-4138

available at http: www.econjournals.com

International Journal of Economics and Financial Issues, 2015, 5(3), 709-715.

Determinants of Deviation from Inflation Targets in Pakistan: A Vector Autoregressive Approach

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ABSTRACT

State Bank of Pakistan has mandate of price stability along with output growth. However, inflation deviation from the announced target is common. Employing impulse response functions and variance decomposition, over the period, 1991Q1-2007Q4, this paper attempts to explain why inflation targets have been missed in Pakistan. The results are indicative that inflation gap responds to shocks in government credit from State Bank, world crude oil price, real effective exchange rate and money supply. The response is more prominent in case of government credit from Central Bank. On the other hand, variance decomposition analysis suggests that most of the variation in deviation from the target is explained by its own lagged values followed by variation in government loan from Central Bank.

Keywords: State Bank of Pakistan, Inflation, Real Effective Exchange Rate, Impulse Response, Variance Decomposition
JEL Classifications: E0, E23, E31

1. INTRODUCTION

Price stability or inflation has always featured as one of the most important objective of macroeconomic policymaking inflation targeting (IT) a primary objective across the globe. New Zealand was the first to adopt this policy in 1989 and now almost 50 countries of the world including developed and emerging economies are included in the list.

It is implicitly assumed that in the economy of Pakistan that there exists an expected relationship between money demand and inflation and moreover stability in money demand function is a matter of facts. It has been observed, however, during the past couple of decades, this kind of relationship has been weakened and money demand function found to be instable over the past decades. To achieve a specific intermediate target, monetary aggregate, through IT makes it impossible and resulting in a significant rise in the probability of missing the IT.

State Bank of Pakistan (SBP) has been observed significant changes after the implementation of 1990s financial reforms in the country, specifically the direct use of instruments of the monetary policy. So after the implementation of the 1990s financial reforms, the question raised about the stable money demand function and persistence of monetary aggregate targeting regime. So in the case when SBP observed that economy departs from the existence monetary policy regime, they have the rights and other possibilities such as using inflation, exchange rate or nominal income as the choice of nominal anchor (Moinuddin, 2007). Moreover, these reforms made the central bank more independent in setting the monetary policy instrument but still fiscal stress prevails most of the times government borrows a lot from central bank to fill the budgetary gaps, which changes the monetary policy posture leading missing IT.

This study employs impulse response functions and forecast error variance decomposition to find, on one hand, the determinants of inflation deviation from the target while, on the other hand, to estimate relative contribution of domestic and foreign shocks in deviation of inflation from the target inflation using quarterly data from 1991 to 2007.

Impulse response analysis has been undertaken to capture the persistence of different shocks while the forecast error decomposition technique has been used to analyze the relationship between focused variables. Before running the analysis, the stationarity of the series has been confirmed by employing augmented Dickey Fuller (ADF) unit root tests.

The rest of the paper is organized as follows: A brief review of previous studies discusses in Section 2 while the methodology, estimation technique and discussion of results are presented in Section 3. Section 4 analyzes impulse response functions and forecast error variance decomposition techniques separately and finally in Section 5 discusses final results along with furnishing some policy recommendations.

2. A BRIEF REVIEW OF EMPIRICAL LITERATURE

A handful literature, with mixed results, is available investigating the relationship among deviation from IT, supply side and demand side factors and imported inflation.

Caldero´n and Schmidt-Hebbel (2003) examined that accuracy in meeting ITs depends on the independence of the Central Bank and country-risk. The authors estimated unbalanced panel for the 19 countries for the period 1990-2001 using the generalized least square. The results of the study showed that both exchange rate and external shocks and inflation raised the deviation of the actual inflation from its targeted level. The independence of the central banks raised the accuracy of the targets while the high country-risk spreads reduced target accuracy.

Albagli and Schmidt-Hebbel (2004) extended the work of Caldero´ n and Schmidt-Hebbel by extending time period from 1990 to 2003 for the same sample but with a different estimation technique i.e., using ordinary least square. This work analyzed IT performance by several ways. The authors broaden the research scope by adding different sources of domestic and foreign shocks that can deviate inflation from its targeted level. The results are evident that several measures of institutional and policy weaknesses contribute significantly to the deviation from IT. Further Gosselin (2007), extending the work of Albagli and Schmidt-Hebbel, found that exchange rate movements, differences in financial sector development and fiscal deficits could explain the fraction of the cross-country and time variation in inflation deviations.

