Impact of Supply of Money on Food and General Price Indices: A Case of Pakistan

Khan, Rana Ejaz Ali and Gill, Abid Rashid

The Islamia University of Bahawalpur. Pakistan.

January 2007

Impact of Supply of Money on Food and General Price Indices: A Case of Pakistan

Rana Ejaz Ali Khan and Abid Rashid Gill*

Abstract: *The paper probed the impact of supply of money on food and general price indices by estimating a series of equations taking CPI food, CPI general, WPI food, WPI general, GDP deflator and SPI as measures of inflation and M1, M2 and M3 supply of money as explanatory variables. For analysis, OLS technique is used covering time series data for the years 1975-76 to 2006-07 that was made stationary by Durbin-Watson criterion. AR (1) is used to check autocorrelation. The results for CPI food, CPI general, WPI general, GDP deflator and SPI show that they are negatively related with M1 supply of money. CPI food, CPI general, WPI general, GDP deflator, and SPI are also negatively related with M2 supply of money. The results show that CPI food, CPI general, WPI general, GDP deflator and SPI are positively related with M3 supply of money. It may be concluded that supply of money M1 and M2 affects the food and general indices in the same way. However, M1 supply of money affects the CPI general strongly than CPI food.*

Keywords: Inflation, Money supply, Consumer Price Index, Food prices, Sensitive Price Indicator.
JEL Classification: E31, E51, E61, H62.

* *Rana Ejaz Ali Khan is Assistant Professor, Department of Economics, The Islamia University of Bahawalpur. (Pakistan), ranaejazalikhan@iub.edu.pk and Abid Rashid Gill is Lecturer, Department of Economics, The Islamia University of Bahawalpur. (Pakistan), abeepk@yahoo.com .*

1. Introduction

Researchers usually look at subsets or special indices of measures of inflation. One common set is inflation excluding food and energy, i.e. core inflation. It is a measure of inflation which excludes certain items that face volatile price movements e.g. food products and energy. Core inflation eliminates products that can have temporary price shocks (i.e. energy, food products). It is thus intended to be an indicator and predictor of underlying long-term inflation.

Headline inflation is another measure concerning total inflation within an economy and is affected by areas of the market which may experience sudden inflationary spikes such as food or energy. So headline inflation may not present an accurate picture of the current state of the economy. It differs from core inflation which excludes factors, such as food and energy costs.

On the other hand food and general inflation has different determinants and for the economies they are measured by consumer price index (food), consumer price index (general). Along with these two, in Pakistan the other food and general indices are wholesale price index (food) and wholesale price index (general). The remaining general price indices are sensitive price indicator and GDP deflator.

To investigate the effects of components of money supply on food and general measure of inflation is the core of present study.

2. Literature Review

In this section we will review literature to build our framework for analysis including model and selection of variables. A debate on whether monetary aggregates explain inflation or not is still going on for a couple of decades. A number of variables directly and indirectly related with monetary variables have been used to explain the phenomenon. They range from kind of supply of

money to treasury bill rates. The models range from Simple monetary models to Granger Causality framework. Still the role of money to explain inflation has contradicting views.

There is a long history of literature on inflation, in the earlier studies, Hossain (1986 for Pakistan) developed a simple monetary model of inflation on the basis of an assumption that any disequilibrium in the real money market adjusts itself through changes in price level but not instantaneously. From results both domestic and external factors[1] were identified as the determinants of inflation.

The monetarist and structuralist hypotheses to determine the possible factors affecting the inflationary process in Pakistan were tested by Bilquees (1988). The results of the monetarist model strongly suggested the need for a simultaneous consideration of the structural factors to identify the possible determinants of inflationary process in the economy. However, the study did not establish the superiority of one hypothesis over the other. While Siddiqui (1989) tested the hypotheses of unidirectional causality from money to inflation. The money was found to be endogenous and both narrow and broad money indicated a bi-directional relationship with inflation[2]. The estimated money inflation feedbacks were interpreted to be caused by the link of money and inflation with government budget deficits, balance of payments adjustments and suppressed interest rates.

