©*The Pakistan Development Review*
49:4 Part II (Winter 2010) pp. 449–460

The Price Puzzle and Monetary Policy Transmission Mechanism in Pakistan: Structural Vector Autoregressive Approach

MUHAMMAD JAVID and KASHIF MUNIR

1. INTRODUCTION

The prime objective of economic policies is to increase the welfare of the general public and the monetary policy supports this broad objective by focusing its efforts to promote price stability. The growing importance of monetary policy stabilisation efforts may reflect both political and economic realities. Understanding the transmission mechanism of monetary policy to inflation and other real economic variables is imperative for central bankers to conduct monetary policy effectively. High inflation reduces growth by reducing investment and productivity growth which reduces the welfare, gives a theoretical foundation for the choice of price stability as an objective of monetary policy. These arguments about monetary policy objectives lead to the choice of price stability as the single or primary objective of monetary policy. Monetary policy is one of the important tools with the monetary authorities to achieve the objectives of price stability. There is extensive theoretical as well as empirical literature available on the effects of monetary policy shocks on the real economic aggregates and prices.

A tightening of monetary policy generally is expected to reduce the output and prices. The feedback of prices to a monetary policy shock is sometimes contrary to the conventional views of monetary policy transmission mechanism, known as price puzzle. According to the conventional views of monetary transmission mechanism, tight monetary policy is associated with a fall in the money supply and output. However, the monetary tightening is associated with an increase in the price level rather than decrease [Sims (1992)].

In the literature, numbers of explanations are available for price puzzle. To resolve the price puzzle, Sims (1992) proposed introduction of the commodity prices and Giordani (2004) suggested adding the potential output. Sims (1992) proposed that price puzzle might be due the fact that interest rate innovations partially reflect inflationary pressure that lead to price increases and introduction of commodity price index in the VAR appears to capture enough additional information about future

Muhammad Javid <javid@pide.org.pk> is Research Economist and Kashif Munir <kashif@pide.org.pk> is Staff Economist at Pakistan Institute of Development Economics respectively.

inflation. So the introduction of the commodity price may resolve the price puzzle. Sims, (1992) and Grilli and Roubini, (1995) provided the evidence that this explanation of the price puzzle might also explain the exchange rate puzzle. Sims and Zha (1995) proposed structural VAR approach with contemporaneous restrictions that includes variables proxying for expected inflation. Castelnuovo, *et al.* (2010) proposed that the positive response of prices to a monetary policy shock is associated with a weak interest rate response to inflation. Krusec (2010) argue that imposing the long run restrictions in the cointegrated structural VAR framework can resolve the price puzzle. The advantage of long-run identification is that there is no need for additional variables besides prices, interest rate and output. Sims and Zha (2006) suggest that change in the systematic component of monetary policy have not allowed reduction in inflation or output variance without substantial costs. Inclusion of commodity prices resolves the price puzzle because they contain information that helps the Federal Reserve to forecast inflation [Hanson (2004)].

Pakistan is facing unprecedented high inflation and SBP has been using tight monetary policy to curb inflation. SBP use monetary aggregates (M2) as intermediate target in accordance with real GDP growth and inflation targets set by the Government. The selection of M2 as intermediate target to control inflation, based on two key assumptions that the demand for M2 function is stable and it has strong association with the rate of inflation [Qayyum (2008)]. Since 2005 SBP has been pursuing tight monetary policy to control inflation and the monetary authority mainly relay on interest rate channel. This brings to fore the question of effectiveness of the interest rate channel of the transmission mechanism. However, in case of developing countries including Pakistan the monetary policy actions transmit its affect on macroeconomic variables with a considerable lag and with high degree of volatility and uncertainty. Agha, *et al.* (2005) argue that monetary tightening in Pakistan leads first to a fall in domestic demand, primarily investment demand financed by bank lending, which translates into a gradual reduction in price pressures that eventually reduces the overall price level with a significant lag. The VAR modeling with Cholesky decomposition has been used in this study.