Gregoriou and Kontonikas (2005) found a strong non-linear relationship in the adjustment process after adopting the IT policy over the 1990s in all five OECD countries under studied. Exponential smooth transition autoregressive models parameter indicate that the speed of adjustment differs across countries and rapid speed of adjustment towards target found in UK, Australia and New Zealand as compared to Sweden and Canada. They also found that the countries which undershoot the target, their speed of adjustment process is almost twice as compare to the countries which are overshoot the target.

Roger and Stone (2005) concluded that the deviations of the inflation from target levels were due to a mix of domestic and external shocks. The most common shocks were shifts in capital inflows, changes in world fuel prices, domestic shocks like changes in fiscal and monetary policies, domestic food supply, and some country-specific developments. After the financial crisis in the 1990s, many emerging economies also adopted IT. In econometric work on Pakistan, Akbari and Rankaduwa (2006) estimate an output-inflation trade-off model and find out that "a 1% decline in inflation rate caused by a permanent reduction in monetary growth rate would result in a cumulative output gross domestic product (GDP) decline of 0.87% below its potential level if monetary policy were to target the inflation rate of 3.4%, the resulting cumulative decline in output below its potential level (trend) would be about 5.1%" (Akbari and Rankaduwa, 2006, p.185). Khalid (2006) analysed the IT policy of emerging countries and then the discussion and analysis of the study focused on IT as a choice of policy regime for Pakistan. While in a report by the Treasury and FX Group 2007, it is argued that it is difficult to implement IT policy in country like Pakistan where consumer price index (CPI) remains inelastic with respect to money supply and there is a greater chance that IT would have a negative impact on output growth. In this regard, Qayyum (2008) also pointed out the importance of the money supply in controlling inflation in Pakistan. Felipe (2009) argued based on the theoretical foundations of IT model for Pakistan economy that SBP should take into consideration a number of issues before makes a final decision whether shift or not to IT policy, even though Pakistan meets the basic requirements to implement some version of the IT policy. He also identified the main three reasons which are main hurdles to implement the IT policy in Pakistan such as "(1) Lack of constancy of money demand function, (2) inflation is a demand –pull phenomenon based on theoretical model of IT which is not true in case of Pakistan and, (3) the empirical level, researchers have failed to estimate the NAIRU properly even in case of US, for Pakistan economy it is hard to understand the meaning of a trade-off between inflation and unemployment where underemployment in the agricultural and urban informal sectors coexist with the formal economy but without a clear boundary." Another study by Saleem (2010) pointed out that in Pakistan price stability can be achieved through interest rate channel. He also found a negative relationship between GDP growth and inflation which makes the strong case for IT policy and recommend that Pakistan should adopt flexible IT policy. But Arif (2011) pointed out that "Central Banks cannot control inflation directly with the instruments at their disposal, such as interest rate and reserve requirements. Instead, they need to assess the various channels by which monetary policy affects prices and output in the economy – The transmission mechanism - The transmission mechanism of monetary policy is concerned with the relationships between changes in the supply of money and the level of real income (output). There are several channels through which changes in money supply affects output. The relative strength of these channels varies from country to country depending on the state of its financial markets. In Pakistan, the traditional interest rate channel accounts for more than 40% of the output effect after 2 years. The empirical findings of a study on the subject also points towards a role of banks through lending to private sector which affects aggregate spending" (Arif, 2011. p. 57-58). Similar study conducted by Rizvi et al. (2012) and found that there are no causal

relationship between inflation and interest rate in case of Pakistan and concluded that the interest rate plays no role in determining inflation directly in Pakistan, however, it can impact inflation through the money supply channel. Overall they concluded that Pakistan is not yet ready to adopt the IT policy in this scenario.