The competing monetarist and the neo-Keynesian views on the acceleration of inflation were tested by Hussain (1990) for five south Asian countries. The results consistently supported the monetarist view that changes in real money balances contribute to

[1] Changes in the prices of traded goods in the international market, real income, real money supply, the expected rate of inflation, procurement prices, changes in terms of trade between traded and non-traded goods.
[2] See also, Mubarak (2005) and Khalid (2005) for Ganger Casuality.

an acceleration of inflation. It was the first study to explain the significant effect of money supply on price level.

A model of inflation was developed by Hasan, et. al. (1995) by taking the factors that characterize the behaviour of inflation. For effect of these factors, the components of Whole Sale Price Index (WPI)[3] were taken in inflation equation. They developed a model of inflation by taking the factors that characterize the behavior of prices equation[4]. The equation was in logarithmic form and the estimated coefficients represent elasticity of the respective variables. The study concluded that contrary to the popular perception that contribution of supply shocks and monetary expansion to the rise in the WPI is somewhat limited. The principal factors contributing to inflation appear to be the rise in procurement prices[5] (especially of wheat) and administered prices primarily of energy inputs and the increase in the indirect taxes (see also Ali 1996).

The endogenous and exogenous nature of money supply was analyzed by Chaudhry and Ahmad (1995) along with identification of variables leading to inflation and endogenous or exogenous nature of money supply. The model was based on the monetarist and quantity theory approach to inflation and the price equation was given in the log forms. The results suggested that the domestic financing of budget deficit, particularly from the banking system is inflationary in the long-run and provide support for a positive relationship between budget deficit and inflation. The money supply was found endogenous rather than exogenous.

The monetary and real theories have also been applied to see the inflationary trends in Pakistan. In case of real theories the largest contribution in inflation comes from profits, followed by wages,

[3] The components of WPI are the WPI of food, manufactures and raw materials separately.
[4] The key factors include supply shock, monetary policy shocks, tax policy shocks, external shocks, pricing policy shocks and expectations.
[5] See also, Khan and Schimmel Phennin 2006.

indirect taxes and terms of trade. (Ali 1996) concluded that from policy perspective monetary analyses has an edge over real analyses for controlling inflation through monetary management.

An overall inflation equation along with its two broad components, i.e. CPI food and CPI non-food equations to explain the persistence of inflation in Pakistan, was estimated by Khan and Qasim (1996). The results underscored that higher monetary expansion caused by massive borrowing from the banking system to finance fiscal deficit had remained the principle source of accelerating inflation in Pakistan. The expansionary fiscal policy stance, a deteriorating balance of payment position and repeated downward adjustment in rupee has caused price level to increase. The study proposed that supply side variables are important to put downward pressure on price level. Revival of commodity-producing sectors[6] and improvement in the availability of goods and services may put downward pressure on price level. Government administered prices[7] were also found to be inflationary in nature (See also Hasan, et. al. 1995).

The casual relationship between money and prices in Pakistan employing co-integration and error correction model was estimated by Hussain and Mahamood (1998). Two measures of prices (CPI and WPI) and three measures of money stocks (M0, M1 and M2) were analyzed. The results indicated a long-run relationship between prices and M2 suggesting a unidirectional causality running from money to prices and thus supporting the monetarist's claim regarding the role of money.

In the recent literature, Granger causality criterion was adopted by Khalid (2005) to identify leading indicators of inflation to frame the inflation targeting policy. The results suggested that imported inflation, seignorage and openness cause inflation in Pakistan. The estimates further indicated that deficit-GDP ratio, money depth,

[6] Agricultural and manufacturing sector.
[7] Such as the support prices of wheat and electricity charges

exchange rate depreciation and domestic credit may be important determinants of inflation.

The estimation of threshold level of inflation for Pakistan was attempted by Mubarak (2005) following Khan and Senhadji (2001) who initially developed it for the analyses of threshold level of inflation for industrialized and developing countries between inflation and economic growth. The study estimated it for Pakistan by taking variables of CPI real GDP, population and total investment[8]. The Granger Causality test found causality direction from inflation to economic growth and not vice versa. The study estimated 9 percent threshold inflation for economic growth at which inflation would be inimical for economic growth.