Interest rate and rate of inflation in Pakistan are rising during current decade and they have strong positive correlation. If rise in interest rate follows rise in price then we face price puzzle. The movements of interest rate and inflation can be depicted in Figure 1 which shows a positive relationship between discount rate and inflation although a number of other factors were at play. In Table 1, the coefficient of correlation between inflation and discount rate, 6-month treasure bill rate, call money rate is 0.34, 0.46 and 0.48 respectively over the period of full sample from 1991M1 to 2010M8. As it can be seen form Table 2 the coefficient of correlation between inflation and different measure of interest rate is much higher over the sub sample period from 2005:M1 to 2010: M8. The coefficients of correlation between inflation and discount rate, 6-month treasure bill rate, call money rate is 0.74, 0.65 and 0.67 respectively for the period 2005:M1 to 2010:M8. It implies that raising the interest rate in recent years has little impact on dampening inflation rather than it pushes up inflation.

Table 1

Correlation between Inflation and Different measure of Interest Rate (1991M1 to 2010M8)

	INF	R	TB6	CMR	ER	M2G
INF	1.00	0.34	0.46	0.48	0.03	0.03
R	0.34	1.00	0.81	0.59	–0.23	–0.22
TB6	0.46	0.81	1.00	0.73	–0.28	–0.03
CMR	0.48	0.59	0.73	1.00	0.00	–0.12
ER	0.03	–0.23	–0.28	0.00	1.00	–0.45
M2G	0.03	–0.22	–0.03	–0.12	–0.45	1.00

Table 2

Correlation between Inflation and Different measure of Interest Rate (2005M1 to 2010M8)

	INF	R	TB6	CMR	ER	M2G
INF	1.00	0.74	0.65	0.67	0.56	–0.70
R	0.74	1.00	0.95	0.78	0.89	–0.85
TB6	0.65	0.95	1.00	0.83	0.89	–0.79
CMR	0.67	0.78	0.83	1.00	0.72	–0.72
ER	0.56	0.89	0.89	0.72	1.00	–0.72
M2G	–0.70	–0.85	–0.79	–0.72	–0.72	1.00

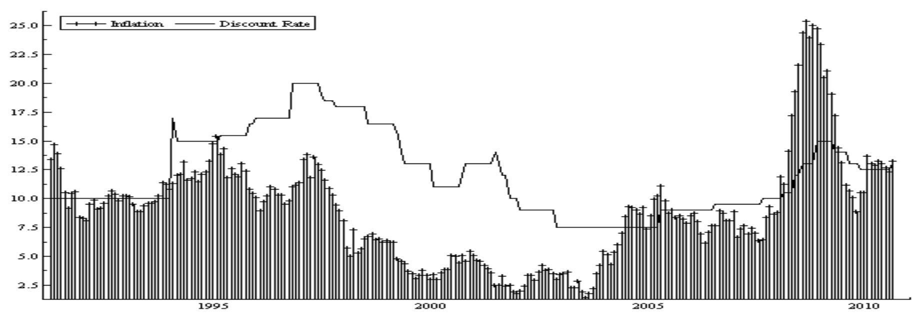

Fig. 1. Inflation and Interest Rate (1990: M1 to 2010:M8)

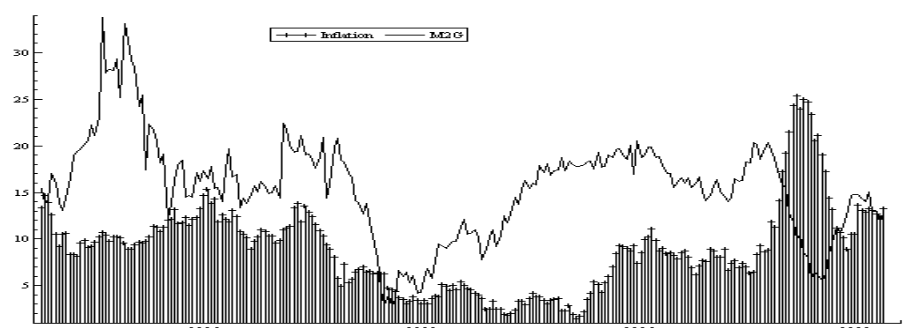

Fig. 2. Inflation and M2 growth (1990: M1 to 2010: M08)