3. METHODOLOGY AND DATA SOURCES

Almost 21 countries in the world have adopted IT policy. The policy is aimed at reducing the gap between the targeted inflation and the actual level of inflation. Pakistan still stands away from the list and is not included in the countries which explicitly adopt IT policy.

3.1. Methodology

We employ reduced form vector auto regression (VAR) approach, introduced by Christopher Sims in 1980, to gauge the effect of domestic and exogenous shocks on the deviation of targeted inflation from actual inflation in Pakistan.

3.1.1. VAR analysis

A VAR, which provide a systematic way to capture a rich dynamics of multiple time series, is a simple linear model with n-equations and variables. The most important advantage of using the VAR methodology is that in VAR no need to be distinguished the endogenous and exogenous variables in the model and system of equations estimated in VAR simultaneously. Similarly in a reduced form VAR each variable express as a linear function of its own past values, the past values of all of other variables used in the model and a serially uncorrelated error term. So the reported results in VAR analysis are come from the forecast error variance decompositions and impulse responses.

3.1.2. Impulse responses

Impulse response represents the response of current and future values of each of the variables in the estimations to a one-unit increase in the current value of one of the VAR errors assuming that this error returns to zero in following periods and all other errors are equal to zero. But, this is more implemented when the errors are uncorrelated across equations making, impulse responses useful, for recursive and structural VARs.

3.1.3. Forecast error variance decomposition

The percentage of the variance of the error when forecasting a variable in the result of the occurrence of a specific shock at a given time period is called forecast error variance decomposition and it is same like as just partial R^2 for forecast error. So in other words, by the method of variance decomposition we can find out that how much a variable is affected by the fluctuations in different shocks which occur at different time horizon (Stock and Waston 2001).

In this work, a five-variable system is developed for estimation namely government credit from SBP, deviation of inflation from its targeted level (inflation gap), money supply, real effective exchange rate, and world crude oil prices denoted by i_t, g_t, m_t, r_t, w_t respectively wherein government credit from SBP and money supply represent domestic shocks while real effective exchange rate and world crude oil prices are exogenous shocks. These shocks are assumed to be mutually uncorrelated so the impact of each shock can be examined individually.

3.1.4. Basic model

The steps involved in the construction of basic model are given as follows:

Let,

$$X_t = A(L)\,X_{t-1} + U_t \tag{1}$$

Where, X_t is the 5 × 1 vector of endogenous variables i.e., $X_t \equiv [i_t, g_t, m_t, r_t, w_t]$, A (L) is 5 × 5 matrix of lag polynomials and U_t is the 5 × 1 vector of reduced form innovations so U^*_t is $\equiv [u^i_t, u^g_t, u^m_t, u^r_t, u^w_t]$. The residuals are independently and identically distributed with variance covariance matrix $E(U_t U^*_t) = \Sigma$. Therefore, the relationship between reduced form and structural shocks can be defined in AB-model as following:

$$AU_t = BV_t \tag{2}$$

Where, V_t are structural shocks and A and B are 5 × 5 matrices depicting immediate relationship between variables and linear relationship between structural shocks and reduced form innovations respectively. Consequently, structural form of VAR from the reduced form VAR can be obtained by pre multiplying Equation (1) with A as,

$$AX_t = AA(L)\,X_{t-1} + AU_t \tag{3}$$

Resultantly,

$$AX_t = AA(L)\,X_{t-1} + BV_t \tag{4}$$

With the lag length equals to one, Equation (4) takes the following form:

$$\begin{pmatrix} 1 & \alpha_{12} & -\alpha_{13} & -\alpha_{14} & -\alpha_{15} \\ -\alpha_{21} & 1 & -\alpha_{23} & -\alpha_{24} & -\alpha_{25} \\ -\alpha_{31} & -\alpha_{32} & 1 & -\alpha_{34} & -\alpha_{35} \\ -\alpha_{41} & -\alpha_{42} & -\alpha_{43} & 1 & -\alpha_{45} \\ -\alpha_{51} & -\alpha_{52} & -\alpha_{53} & -\alpha_{54} & 1 \end{pmatrix} \begin{pmatrix} i_t \\ g_t \\ m_t \\ r_t \\ w_t \end{pmatrix} =$$