Agha, et. al. (2005) in a study disentangled and investigated the channels, through which monetary policy shocks are propagated in Pakistan. The measure of stance of monetary policy taken was the 6-month treasury bill rate, reflecting the developments in financial market. The results indicated that monetary tightening leads first to a fall in domestic demand primarily investment demand financed by banks lending, which translate into a gradual reduction in price pressures that eventually reduces the overall price level with a significant lag. In addition to the traditional interest rate channel, the results pointed out a transmission mechanism in which banks offer an active asset price channel. The exchange rate channel has been found less significant by comparison.

The determinants of inflation and feasibility of an inflation rate targeted monetary policy was estimated by Akbari and Rankaduwa (2005). Two versions of the model were estimated using CPI and WPI as measures of general price level. The study found that foreign price level of imports, money supply, and domestic output are significant determinants of general price level.

[8] Population and total investment are the variables rarely used to explain the phenomenon of inflation.

The theoretical and empirical soundness of monetary aggregate M2 was analyzed by Khan and Hussain (2005). The study proposed a broader monetary aggregate M3 by exploring the fundamental characteristics and empirical relevance of financial assets. The functional and empirical (F-M dual criterion) approaches were used in the study.

Dittmar, et. al. (2005) following Furher and Moore (1995) examined that whether a flexible-price, general-equilibrium business cycle model with money and central bank using an interest rate target can account for inflation persistence. They explored and reproduced the output and inflation components of a vector autocorrelation function. The components were derived from a three-variable auto-regression including four lags each of output, inflation, and the interest rate. The study concluded that it is quite easy to generate inflation persistence in flexible-price models if the central bank is following an interest rate rule.

The study by Grauwe and Polan (2005) seemed to be the one using largest data of 30 years to test quantity theory relationship between money and inflation. They analyzed two proportions of quantity theory of money, i.e. two monetary aggregates M1 and M2 and inflation was measured by CPI. They found a positive relation between the long-run growth rate of money and inflation, however, the relation was not proportional. The strong link between inflation and money growth existed in hyperinflation countries. The study further indicated that country specific effects become increasingly important when the rate of inflation increases. It revealed that long-run is a relative concept, i.e., the time it takes for the long-run effects of monetary expansions depends on the level of inflation. Finally, they found that in the group of low inflation countries, money growth and velocity changes are inversely related, while in the group of high inflation countries the reverse holds.

The linkage between excess money supply growth and inflation was investigated by Qayyum (2006). The correlation analysis

indicated that there exists a strong relationship between money growth and inflation (see also Haq and Qayyum 2006; Kemal 2006). The results revealed that money growth in the first round effects real GDP growth and in the second round the money growth affects inflation.

The factors that may forecast inflation in Pakistan were examined by Khan and Schimmelpfennin (2006) by including the standard monetary variables like money supply, credit to private sector as an activity variable, interest rate and exchange rate in the model along with wheat support prices as a supply-side factor. The results indicated that monetary factors have played a dominant role in inflation with a lag of about one year. Private sector credit growth and broad money growth are good leading indicators which can be used to forecast future inflation development. Kemal (2006) has also attempted to test the hypotheses that whether inflation is a monetary phenomenon in Pakistan by co-integration technique (for long-run relationship) and vector error correction mechanism (for short-run dynamics). Johansen approach of co-integration was followed and impulse response function was used to check the time paths of variables. The study concluded that inflation has a positive long-run association with money supply and a negative relationship with income. It was further concluded that the negative association between inflation and output exists.

Three different empirical approaches to forecast inflation in Pakistan were applied by Bokil and Schimmelpfennig (2006) to see their comparative viability. The standard co-integration test based on the regression residuals was used. The study concluded that preferred approach is a leading indicators model, in which broad money growth and private sector credit growth help to forecast inflation. A univariate approach also yields reasonable forecast, but seems less suited to capture turning points. A vector autoregressive (VAR) model illustrates that how monetary developments can be described by a Phillip-curve type relationship.