Qayyum (2008) and Omer and Saqib (2008) analyse the performance of monetary targeting in Pakistan. Since 1991 most of the time M2 growth remains higher than the target rate of money growth set by the SBP to control inflation. Qayyum (2008) also argued that positive deviation of money growth from target level is indication for higher inflation in future. Similarly Omer and Saqib (2008) study suggests that that income velocity of money is not stable in Pakistan and suggest that monetary authority in Pakistan should rethink on monetary targeting strategy in Pakistan. It is argued in *PIDE Monetary Policy Viewpoint* (2010) that a tight monetary policy stance through increase in the discount rate serves little purpose in the current conditions.

In the light of above mentioned facts, this study presents an empirical analysis of the relationship between the interest rate, inflation and exchange rate in Pakistan. The objective of this study is to examine the effects of tight monetary policy on price level and other macroeconomic variables such as output, exchange rate and money supply within the structural VAR frameworks. Monthly data on consumer price index, Monetary aggregate (M2), Industrial production, world oil price and nominal exchange rate has been used over the period 1992: M1 to 2010:M08. All the variables are used in logarithmic form except interest rate. Data are taken from International financial statistics.

The outcome of the study will provide useful insight into the monetary policy transmission mechanism and will help the policy-makers to address the issue of monetary policy effectiveness.

The remainder of the study organised in the following manner. Model specification and econometrics technique used for estimation are described in Section 2. Empirical results are presented in Section 3. Section 4 contains concluding remarks and policy recommendations.

2. METHODOLOGY: STRUCTURAL VAR MODELING

We assume the economy is described by a structural form equation

$$G(L)\, y_t = e_t \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (1)$$

where $G(L)$ is a matrix polynomial in the lag operator L, y_t is an $n\times1$ data vector, and e_t is an $n\times1$ structural disturbances vector. e_t is serially uncorrelated and var(e_t) $=\Lambda$ and Λ is a diagonal matrix where diagonal elements are the variances of structural disturbances; therefore, structural disturbances are assumed to be mutually uncorrelated.

We can estimate a reduced form equation (VAR)

$$y_t = B(L)\, y_t + u_t \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (2)$$

where $B(L)$ is a matrix polynomial (without the constant term) in lag operator L and var(u_t) = $\sum$.

A popular and convenient method is to orthogonalise reduced form disturbances by Cholesky decomposition as in Sims (1980). However, in this approach to identification, we can assume only a recursive structure. The innovations in Choleski decomposition do not have a direct economic interpretation [Enders (2004)]. Blanchard and Watson (1986), Bernanke (1986), and Sims (1986) suggest modelling the innovations using economic analysis. A structural model (SVAR) in which non- recursive structures are allowed and specifies a set of restrictions only on contemporaneous structural parameters.

Let G_0 be the coefficient matrix (non-singular) on L^0 in $G(L)$, that is, the contemporaneous coefficient matrix in the structural form, and let $G^0(L)$ be the coefficient matrix in $G(L)$ without contemporaneous coefficient G_0. That is

$$G(L) = G_0 + G^0(L) \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (3)$$

Then, the parameter in the structural form equation and those in the reduced form equation are related by

$$B(L) = -G_0^{-1} G^0(L) \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (4)$$

In addition, the structural disturbances and the reduced form residuals are related by $et = G_0 u_t$, which implies

$$\sum = G_0^{-1} \Lambda G_0^{-1} \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (5)$$

