

Is Inflation a Monetary Phenomenon in Pakistan?

Muhammad Awais Anwar

Forman Christian College (A Chartered University), Lahore, Pakistan

Abstract

This paper attempts to find out long run relationship between inflation and money supply. The paper support the assertion that inflation in Pakistan is a monetary phenomenon in the long run but changes in money supply does not impact inflation instantly. The study proclaims that the system does not converge to equilibrium in response to changes in any of the variable.

Introduction

High Inflation is problem all over the world and its impacts on the economy are such which urges the policy makers to contour it. Year 2008-09 saw the declining trend in inflation all over the world because of global financial crisis, where the world output was being shrunken and inadequate economic activity put downward pressure on prices. During this global turmoil Pakistan was one of only those handful countries which were still being experienced by hike in prices and especially those in food and commodity prices. In Pakistan overall CPI inflation during the first ten months of the fiscal year 2008-09 (July-April) averaged at 22.4 percent (*Pakistan Economic Survey, 2008-09*).

High and persistent inflation is a regressive tax and adversely impacts the poor and economic development as it erodes the savings of poor (Fisher and Modigliani, 1978). High and persistent inflation is detrimental to growth as well (Khan and Senhadji, 2001). Moderate or low inflation may be desirable but when it crosses a limit it becomes equally undesirable as Sarel (1995) points that inflation of more than 8% had highly negative impacts on growth (for the data of 87 countries) below that level inflation instead had some positive effects for growth.

In Pakistan inflation has crossed the desired level and is highly daunting for the welfare of the country. Hence there is a need to take appropriate steps to contain it within limits. Any remedial measure without the understanding of the reasons might not be appropriate hence there is a need to first study the basic reason for inflation in Pakistan before a treatment can be suggested. As Burton and Fisher (1997) states;

“Inflation does not happen out of a clear blue sky. It is serving some political economy purpose in each country where it continues. In seeking to end inflation, it is useful to try to understand what purpose its continuation serves in each particular case.”

Many factors are responsible for the current surge in the domestic prices in Pakistan. Government of Pakistan identified various factors like rising food prices, weaker rupee/dollar exchange rate; gradual withdrawal of subsidies on gas, electricity and petroleum; the imposition of custom duty on the imports of various items; and an upward revision in the support prices of wheat and sugarcane crops as the major factors contributing to inflation in Pakistan. (*Pakistan Economic Survey 2008-09*).

This study will be an attempt to address the issue whether the inflation in Pakistan is related to changes in money supply or if there is long run relationship between inflation and money supply.

Section II of the study reviews the relevant literature and provides understanding of the theoretical background. Section III focuses on the methodology being adapted and the empirical results. The final section reports conclusion and policy implication.

Theoretical Background & Overview of Literature

Inflation is one of the most important issues in overall economy of any country. It has given special attention in the literature too. Starting with the work of American Classical Economist, Irving Fisher in 1911 examined the link between the quantity of money in the economy and output. According to Fisher's quantity theory of money movement in the price level is a result of excess money growth in the economy. Friedman in 1963 also supported Fisher by declaring “Inflation is always and everywhere a monetary phenomenon”. In the analysis of monetarist the sole reason of inflation is high money growth. Therefor according to classical and neoclassical economists the fight for inflation could be made by reducing the money supply. The only difference between classical and neoclassical theories of inflation is that neoclassical

assumes full employment in the economy and hence any increase in the money supply will lead to increase in price level with real output being unchanged. But on the other hand classical (David Hume) assumes some real effect of money in the short run due to the assumption of underemployment and price rigidities in short run. But in general classical and neoclassical economists view monetary policy as an instrument to fight against inflation.

Keynes in 1940 developed a model of inflation. According to his model, price rigidities in the labor market leads to unanticipated increase in the profits of firms because of unexpected increase in the aggregate demand which increases prices under full employment condition. Meeting of excess demand by firms push wages up in the labor market which in turn further induces aggregate demand pressure in the economy, prices again increase. This wage-lag mechanism leads to inflation spiral which could be eliminated by reducing aggregate demand in the economy. According to Keynesian Economists, fiscal policy is considered as an important tool to combat against inflation.