Moinuddin (2007) attempted to answer two questions regarding inflation, i.e. whether money demand function still exhibit a stable relationship between monetary aggregate and inflation, and if not then whether inflation targeting is suitable in specific circumstances of Pakistan. For the purpose a long-term co-integrated relationship between real money balances, broad money (M2), real GDP as scale variable and call money rate for opportunity cost variable were estimated. The study concluded that monetary aggregate is no more appropriate for Pakistan because of an unstable money demand function. Change in legal/legislative framework is required to enable SBP to focus on a single objective of price stability rather than dual mandate of supporting growth and price stability.

In all the studies reviewed, only one study has attempted to analyze the money supply effect on CPI food and CPI non-food (i.e. Khan and Qasim 1996). We will probe the CPI food, CPI general, as well as WPI food and WPI general along with GDP deflator and SPI.

3. Model Specifications

We have employed linear regression model and method of least square to examine the relationship between measure of inflation, i.e. consumer price index (CPI) food, CPI general[9], whole sale price index (WPI) food, WPI general[10], GDP deflator and sensitive price indicator (SPI)[11] and components of supply of money, M1

[9] The CPI covers 374 items in the basket of goods and services, which represent the taste, habits and customs of the people.

[10] WPI covers items which could be precisely defined and are offered in lots by producers/manufacturers. It includes food, raw materials, fuel, lighting and lubricants, manufactures building material.

[11] The SPI computed on weekly basis assess the price movements of essential commodities at short intervals so as to review the price situation in the country. It covers 53 items, all representing basic necessities.

(liquid measure of money), M2 (broader money)[12] and M3 (broadest measure of money)[13]. A series of model explaining the effect of three types of supply of money on price indices have been established.

The series of models (6 models) for estimation are respectively given as:

$$LOG(CPIF) = \beta 0 + \beta 1LOG(M1) + \beta 2LOG(M2) + \beta 3LOG(M3) \ldots\ldots\ldots (1)$$
$$LOG(CPIG) = \beta 0 + \beta 1LOG(M1) + \beta 2LOG(M2) + \beta 3LOG(M3)\ldots\ldots\ldots.. (2)$$
$$LOG(WPIF) = \beta 0 + \beta 1LOG(M1) + \beta 2LOG(M2) + \beta 3LOG(M3)\ldots\ldots\ldots.. (3)$$
$$LOG(WPIG) = \beta 0 + \beta 1LOG(M1) + \beta 2LOG(M2) + \beta 3LOG(M3)\ldots\ldots\ldots (4)$$
$$LOG(GDPD) = \beta 0 + \beta 1LOG(M1) + \beta 2LOG(M2) + \beta 3LOG(M3) \ldots\ldots\ldots (5)$$
$$LOG(SPI) = \beta 0 + \beta 1LOG(M1) + \beta 2LOG(M2) + \beta 3LOG(M3)\ldots\ldots\ldots\ldots (6)$$

Where dependent variables are as:
Log (CPIF) = Log of CPI food
Log (CPIG) = Log of CPI general
Log (WPIF) = Log of WPI food
Log (WPIG) = Log of WPI general
Log (GDPD) = Log of GDP deflator
Log (SPI) = Log of SPI
The explanatory variables are as:
Log (M1) = Log of M1 supply of money
Log (M2) = Log of M2 supply of money
Log (M3) = Log of M3 supply of money

Since we are using time series data and most of time series exhibit nonstationary property over the long-run that is violation of one of the important assumptions of OLS. The nonstationary time series may lead to problem of spurious regression (co-efficient of the model seem significant when they are non-stationary). An important indicator of spurious regression is that Durbin Watson

[12] Though current money aggregates are questioned by Khan and Hussain (2005) as they have been defined more on functional consideration as compared to the empirical evidence.
[13] Though Chaudhry and Ahmed (1995) argued that money supply is not exogenous but it depends on international reserves and fiscal deficit and emerged as endogenous variables.

statistics should be less then Co-efficient of Determination. In all of our models D statistics is substantially higher then R, so we are comfortable in applying OLS model[14] rather then to use complex Co-Integration technique[15]. Furthermore AR (1) process is used to get model autocorrelation free. In all the cases, the Durbin Watson statistics are in no-autocorrelation region that supports model specification.