Maximum likelihood estimates of Λ and G_0 can be obtained only through sample estimates of $\sum$. The right hand side of Equation (5) has n×(n+1) free parameter to be estimated. Since $\sum$ contains $n\times(n+1)/2$ parameters, we need at least $n\times(n+1)/2$ restrictions. To identify the structural model after normalising n diagonal elements of G_0 to 1, it is necessary to impose $n\times(n-1)/2$ restrictions on G_0. In the VAR modelling with Cholesky decomposition require all elements above the principal diagonal to be zero. However, in the structural VAR approach G_0 can be any structure as it has enough restrictions.

2.1. Identification of Monetary Policy Shocks

The variables included in the study are short term interest rate (R), monetary aggregate as measured by (M2), the consumer price index (CPI), Industrial production index (IP), world price of oil (WOP) and the exchange rate (ER) expressed as units of domestic currency for one unit of U.S. dollar. Short term interest rate (R) is monetary policy instrument and M2 is intermediate target variable. The ultimate targets that monetary authority would like to control are macroeconomic goal variables such as prices and growth. Industrial production is used as proxy for real economic growth. By controlling the intermediate target variable, policy-makers believe that they are influencing the ultimate policy targets in a predictable way. With a monetary aggregate as an intermediate target, the implicit assumption is that, other things being equal, higher rates of growth in the money supply increase the inflation and level of economic activity in the short run. Slower monetary growth rates are associated with lower inflation rates and level of economic activity.

The world price of oil is included in monetary policy reaction function to control the negative supply shock and inflationary pressure. The exchange rate is included in the monetary policy reaction function to capture the effect of interest rate innovations on the exchange rate. Exchange rate is an important channel through which monetary policy affect output and prices. Higher interest rates make domestic financial assets attractive and this induces the appreciation of the domestic currency.

For the restrictions on the contemporaneous structural parameters G_0, we follow the general idea of Sims and Zha (1995) and Kim and Roubini (2000). The following equations summarises our identification scheme based on Equation (5), $e_t = G_0 u_t$

$$\begin{bmatrix} e_{MS} \\ e_{MD} \\ e_{CPI} \\ e_{IP} \\ e_{WOP} \\ e_{ER} \end{bmatrix} = \begin{bmatrix} 1 & g_{12} & 0 & 0 & g_{15} & g_{16} \\ g_{12} & 1 & g_{23} & g_{24} & 0 & 0 \\ 0 & 0 & 1 & g_{34} & g_{35} & 0 \\ 0 & 0 & 0 & 1 & g_{45} & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 \\ g_{61} & g_{62} & g_{63} & g_{64} & g_{65} & 1 \end{bmatrix} \begin{bmatrix} u_R \\ u_M \\ u_{CPI} \\ u_{IP} \\ u_{WOP} \\ u_{ER} \end{bmatrix} \quad \dots \quad \dots \quad \dots \quad (6)$$

There are 16 zero restrictions on the g_{ij} parameters, the system is over identified; with six variables, exact identification requires only $(6^2–6)/2=15$ restrictions.

Where e_{MS},e_{MD} e_{CPI}, e_{IP}, e_{WOP}, e_{ER} are the structural disturbances, that is, money supply shocks, money demand shocks, CPI shocks, IP shocks, WOP shocks, and ER shocks, respectively, and u_R, u_M, u_{CPI}, u_{IP}, u_{WOP}, and u_{ER} are the residuals in the reduced form equations, which represent unexpected movements (given information in the system) of each variable.

The money supply equation is assumed to be the reaction function of the monetary authority, which sets the interest rate after observing the current value of money, the exchange rate and the world price of oil but not the current values of output, and the price level, As in Sims and Zha (1995) and Kim and Roubini (2000), the choice of this monetary policy feedback rule is based on the assumption of information delays that do not allow the monetary policy to respond within the period to price level and output developments. These studies assume that monetary authority cannot observe and react to aggregate output data and aggregate price data within a month.