$$\begin{pmatrix} d_{11} & d_{12} & d_{13} & d_{14} & d_{15} \\ d_{21} & d_{22} & d_{23} & d_{24} & d_{25} \\ d_{31} & d_{32} & d_{33} & d_{34} & d_{35} \\ d_{41} & d_{42} & d_{43} & d_{44} & d_{45} \\ d_{51} & d_{52} & d_{53} & d_{54} & d_{55} \end{pmatrix} \begin{pmatrix} i_{t-1} \\ g_{t-1} \\ m_{t-1} \\ r_{t-1} \\ w_{t-1} \end{pmatrix} +$$

$$\begin{pmatrix} 1 & b_{12} & b_{13} & b_{14} & b_{15} \\ b_{21} & 1 & b_{23} & b_{24} & b_{25} \\ b_{31} & b_{32} & 1 & b_{34} & b_{35} \\ b_{41} & b_{42} & b_{43} & 1 & b_{45} \\ b_{51} & b_{52} & b_{53} & b_{54} & 1 \end{pmatrix} \begin{pmatrix} u^i_t \\ u^g_t \\ u^m_t \\ u^r_t \\ u^w_t \end{pmatrix}$$

Solving Equation (4) for X_t yields,

$$X_t = A^{-1}A(L)\,X_{t-1} + A^{-1}BV_t \quad (5)$$

$$\begin{pmatrix} i_t \\ g_t \\ m_t \\ r_t \\ w_t \end{pmatrix} \begin{pmatrix} 1 & \alpha_{12} & -\alpha_{13} & -\alpha_{14} & -\alpha_{15} \\ -\alpha_{21} & 1 & -\alpha_{23} & -\alpha_{24} & -\alpha_{25} \\ -\alpha_{31} & -\alpha_{32} & 1 & -\alpha_{34} & -\alpha_{35} \\ -\alpha_{41} & -\alpha_{42} & -\alpha_{43} & 1 & -\alpha_{45} \\ -\alpha_{51} & -\alpha_{52} & -\alpha_{53} & -\alpha_{54} & 1 \end{pmatrix} =$$

$$\begin{pmatrix} d_{11} & d_{12} & d_{13} & d_{14} & d_{15} \\ d_{21} & d_{22} & d_{23} & d_{24} & d_{25} \\ d_{31} & d_{32} & d_{33} & d_{34} & d_{35} \\ d_{41} & d_{42} & d_{43} & d_{44} & d_{45} \\ d_{51} & d_{52} & d_{53} & d_{54} & d_{55} \end{pmatrix} \begin{pmatrix} i_{t-1} \\ g_{t-1} \\ m_{t-1} \\ r_{t-1} \\ w_{t-1} \end{pmatrix} +$$

$$\begin{pmatrix} 1 & \alpha_{12} & -\alpha_{13} & -\alpha_{14} & -\alpha_{15} \\ -\alpha_{21} & 1 & -\alpha_{23} & -\alpha_{24} & -\alpha_{25} \\ -\alpha_{31} & -\alpha_{32} & 1 & -\alpha_{34} & -\alpha_{35} \\ -\alpha_{41} & -\alpha_{42} & -\alpha_{43} & 1 & -\alpha_{45} \\ -\alpha_{51} & -\alpha_{52} & -\alpha_{53} & -\alpha_{54} & 1 \end{pmatrix}^{-1} \begin{pmatrix} 1 & b_{12} & b_{13} & b_{14} & b_{15} \\ b_{21} & 1 & b_{23} & b_{24} & b_{25} \\ b_{31} & b_{32} & 1 & b_{34} & b_{35} \\ b_{41} & b_{42} & b_{43} & 1 & b_{45} \\ b_{51} & b_{52} & b_{53} & b_{54} & 1 \end{pmatrix} \begin{pmatrix} u_t^i \\ u_t^g \\ u_t^m \\ u_t^r \\ u_t^w \end{pmatrix}$$