The annual time series data[16] of all the variables under discussion for the years 1976 to 2007 has been used. The data of M1, M2, M3 (million rupees) is taken from Economic Survey of Pakistan 2006-07 (SBP various issues). The data on CPI, WPI, GDP deflator and SPI has been taken from (GOP various issues) and it has been rebased on 1976 values.

4. Results and Discussion

The estimated OLS regression results of effect of supply of money on food and general price indices have correct sign and statistically significant at 5 percent level of significance. Explanatory power of each equation represented by R^2 is fairly high. The estimated equation of model 1 is given as:

LOG(CPIF)=0.404 +0.450LOG(M1)-0.022LOG(M2)-0.493LOG (M3)+0.49AR(1) .....(7)
t-values (4.219) (2.536) (-1.489) (2.716) (2.0169)
$R^2 = 0.99$ Adj $R^2 = 0.99$ F = 11711.41 DW=1.83

[14] OLS model is also used by Akberi and Rankaduwa (2005).
[15] Though co-integration technique is also prevalent for relationship between monetary balances and inflation, see for instance Moinuddin (20070; Kemal (2006) and Hussain and Mahmood (1998).
[16] In the previous literature, Khan and Schimmelphennin (2006) have used monthly time serried data and Akberi and Rankaduwa (2005) have used quarterly data while large number of studies, for instance, Khan and Hussain (2005); Mubarak (2005); Khalid (2005); Grauwe and Polan (2005); Bokil and Schimmelphennin (2006) have used annual data. The availability of quarterly national income accounts data, quality and techniques of data are direly needed for effective policy process for monetary measures in the economy (Khalid 2005; Moinuddin 2007)

The coefficients of equation (7) represented that a 10 percent increase in M1 supply of money would increase CPI (food) by 4.5 percent. While M2 supply of money has statistically insignificant coefficient and M3 supply of money has negative effect on CPI (food). The explanation may be that for given supply of food items, the increase in M1, i.e. increase in cash and demand deposits results into increase in demand for food items. It puts pressure on the prices of food items in the market.

On the other hand increase in M3 (broadest measure of money), i.e. M1 + time deposits, institutional money-market fund, short-term repurchase agreements and larger liquid assets increase the financial savings which ultimately positively effect the investment and output in the long-run. In our model the increase in M3 supply of money has resulted into enhanced investment and output of food items and decreased price of these items in the market due to larger supply. It is an indication that increases in financial savings has positive effect on investment and output.

The estimated results of model 2 are shown in equation (8).

LOG(CPIG)=0.386+0.513LOG(M1)+0.928LOG(M2)-0.527LOG(M3)+0.80AR(1) ....(8)
t-values (3.814) (2.635) (59.270) (-2.637) (2.017)
$R^2 = 0.98$ Adj $R^2 = 0.98$ F = 48885.71 DW = 1.95

The estimates of model 2 reveals that a 10 percent increase in M1 supply of money will increase CPI (general) by 5.1 percent and a 10 percent increase in M2 supply of money will increase CPI (general) by 9.2 percent. But in M3 supply of money, a 10 percent increase would reduce CPI (general) by 5.2 percent. In comparison, the effect on CPI (food) and CPI (general) from the results of model 1 and model 2, it may be concluded that M1 supply of money has stronger effect on CPI (general) as compared to CPI (food). While M2 supply of money only affects the CPI (general) not the CPI (food). However, M3 supply of money has same type of effect, i.e. negative on CPI (food) and CPI (general) but the effect is stronger for CPI (general).