The demand for real money balances depends on real income and the opportunity cost of holding money—the nominal interest rate. So, in our money demand equation, we exclude (contemporaneously) the world price of oil and the exchange rate. For the other equations, our general assumption is that real activity responds to price and financial signals (interest rates and exchange rates) only with a lag. The interest rates, money, and the exchange rate are assumed not to affect the level of real activity contemporaneously. They are assumed to affect real activity with a one-period lag. While exchange rates will eventually feed through to the domestic CPI. Since oil is a crucial input for most economic sectors, the price of oil is assumed to affect prices and the real sector contemporaneously. Kim and Roubini (2000) proposed that firms do not change their output and price unexpectedly in response to unexpected changes in financial signals or monetary policy within a month due to inertia, adjustment costs and planning delays, but they do in response to those in oil prices following their mark-up rule.

The identifying restriction in the equations for the price of oil takes these variables as being contemporaneously exogenous to any variable in the domestic economy. Since the exchange rate is a forward-looking asset price, we assume that all variables have contemporaneous effects on the exchange rate in this equation.

In summary, the structural shocks are composed of several blocks. The first two equations are money supply and money demand equations which describe money market equilibrium. The next two describe the domestic goods market equilibrium; the fifth and sixth equations represent the exogenous shocks originating from the world economy, and oil price shocks. The last is the arbitrage equation describing exchange rate market.

In Table 3, we report the estimated coefficients. On the basis of Akick Information Criteria (AIC) four 4 lags were used in SVAR estimation.

Table 3

Contemporaneous Coefficient in the Structural Model

	Coefficient	Standard Error
g_{12}	–13.98	86.57
g_{15}	6.85	25.35
g_{16}	–240.17	871.78
g_{21}	–0.011	0.104
g_{23}	0.677	0.35
g_{24}	–0.35	0.04
g_{34}	0.0122	0.005
g_{35}	–0.021	0.005
g_{45}	0.034	0.064
g_{61}	0.575	7.91
g_{62}	9.997	217.06
g_{63}	4.989	123.97
g_{64}	–0.599	11.05
g_{65}	–0.1176	1.35

Likelihood test of over-identifying restriction χ^2 (1) =0.018 [0.8912].[1]

The estimated values of g_{12} and g_{16} are negative implies that the monetary authority increase interest rate when it observes unexpected increases in the monetary aggregates and unexpected exchange rate depreciation. Kim and Roubini (2000) finding support these results. The likelihood ratio test of the over-identifying restriction shows that identifying restrictions are not rejected.

3. THE EFFECT OF MONETARY POLICY SHOCKS

Theoretically tight monetary policy stance implies that rise in interest rate cause fall in monetary aggregate initially and the price level declines with no increase in output level. There is a possibility that output increase or a price level increase after a monetary contraction, but if the monetary contraction is exogenous in the sense that it is independent of any systematic response to any shock such as oil shocks, inflationary pressure, money demand shocks, then almost no theory implies that the output or price level should increase [Kim and Roubini (2000)].

In case of tight monetary policy stance, higher interest rate would put pressure on the exchange rate to appreciate for given expected inflation. However, not all increases in interest rates will be associated with a currency appreciation, if there is an increase in expected inflation, the consequent Fisherian increase in the nominal interest rate would be associated with an impact depreciation of the exchange rate. Therefore, the

[1]Probability are given in the bracket.

response of the exchange rate to an increase in the interest rate will depend on whether it is the nominal or the real interest rate that is increasing.

3.1. Empirical Results

In Figure 3 we display the estimated impulse responses. Figure gives the impulse responses (over 48 months) to a one-standard-deviation positive interest rate shock (i.e., a monetary contraction). In response to interest rate shock initially the money supply rises smoothly over some horizon then falls, Consider now the impulse response of the other variables to the contractionary monetary shock. The monetary contraction leads to a persistent rise in the price level. The rise in the price level is persistent over the full 48 months horizon and this rise is statistically significant over the full horizon.