Equation (5) can be written in abbreviated form as:

$$X_t = C(L)\,X_{t-1} + \varepsilon_t \quad (6)$$

Where $C(L) = A^{-1}A(L)$ and $\varepsilon_t = A^{-1}BV_t$

$$\begin{pmatrix} \varepsilon_t^i \\ \varepsilon_t^g \\ \varepsilon_t^m \\ \varepsilon_t^r \\ \varepsilon_t^w \end{pmatrix} = \begin{pmatrix} 1 & \alpha_{12} & -\alpha_{13} & -\alpha_{14} & -\alpha_{15} \\ -\alpha_{21} & 1 & -\alpha_{23} & -\alpha_{24} & -\alpha_{25} \\ -\alpha_{31} & -\alpha_{32} & 1 & -\alpha_{34} & -\alpha_{35} \\ -\alpha_{41} & -\alpha_{42} & -\alpha_{43} & 1 & -\alpha_{45} \\ -\alpha_{51} & -\alpha_{52} & -\alpha_{53} & -\alpha_{54} & 1 \end{pmatrix}^{-1}$$

$$\begin{pmatrix} 1 & b_{12} & b_{13} & b_{14} & b_{15} \\ b_{21} & 1 & b_{23} & b_{24} & b_{25} \\ b_{31} & b_{32} & 1 & b_{34} & b_{35} \\ b_{41} & b_{42} & b_{43} & 1 & b_{45} \\ b_{51} & b_{52} & b_{53} & b_{54} & 1 \end{pmatrix} \begin{pmatrix} u_t^i \\ u_t^g \\ u_t^m \\ u_t^r \\ u_t^w \end{pmatrix}$$

The above Equation (6) is a form of autoregressive representation model in the sense that not only each variable is a function of its own past values as well as also function of other variables in the system which leads to present a linear combination of structural innovations of that reduced form innovations.

3.2. Data Sources

The analysis is carried out using quarterly data for the period 1991Q1-2007Q4 for inflation gap (the difference between targeted and actual inflation), government's borrowing from State Bank, real effective exchange rate, money supply and world oil price shocks. Data for GDP has been used as a ratio to government borrowing from State Bank. CPI and M2 are used as the proxy for inflation and money supply respectively. All the variables are used in logarithmic form. Data for all variables are been taken from international financial statistic except the IT s. IT series is converted from yearly basis into quarters because the yearly data of ITs were not enough for proper estimation results as it is only available from 1990s in the Economic Surveys of Pakistan.

4. ESTIMATION AND RESULTS

ADF test is employed to confirm the stationarity of the data and the results are reported in Table 1.

According to the last column of Table 1, results of ADF test shows that all the variables are integrated of order one, it means all the series are stationary at their first difference and all the series are non-stationary at their level.

4.1. Results

Figure 1a depicts the response of inflation gap to the one standard deviation in inflation gap itself. As is evident from the Figure 1a, response of inflation gap to its own one standard deviation positive shock is negative indicating that error correction mechanism is working in the model and model is stable. The results are further suggestive that shocks in inflation gap do not create permanent deviation between actual and targeted level of inflation and the effect is neutralized after the 4th quarter. The temporary effect of inflation gap shock can be justified on the premise that government sets its target rate of inflation keeping in view of the past behavior of inflation. The effect of the shock in inflation gap would be eliminated and the deviation from IT will come back to its original position after 9th quarter.

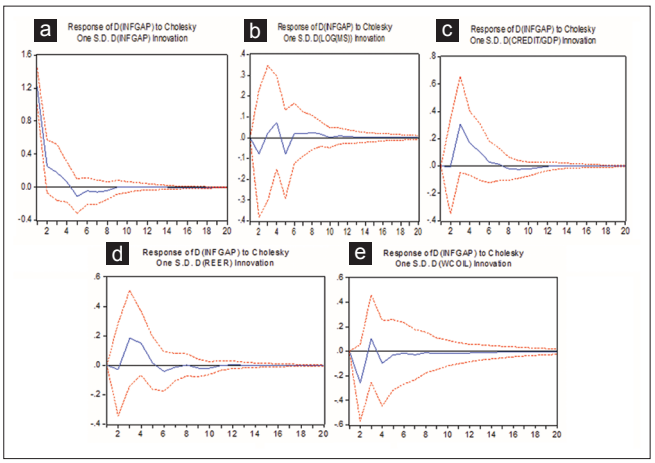
The response of inflation gap to one standard deviation shock in money supply is illustrated in Figure 1b. One time shock in money supply produces fluctuating response in inflation gap. After a sharp decline during first quarter following the shock, inflation gap increases for two successive quarters and then again a sharp decline is observed for the next quarter. However, the effect is neutralized in 10th quarter after experiencing a slight increase in inflation gap. A plausible explanation for this behavior may be the corresponding counter cyclical interest rate policy implemented by SBP in face of any change in money supply. The increased inflation gap in second quarter can be explained in context of the Taylor rule where lower interest rate, through the channel of increased money demand, would result in the higher inflation in the economy. The SBP sets its rate of interest according to inflation and output gap. So, amid negative inflation gaps SBP will set the interest rate at very lower level which in turn can result in increased money demand. The people consume more which leads to the higher inflation in the economy (Malik