Other sources of inflation include cost push and demand pull factors. Cost push inflation occurs because of negative supply shocks or push by workers to get higher wages. Demand pull inflation is a result of actions which increase the aggregate demand in the economy.

Kibritçioğlu (2002) analyzed the major school of thoughts regarding theories of inflation and came to the conclusion that the complex and dynamic interactions of four group of factors (i.e. demand shocks, supply shocks, inertial factors and political process) come together to explain inflation in any economy.

Empirical Investigation with respect to Pakistan

With reference to Pakistan many studies have been conducted by researchers to understand or identify the major determinants of inflation. (Bilquees 1981) estimated an equation for inflation. In her study she found that fiscal variables such as budget deficit, private and public spending play an important role in generating inflation. Her study for the period of 1960-78 indicated that money supply (M1), the degree of openness of trade, expected prices and growth rate of GNP also play a significant role in determining inflation in Pakistan. As indicated this study meant for the period 1960-78 and hence is outdated.

(Hossain 1988) in his study for the period 1962-82 found that lagged money supply had significant impact on inflation. He also found prices of imported goods, real income, real money supply and expected inflation as the major determinants of inflation in Pakistan. However his study included the period of 1960s in which the inflation was very low and hence his results might not be much conclusive.

Bilquees in 1988 again tested structural and monetary variables affecting inflation for the period 1962-1982 and found that money supply and also the expected inflation play a crucial role in determining inflation. Again this study included the period of low inflation and might not be applicable today.

Chaudhary and Ahmad in 1996 attempted to point out the major sources of inflation in Pakistan. Their study included both the structural and monetary variable for the annual data from 1972-1992. Their empirical estimation revealed that inflation is not purely a monetary phenomenon in Pakistan instead they for the first time identified growth of services sector, public debt and import prices as the major sources of inflation in Pakistan. The methodology adapted in this study was simple OLS and it didn't consider the time series nature of data and hence result could be misleading.

Khan and Schimmelpfennig (2006) studied factors that explain and help forecast inflation in Pakistan. A simple inflation model was specified that included standard monetary variables (money supply, credit to the private sector), an activity variable, the interest and the exchange rates, as well as the wheat support price as a supply-side factor. The study performed comprehensive analysis of data and estimated the Vector Error Correction model. Impulse response function of CPI inflation, private sector credit growth and wheat support price was estimated. The study failed to find any cointegrating relationship between the variables. This study proved very helpful in our analysis. We benefited from the methodology of this study with slight variations and advancements.

Malik (2006) studied the effects of monetary policy actions on inflation using Near-VAR approach. His results showed that effect of monetary policy transmits into inflation with a lag of half year and then take another year to reach the peak. This study suggested the identification of variables that are most important in explaining inflation in Pakistan by considering monetary policy actions, supply side factors and foreign inflation. This study provides the base to undertake the topic of determinants of inflation.

Agha and Khan (2006) estimated a long run relationship between inflation and fiscal indicators of Pakistan. Their Johansen Cointegration approach found that sources of financing fiscal deficit specifically bank borrowing contributed to inflation in Pakistan.

Kemal (2006) attributed inflation as a monetary phenomenon in Pakistan. His study based on quarterly data from 1975:1 to 2003:4 showed that growth in the money supply has the lag effect of 9 months on domestic inflation.

The above mentioned studies did try to identify the major sources of inflation in Pakistan with the choice to made between the monetary and structural variables while this study focus only on the monetary side of the issue and tries to test the hypothesis that “Is inflation a monetary phenomenon in Pakistan?”

Methodology

This paper attempts to test the monetarist proposition that Inflation is a monetary phenomena. This view stems from the Fisher quantity theory of money which asserts that increase in money growth lead to equal changes in price level while keeping output and velocity constant. On the other hand Keynesian propose that increase in money supply does not influence prices in the short run but take a certain lag to have its affect on prices. Our particular objective of this paper is to analyse the short run and long run dynamics of inflation to changes in money supply. For empirical investigation of the issue we have taken the data for the following variables

GDP Deflator: To measure the overall level of prices in the economy (Inflation)

Real GDP: Used as an activity variable in the analysis.

M2: To represent the growth of money supply in the economy.