In Pakistan, combinations of factors have been contributing to push up inflation for last several years. Foremost are, government borrowing from SBP to finance deficit, continuously rising energy and food prices and low policy credibility. These factors are also contributing about high inflation expectations in the future. Energy and other commodity prices work through supply chain. Inflation in Pakistan, in recent year, is largely being driven by supply shocks. This may be the reason that tight monetary policy of the SBP since the period of double digit inflation has so far never meets its target of inflation.

Barth and Ramsey (2000) argued that cost channel is an important part of monetary policy transmission mechanism. As oppose to the conventional views of monetary policy transmission mechanism which focus on the demand side effects-a monetary tightening initially reduces output and then prices, the contrast, the cost channel of monetary transmission stresses that supply side or cost effects might dominate the usual demand side effects and therefore, monetary tightening could be followed by an increase in prices. In this view, a rise in interest rates increases the cost of funds that raises the cost of holding inventories. Accordingly the cost shock pushes up prices.

Consider next the effects on the level of output. The output increase over some horizon following the monetary contraction but continuously falls after initial rise.

We now consider the effects of the monetary policy shocks on the level of the exchange rate. The effect of a monetary contraction (an increase of the domestic interest rate) is a depreciation of the domestic currency relative to the U.S. dollar. This depreciation of the domestic currency following the interest rate shock prolong and persistent over the 48-month of horizon. These results are contradictory with Grilli and Roubini (1995) suggest that a positive interest differential in favour of domestic assets is associated with a persistent appreciation of the domestic currency. Exchange rate is an important channel through which monetary policy affects output and prices. Higher interest rates make domestic financial assets attractive and this induces the appreciation of the domestic currency. But due to the lack of competiveness of the external sector of the economy, domestic currency is continuously in pressure. The rupee has been under constant pressure owing to weaknesses in the external sector as well as high domestic inflation.

We also examined the impulse responses to oil price shocks (Figure 4). In response to oil price shocks, we find a interest rate increase up to 24 month after initial fall, and price increases which is consistent with monetary contraction after an inflationary oil price shock. In conclusion the inclusion of the oil price seems important in identifying monetary policy shocks.