Table 1: ADF unit root test

Variables	Level		First difference		Conclusion
	t-statistics	*P* value	*t*-statistics	*P* value*	
i_t	−2.231284	0.1975	−6.413006	0.0000	I (1)
g_t	−0.923343	0.7749	−7.133561	0.0000	I (1)
m_t	−0.865062	0.7934	−7.148216	0.0000	I (1)
r_t	−1.792902	0.3809	−8.279161	0.0000	I (1)
w_t	2.848048	1.0000	−5.044004	0.0001	I (1)

*Significant at 1% level of significance. ADF: Augmented Dickey-fuller

Figure 1: (a) Response of D(INFGAP) to Cholesky one S.D. D(INFGAP) innovation, (b) response of D(INFGAP) to Cholesky one S.D. D(LOG(MS)) innovation, (c) response of D(INFGAP) to Cholesky one S.D. D(CREDIT/GDP) innovation, (d) response of D(INFGAP) to Cholesky one S.D. D(REER) innovation, (e) response of D(INFGAP) to Cholesky one S.D. D(WCOIL) innovation



and Ahmed, 2010; Ahmad and Malik, 2011). Augmented Phillip's curve provides plausible explanation for a decrease in inflation gap after 4th quarter. Peoples will expect higher wage rate if they anticipate that expected inflation to occur in the economy. So peoples would anticipate inflation and account for it. As is evident from Figure 1b, the inflation gap again starts to increase after the 6th quarter. So, despite of higher ITs, SBP is unable to control inflation resulting in actual inflation higher than the targeted inflation (positive gap) till the 9th quarter. According to moderate monetarists, the short run and long run behave of the economy may be somewhat different in the sense that in the short-run when inflation once the injected in the system people will begun to anticipate it and output grows less than inflation which neutralizing the effect of the shock in money supply in the 10th quarter. So it means in the short-run any increase in money supply lead to a rise in the aggregate demand which lead to generate the more employment in the economy.

Figure 1c illustrates the response of inflation gap to one standard deviation shock in credit to government or government borrowing from the State Bank. At the beginning, when government borrows from State Bank, no deviation in the inflation from its targeted level is observed. Because, as government has budget deficit it borrows from State Bank and State Bank has to print new money to fulfill the requirement of government expenditures but this money does not immediately affect the economy. So, after 2nd quarter actual inflation starts increasing generating the positive gap between actual and targeted inflation and reaches at the peak till the 3rd quarter indicating a direct and positive relationship between inflation and government borrowing from SBP (Arby, 2006). These results of our study are also concurrence with Agha and Khan (2006) concluding that inflation in Pakistan is significantly affected by the sources of financing the budget deficit especially by government borrowing from State Bank. After the 3rd quarter the inflation gap starts decreasing and this trend continues till the 7th quarter. This decline in inflation can be an outcome of tight monetary policy where State Bank, may sell the security bonds or T-bills. At the start of the 8th quarter, inflation gap registers a negative trend which may be due to the higher targets set by the government as it is the start of the fiscal year. Finally the effect of this credit shock seems to be neutralized in the 12th quarter.