It is estimated that in case of CPI (general) there is a strong role of M1 and M2 supply of money in accelerating inflation in Pakistan[17]. Among them M2's role is stronger than M1 supply of money. The results are consistent with findings of Khan and Qasim (1996) and Nasim (1995). On the other hand M3 supply of money leads to decrease in CPI (general). The explanation may be the same as of model 1, i.e. increase in M3 results into increased levels of investment and output which ultimately reduces the price level. It corroborates the results by Kemal (2006) explaining long-run positive relationship between inflation and supply of money. The explanation given is that increase in output resulting from demand stimulus leads to decline in inflation.

The estimates results of OLS model 3 are presented in equation 9. Unlikely the parameters of all the explanatory variables are statistically insignificant.

$$LOG(WPIF)=0.072+0.121LOG(M1)-0.011LOG(M2)+0.878LOG(M3)+0.336AR(1) \quad (9)$$

t-values (0.779) (0.618) (-0.711) (0.4370) (1.88)

$R^2 = 0.99$ adj $R^2 = 0.99$ DW = 2.12 F = 1692.559

The explanation for the results of model 3 may be that supply of money in any form has no significant role in WPI (food). It is consistent with the results of Khan and Qasim (1996). The explanation may be based on a strange phenomenon, i.e. WPI (food) measure of inflation includes the prices of food items which are produced/supplied in lots of producers or manufacturers, so the producers of food items receive no increased prices due to supply of money.

[17] When we take the CPI (general) as a good measure of inflation in an economy, though Moinuddin (2007) suggested improvement in CPI to adequately depict headline inflation. See also for such type of results, McCandless and Weber (1995); Hussain (1990); Rolnick and Weber (1994); Hussain and Mehmood (1998) and Qayyum (2006).

The estimated results of OLS model 4, that is concerned with WPI (general) have been shown in equation (10). All the parameters of the equation are statistically significant.

$$LOG(WPIG) = 7.786 + 0.146LOG(M1) + 0.969LOG(M2) - 0.163LOG(M3).....(10)$$

t-values (3.271) (2.614) (58.257) (-2.667)

$R^2 = 0.99$ Adj $R^2 = 0.99$ DW=1.98 F=1692.559

The results show that a 10 percent increase in M1 will increase WPI (general) by 1.4 percent and a 10 percent increase in M2 will increase WPI (general) by 9.6 percent. But a 10 percent increase in M3 will reduce WPI (general) by 1.6 percent. The results are consistent with findings of Hussain and Mehmood (1998). If we make the comparison of all kinds of supply of money on WPI (food) and WPI (general), it is evident that WIP (food)---which includes only food items--- has no effect of all kinds of supply of money but WPI (general)---which includes raw material, fuel, lighting and lubricants, manufacturer's building material along with food items has positive impact of M1 and M2 supply of money and negative effect of M3 supply of money. For the WPI (general), M2 supply of money has many times stronger effect as compared to M1 supply of money.

The results of model 5, that is concerned with the effects of M1, M2 and M3 supplies of money on GDP deflator are shown in equation (11). All the parameters are statistically significant.

$$LOG(GDPD) = 9.503 + 0.25\ LOG(M1) + 0.968\ LOG(M2) - 0.276\ LOG(M3)...(11)$$

t-values (3.179) (3.568) (46.306) (-3.598)

$R^2 = 0.99$ adj$R^2 = 0.99$

The results explain that 10 percent increase in M1 supply of money will increase GDP deflator by 2.5 percent and a 10 percent increase in M2 supply of money will increase GDP deflator by 9.6 percent. While a 10 percent increase in M3 supply of money will reduce GDP deflator by 2.8 percent.

The results for GDP deflator show that supply of (M1 and M2) increases the prices of all the goods and services produced domestically. The results are consistent with findings of Kemal (2006). On the other hand M3 supply of money has negative effect on the prices of domestically produced goods and services. The M1 supply of money has more than three times stronger effect on GDP deflator as compared to M2 supply of money.

The estimated results of OLS model 6 are presented in equation (12). The estimated parameters of all the explanatory variables are statistically significant.