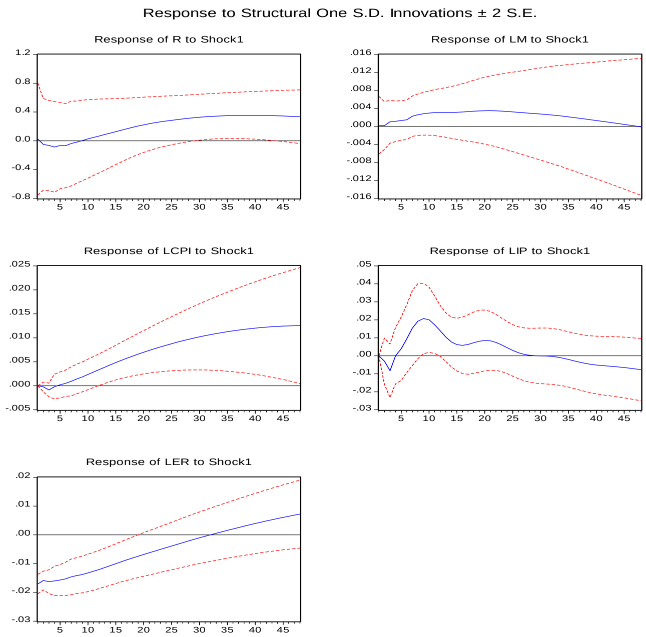

Fig. 3. Impulse Responses to Interest Rate Shocks

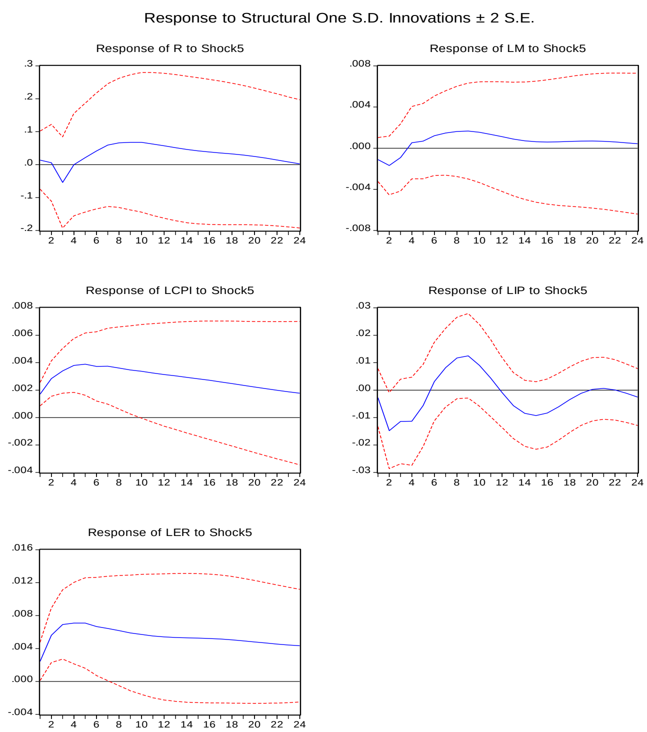

Fig. 4. Impulse Responses to Oil Price Shocks

3.2. Sources of Output and Nominal Exchange Rate Fluctuations

We report the results regarding the sources of output fluctuations and nominal exchange rate fluctuations. In Table 4, we report the forecast error variance decomposition of industrial production and in Table 5 the forecast error variance of nominal exchange rate. First the interest rate shocks' contribution in explaining output fluctuations is about 9 percent at the peak, which implies that monetary policy shocks are not the dominant sources of output fluctuations in Pakistan. This result supports the finding of Kim (1999): monetary policy shocks are not major sources of output fluctuations in G-7 countries. The oil price shocks explain only 4 percent variation in output in a 48-month horizon. This result is contradictory with the finding of Kim and Roubini (2000). One possible justification for this finding is that for a long time there was a subsidy on oil prices in Pakistan. Third, monetary policy shocks explain a very large proportion of exchange rate fluctuations in the short-run. Over 70 percent of nominal exchange rate fluctuations are due to monetary policy shocks at 6-month horizon and 43 percent fluctuation in exchange rate is explained over the six month horizon.

Table 4

Forecast Error Variance of Output

Period	r	lm	lcpi	lwop	ler
12	9.369639	11.34967	1.872975	4.378689	3.791765
24	9.565921	16.48867	5.385525	4.505386	5.20493
36	8.799081	18.38105	8.404445	4.393734	5.860243
48	9.529952	18.52376	10.52516	4.185117	6.102113

Table 5

Forecast Error Variance of Nominal Exchange Rate

Period	r	lm	lcpi
6	73.37099	9.621603	4.117469
12	66.77105	10.60053	9.727755
24	55.44579	10.02899	20.81497
36	46.64165	8.588692	30.8504
37	46.11865	8.484925	31.51996
48	43.15545	8.058522	36.01111

4. CONCLUSION

In this paper we investigate the effects of monetary policy shocks on the prices and other macroeconomic variables within a structural vector autoregressive (SVAR) model approach. Our finding suggests that a positive interest rate shock (contractionary monetary policy) leads to persistent rise in the price level over 48-month horizon. A tightening of monetary policy generally is expected to reduce the price level, not increase it. Results indicate the existence of price puzzle in Pakistan over the period studied. It is also suggested that monetary policy shocks are not the dominant sources of output fluctuations in Pakistan. Tight monetary policy stance through increase in the discount rate serves little purpose in the current conditions. Indeed, it only further squeezes the private sector and discourages private investment which is already facing an extremely difficult situation (*PIDE Monetary Policy Viewpoint*). The results also indicate that monetary contractions in Pakistan over period reviewed associated with persistent depreciation of domestic currency value relative to the U.S. dollar. Supply shock is the major source of inflation in Pakistan, so the only tight monetary policy is not the solution of the problem. Monetisation of fiscal deficit is also contributing factor in inflation, therefore both monetary and fiscal policy should be used to curb the inflation.