The response of inflation gap to one standard deviation in real effective exchange rate is depicted in Figure 1d. As is evident, inflation gap is seen to declines slightly in the first quarter. However, a sharp increase is documented in the second quarter. Plausibly, imports become expensive and exports are cheaper for foreigners when domestic currency depreciates. Increased exports earnings generate increased aggregate demand which may lead to high inflation. The effect of the shock would be completely neutralized in the 11th quarter.

The inflation gap, in response to a shock in world oil prices is depicted in Figure 1e, which declines in the 1st quarter as the shock in world oil prices is unanticipated. At the end of the 1st quarter, however, the inflation gap starts increasing and this increase continues till the 3rd quarter. This trend may be explained in terms that world oil prices starts affecting the level of actual inflation amid monetary aggregates rules, to increase the employment and output in the country the role of central bank is to counter the shock by decreasing the nominal interest rate (or enhance the money supply) which leads to decrease the financing cost for the firm. However, a significant monetary insertion require for lowering the nominal interest rate which leads to increase the current and future inflation in the economy (Leduc and Sill, 2001). After the 12th quarter the effect of the world oil prices is neutralized.

From the results of the above mention five shocks it is evident that the main factors that cause fluctuations in the actual level of inflation from its targeted level are the credit to government, world oil prices and real effective exchange rate. On the other hand, money supply is found to cause greater fluctuations in the inflation gap. Furthermore, the results of the variance decomposition of inflation gap reported in Table 2 which also shows that money supply does not affect inflation gap directly but it contributes to inflation gap very significantly through the channels of real effective exchange rate and credit to government.

The results of the variance decomposition of inflation gap reported in Table 2 are suggestive that government credit from State Bank has much significant contribution to the standard error of inflation gap (6.8%). World crude oil prices and real effective exchange rate are contributing 4.5% and 3% respectively. While money supply has not much significant effect in the increase in inflation gap as it contributes only 1% in the variance decomposition of inflation gap. (In impulse response function results we report the other way round) The decomposition of credit from State Bank is showing the significant contribution of money supply as about 7% of the forecast error in credit is explained by money supply. Further the variance decomposition of world crude oil prices is confirmatory to the strong relationship between real effective exchange rate and world oil prices as real effective exchange rate is contributing 15.3% to the forecast