LOG(SPI)=0-.039+1.021LOG (M1)+1.007LOG(M2)-1.031LOG(M3)+0.81AR (1)....(12)
t-values (-1.004) (27.872) (359.60) (-27.373) (5.62)
$R^2 = 0.99$ Adj. $R^2 = 0.99$ DW = 1.95 F = 48885

The results show that a 10 percent increase in M1 supply of money would increase SPI by 10.2 percent and a 10 percent increase in M2 supply of money would increase SPI by 10.1 percent. The 10 percent increase in M3 supply of money would reduce inflation by 10.3 percent.

It explained that M1 and M2 supply of money lead to increase in the prices of essential commodities and there is one to one relationship between the growth rates of supplies of monies and the rate of inflation (CPI). The results are consistent with other studies like Qayyum (2006), McCandless and Weber (1995), Rolnick and Weber (1994) and Lucus (1980). For the sixth model again the increase in M3 supply of money has shown negative effect on inflation.

5. Conclusion

Pakistan is facing acute problem of inflation for the couple of decades. It is posing a major threat to macro economic stability. To control the inflation has become one of the major objectives of national economic policy. We have analyzed the relation between money (M1, M2 and M3) and food and general indices of price.

The main conclusion of the study is that M1 supply of money explains all measure of inflation (food and general), thus a support to the stance that if increase in money supply is not accompanied by increase in output, it will lead to increase in inflation. In the case of Pakistan government has been borrowing heavily from central bank (by printing of money) to finance its deficit and output had not been increased with the same ratio as borrowing have been used to finance current expenditures. Our study strongly negates government policy of borrowing for non-productive purpose that adds to inflation of food and general items.

The effect of M2 supply of money (a broader measure of supply of money) on enhancing inflation is also significant in some cases but the effect of M3 supply of money, that is negative on all measure of inflation is more considerable. Our findings support the argument that increase in financial savings that is an indicator of financial depth positively affects investment and subsequently output. So the issue is not just the supply of money rather it is the composition of supply of money that is important for a policy formulation to contain inflation. On the basis we recommend followings measures to contain inflation.

- State Bank of Pakistan (SBP) should strictly regulate money supply, especially by printing of money to finances government's deficit. The supply of money should not cross the limits.
- Recently SBP has been increasing discount rate to curtail money supply to ease inflationary pressures but on the other hand government borrowings from SBP have crossed the limits. The policy needs correction, otherwise borrowings from SBP (through printing of money) would increase the inflation particularly of CPI (food) and SPI.
- Increase in M3 supply of money that is result of increase in time deposits, and other near money instruments have shown positive impact to curtail inflation. We recommend the policies to encourage financial savings like increase in deposit rate, and development of money and capital market.

It is also needed to break banking monopoly that is earning high spread through depressing deposit rate and charging high lending rate.

- Supply side reforms seek to increase the productive capacity of the economy in the long-run and raise the trend rate of growth of economy, which may be connected with M3 supply of money through institutional money-market funds, short-term purchase agreements and large time deposits.

References

Agha, A., N. Ahmed., Y. Mubarak and H. Shah (2005) "Transmission Mechanism of Monetary Policy in Pakistan", Working Paper No. 9, July 2005. State Bank of Pakistan, Karachi, Pakistan

Akbari, A. and W. Rankaduwa (2005) "Inflation Targeting in a Small Emerging Market Economy: The Case of Pakistan", *SBP Bulletin, 2(1):169-190.*

Ali, M. S. (1996) "Analyzing Inflation: Monetary and Real Theories", *The Pakistan Development Review,* 35(4):761-771.

Bilquees, F. (1988) "Inflation in Pakistan: Empirical Evidence on the Monetarist and Structuralist Hypotheses", *The Pakistan Development Review, 27:(2):109-130.*

Bokil, M. and A. Schimmelpfennig (2006) "Three Attempts of Forecasting Inflation Pakistan", *The Pakistan Development Review, 45(2):341-368.*

Chaudhary, M. A. and N. Ahmed (1995) "Money Supply, Deficit, and Inflation in Pakistan", *The Pakistan Development Review, 34(4):945-956.*

Dittmar, R. D., W. T. Gavin, and F. E. Kydland (2005) "Inflation Persistence and Flexible Prices", *International Economic Review, 46(1):245-261.*

Fuhrer, J. C. and G. R. Moore (1995) "Inflation Persistence", *Quarterly Journal of Economics, 110:127-59.*

GOP (various issues) Pakistan Economic Survey. Government Advisor's Wing, Finance Division, Government of Pakistan (GOP), Islamabad.