REFERENCES

Agha, A. I., A. Noor, A. M. Yasir, and S. Hastam (2005) Transmission Mechanism of Monetary Policy in Pakistan. *SBP-Research Bulletin* 1:1.

Barth, Marvin J. and Valerie A. Ramsey (2000) The Cost Channel of Monetary Transmission National Bureau of Economic Research. (Working Paper 7675).

Bernanke, B. (1986) Alternative Explanations of the Money-income Correlation. In K. Brunner and A. H. Metzler (eds.) *Real Business Cycles, Real Exchange Rates, and Actual Policies*. Carnegie-Rochester Series on Public Policy 25. North-Holland, Amsterdam, pp. 49–99.

Blanchard, O. J. and M. W. Watson (1986) Are Business Cycles All Alike? In R. Gordon (ed.) *The American Business Cycle: Continuity and Change*. Chicago: University of Chicago Press. 123–156.

Castelnuovo, E. and S. Palolo (2010) Monetary Policy Inflation Expectations and the Price Puzzle. *The Economic Journal*, doi:10.1111/j.1468-0297.2010.02368.

Enders, Walter (2004) *Applied Econometric Time Series* (2nd Edition). John Wiley & Sons.

Giordani, P. (2004) An Alternative Explanation of the Price Puzzle. *Journal of Monetary Economics* 15, 1271–1296.

Grilli, V. and N. Roubini (1995) Liquidity and Exchange Rates: Puzzling Evidence from the G-7 Countries. Yale University, CT. (Working Paper).

Hanson, M. S. (2004) The Price Puzzle Reconsidered. *Journal of Monetary Economics* 51, 1685–1413.

Kim, Soyoung (1999) Do Monetary Policy Shocks Matter in the G-7 Countries? Using Common Identification Assumptions about Monetary Policy Across Countries. *Journal of International Economics* 48, 387–412.

Kim, Soyoung and Nouriel Roubini (2000) Exchange Rate anomalies in the Industrial Countries: A Solution with a Structural VAR Approach. *Journal of Monetary Economics* 45, 561–586.

Krusec, Dejan (2010) The "Price Puzzle" in the Monetary Transmission VARs with Long-run Restrictions. *Economic Letters* 106, 147–150.

Omer, M. and O. F. Saqib (2008) Monetary Targeting in Pakistan: A Skeptical Note. State Bank of Pakistan. (Working Paper Series No. 25).

PIDE (2010) PIDE Monetary Policy Viewpoint, October.

Qayyum, A. (2008) Does Monetary Policy Play Effective Role in Controlling Inflation in Pakistan. http://mpra.ub.uni-muenchen.de/13080/

Sims, C. A. (1986) Are Forecasting Models Usable for Policy Analysis? *Federal Reserve Bank of Minneapolis Quarterly Review* 10, 2–16.

Sims, C. A. (1992) Interpreting the Macroeconomic Time Series Facts: The Effects of Monetary Policy. *European Economic Review* 36, 975–1000.

Sims, C. A. and T. Zha (1995) Does Monetary Policy Generate Recessions? Using Less Aggregate Price Data to Identify Monetary Policy. Yale University, CT. (Working Paper).

Sims, C. A. and Tao Zha (2006) Does Monetary Policy Generate Recession? *Macroeconomic Dynamics* 10, 231–272.