Table 2: Variance decomposition of the variables

Period	S.E.	D (INFGAP)	D (LOG (MS))	D (CREDIT/GDP)	D (REER)	D (WCOIL)
Variance decomposition of D (INFGAP)						
1	1.220097	100.0000	0.000000	0.000000	0.000000	0.000000
2	1.275701	95.47952	0.367946	0.001772	0.051042	4.099113
3	1.352481	86.68570	0.354309	5.099852	1.896635	4.227940
4	1.384320	82.94756	0.618409	6.337780	2.983749	4.526204
5	1.395350	82.24922	0.923102	6.800951	2.949204	4.500308
6	1.399813	81.82685	0.941111	6.801600	3.020329	4.484228
7	1.401551	81.78516	0.956393	6.792375	3.021425	4.513296
8	1.402564	81.75336	0.986479	6.803148	3.017318	4.512495
9	1.403174	81.68222	1.001715	6.827951	3.033628	4.529521
10	1.403567	81.63687	1.001162	6.848492	3.051023	4.538840
Variance decomposition of D (CREDIT/GDP)						
1	0.014538	3.914711	3.389983	92.69531	0.000000	0.000000
2	0.014832	4.411765	4.875810	90.31703	0.038177	0.153225
3	0.015269	5.168886	6.494299	86.75429	0.056752	0.319474
4	0.015367	5.132080	6.806662	85.81626	0.438502	0.327591
5	0.015523	5.080765	6.750541	84.76735	0.891159	1.056268
6	0.015597	5.115480	6.725044	84.24135	0.971597	1.447654
7	0.015660	5.209030	6.823591	83.59135	0.963762	1.685965
8	0.015693	5.213608	6.822231	83.24366	0.968454	1.866361
9	0.015723	5.193709	6.801107	82.92280	0.966596	2.007007
10	0.015744	5.182761	6.787558	82.70231	0.964357	2.107617
Variance decomposition of D (LOG (MS))						
1	0.116198	1.462105	98.53790	0.000000	0.000000	0.000000
2	0.126002	2.037576	84.04736	1.019582	1.999072	1.054135
3	0.140821	1.895167	67.52328	7.779693	1.652023	6.697213
4	0.145817	2.256644	63.36844	7.501425	4.501290	8.366659
5	0.146944	2.266133	62.91872	7.498068	4.437274	8.241113
6	0.148966	2.215911	61.71391	7.491897	5.601274	8.444426
7	0.149418	2.333867	61.35501	7.447227	5.581204	8.676080
8	0.150004	2.316993	60.87833	7.395187	5.881514	8.700360
9	0.150159	2.340805	60.76539	7.379984	5.878124	8.770612
10	0.150344	2.378016	60.66661	7.362502	5.909025	8.815467
Variance decomposition of D (WCOIL)						
1	143.0924	0.088614	1.562540	1.990163	3.578545	92.78014
2	162.1149	0.962873	6.117087	1.642945	18.52386	72.39185
3	176.9978	4.315312	13.52506	1.499382	17.00938	61.97792
4	187.4571	3.894307	12.30454	1.750532	17.40597	62.63349
5	196.8410	3.648302	11.48114	2.059086	15.85891	60.94160
6	201.7376	3.703818	11.09022	1.969853	16.22948	59.32014
7	204.8480	3.674273	10.96647	1.925944	15.80552	58.69825
8	207.9239	3.707228	10.88833	1.870383	15.54271	58.22741
9	209.2947	3.727222	10.80248	1.847193	15.42158	57.98883
10	210.2715	3.740560	10.74087	1.836788	15.36460	57.77038
Variance decomposition of D (REER)						
1	3.103840	0.730422	5.026397	1.840379	92.40280	0.000000
2	3.121816	1.544087	4.970212	2.046558	91.36129	0.075365
3	3.433328	1.392190	9.238568	1.887050	85.13332	2.306428
4	3.451242	1.551500	9.174075	1.876884	84.89324	2.287685
5	3.499295	1.848828	9.094762	1.954434	84.24087	2.228328
6	3.519575	1.828375	8.991555	1.956279	83.46236	2.869801
7	3.529151	1.830657	9.046954	1.957014	83.18587	2.969878
8	3.531989	1.832329	9.061759	1.988798	83.08857	2.965457
9	3.533569	1.845812	9.057308	1.987134	83.01765	2.995064
10	3.536042	1.864035	9.045849	1.988413	82.90688	3.054781

error. On the other hand, the variance decomposition of real effective exchange rate is suggestive that 9% of the forecast error in real effective exchange rate is explained by money supply. It is, therefore, evident from the Table 2 that money supply does not affect inflation gap directly but it contributes to inflation gap very significantly through the channels of real effective exchange rate and credit to government.

5. CONCLUSION AND POLICY RECOMMENDATIONS

In Pakistan's history, fluctuations in inflation have always been a matter of concern. Now a day, Pakistan is working with the policy of monetary aggregate targeting. According to this policy, SBP controls the inflation through monetary aggregates. But, it had

never been able to achieve its target of inflation throughout the history except in 2006 keeping the debates alive about inflation in Pakistan being a monetary phenomenon or a fiscal?

The literature on IT and the existing inflation gaps suggest that to perceiving the relationship between other macroeconomic variables and exchange rate will be supportive not only in evaluating the economic policies but also helpful in making these policies target for future.

The results derived from the Impulse responses show that inflation gap, in Pakistan, decays at lower rate against the world oil prices and government borrowing from SBP. The findings from forecast error decomposition are indicative that money supply affects the inflation gap significantly through the government credit. World oil prices have also strong effect on inflation gap but as it is an exogenous shock, government cannot control it by any means. Based on the findings from this study, we conclude that government borrowing from SBP has the stronger impact on deviation of actual inflation from target one in Pakistan.

Therefore, the government should focus on the fiscal side determinants of inflation. It is recommended that policy should be diverted to IT as there is no mixing of policies in IT. Further it is suggested that government should reduce its reliance on State Bank to finance its budget deficit rather it should use other sources of financing like borrowing from commercial banks and external borrowing.

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