Grauwe, P. and M. Polan (2005) "Is Inflation Always and Everywhere a Monetary Phenomenon", *Scandinavian Journal of Economics, 107(6):239-256.*

Haque, N. and A. Qayyum (2006) "Inflation Every Where Is a Monetary Phenomenon: An Introductory Note", *The Pakistan Development Review, 45(2):179-183.*

Hasan, A. M., A. H. Khan, H. A. Pasha, and A. Rasheed (1995) "What Explains the Current High Rate of Inflation in Pakistan." *The Pakistan Development Review, 34:(4), 927-947.*

Hossain, A. (1986) "Monetary Disequilibrium and Inflation: a Monetary Model of Inflation in Pakistan", *The Pakistan Development Review, 25(2):141-162.*

Husain, A. (1990) "The Monetarist Versus the Neo-Keynesian View on the Acceleration of Inflation: Some Evidence from South Asian Countries", *The Pakistan Development Review, 29(1):19-32.*

Hussain, F. and T. Mehmood (1998) "Causality Between Money and Prices: Evidence From Pakistan", *The Pakistan Development Review, 37(3):1155-1161.*

Kemal, M. A. (2006) "Is Inflation in Pakistan is a Monetary Phenomenon", *The Pakistan Development Review, 45(2):213-220.*

Khalid, A. M. (2005) "Economic Growth, Inflation and Monetary Policy in Pakistan: Preliminary Empirical Estimates," *The Pakistan Development Review, 44(4):961-974.*

Khan, A. H. and M. A. Qasim (1996) "Inflation in Pakistan Revisited", *The Pakistan Development Review, 35(4):747-759.*

Khan, M. and S. Senhadji (2001) "Threshold Effects in the Relationship between Inflation and Growth", IMF Staff Papers Vol. 48, No.1. IMF Washington, D.C.

Khan, M. H and F. Hussain (2005) "Monetary Aggregates in Pakistan: Theoretical and Empirical Underpinnings." Working Papers No.7, April 2005. State Bank of Pakistan, Karachi.

Khan, M. S. and A. Schimmelpfennig (2006) "Inflation in Pakistan: Money or Wheat", *SBP Research Bulletin,2(1):213-234.*

Lucus, R. E. Jr. (1980) "Two Illustrations of the Quantity Theory of Money". *American Economic Review, 70(5).*

McCandless, G. T. Jr. and W. E. Weber (1995) "Some Monetary Facts". *Federal Reserve Bank of Minneapolis Quarterly Review, 19(3).*

Moinuddin (2007) Choice of Monetary Policy Regime: Should SBP Adopt Inflation Targeting. SBP Working Paper No.19. SBP Working Paper Series, State Bank of Pakistan, Karachi.

Mubarik, Y. (2005) "Inflation and Growth: An Estimate of the Threshold Level of Inflation in Pakistan" *SBP Research Bulletin, 1:35-44.*

Nasim, A. (1995) Determinants of Inflation in Pakistan. State Bank of Pakistan, Karachi.

Qayyum, A. (2006) "Money, Inflation and Growth Rate in Pakistan", *The Pakistan Development Review, 45(2):203-212.*

Rolnick, A. J. and W. E. Weber (1994) "Inflation, Money, and Output under Alternative Monetary Standards", Research Department Staff Report 175, Federal Reserve Bank of Minneapolis.

SBP (various issues) Annual Report. State Bank of Pakistan (SBP), Karachi.

Siddiqui, A. (1989) "The Causal Relationship between Money and Inflation", *International Economic Journal, 3(2):79-96.*