We have taken the data from the period after 1960 to 2006. All data is taken from world development indicator. We have employed the log transformation of variables as the variables in log form give a more homogenous variance of a series (Lutkepohl and Xu 2009). So log transformation is typically used to stabilize the variance.

Since we are aware that many macroeconomic time series are not stationary in their levels and they are most adequately represented by first differences. In the theory of time series analysis we call such variables integrated of order 1 i.e. I(1). If we use the ordinary regression models for these time series variables that will give us misleading results because neither the mean nor their variance converge to their true value not even in large sample. Augmented dickey

fuller test has been used to test for the stationarity of data (Dickey and Fuller 1979). Results of unit root are given in table 1. Results indicate that all the variables are non-stationary in their levels and become stationary in their first difference form.

Table 1			
Augmented Dickey Fuller Test			
Variables	At Level	First Difference	Order of Integration
GDP Deflator	0.4577	-3.7765	I(1)
Real GDP	-1.8787	-5.5338	I(1)
M2	0.9985	-5.3798	I(1)

Test included intercept in test equation.

Since all the variables are integrated of order one we can test for the cointegration relation between the variables. The general definition of co-integration (for the I(1) case) is therefore the following:

Definition: A vector of I(1) variables y_t is said to be cointegrated if there exist at vector β_i such that $\beta_i y_t$ is trend stationary. If there exist r such linearly independent vectors β_i , $i = 1, \dots, r$, then y_t is said to be cointegrated with cointegrating rank r . The matrix $\beta = (\beta_1, \dots, \beta_r)$ is called the cointegrating matrix.

To formalize we estimate the following model

$$P_t = \alpha + \beta M_t + \gamma Y_t + \varepsilon_t \quad (1)$$

And for the cointegration to exist $\varepsilon_t = P_t - \alpha - \beta M_t - \gamma Y_t$ must be I(0) process. This is the essence of Engle-Granger methodology (Engle & Grenger 1987). To test for cointegration we first estimated (1) by using OLS with t-values in parenthesis.

$$P_t = \begin{matrix} 2.412 \\ (0.735) \end{matrix} + \begin{matrix} 0.915M_t \\ (13.625) \end{matrix} - \begin{matrix} 0.814Y_t \\ (-4.588) \end{matrix}$$

Next we generate the residuals of the above regression and test them for the possible unit root by using Augmented Dickey Fuller Test. i.e. we test $\varepsilon_t = P_t - \alpha - \beta M_t - \gamma Y_t$ for unit root. Augmented dickey fuller test runs the following regression for the detection of unit root with the null hypothesis of $\theta_1 = 0$ i.e. there is a unit root against a alternative of no unit root. i.e. we estimated the following regression for our analysis and results are reported next with t statistic in parenthesis.

$$\Delta \varepsilon_t = c + \theta_1 \varepsilon_{t-1} + \theta_2 \Delta \varepsilon_{t-1} + u_t$$

$$\Delta \varepsilon_t = - \begin{matrix} 0.003 \\ (-0.34) \end{matrix} - \begin{matrix} 0.535 \varepsilon_{t-1} \\ (-4.706) \end{matrix} + \begin{matrix} 0.438 \Delta \varepsilon_{t-1} \\ (3.298) \end{matrix}$$

The results clearly indicate the significance of θ_1 and hence the rejection of unit root in the residuals. And according to EG methodology for testing of cointegration we can conclude the variables price level, money supply and real GDP are cointegrated.

Next we also employed the Johansen Cointegration Approach to test for the long run relation. Results of cointegration are reported in table 2.

Consider a VAR of order 2:

$$P_t = A_1 P_{t-1} + A_2 P_{t-2} + B_1 M_{t-1} + B_2 M_{t-2} + C_1 Y_{t-1} + C_2 Y_{t-2} + \varepsilon_t$$

Where P_t is a vector of non-stationary I(1) GDP deflator variables, M_t is a vector of deterministic variable money supply, Y_t is a vector of deterministic variable real GDP, and ε_t is a vector of innovations. Estimation on e-views revealed 1 cointegrating equation according to trace test and Maximum Eigen value test. Results are reported here as

Table 2				
Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.489677	48.04264	35.19275	0.0013
At most 1	0.270199	18.44333	20.26184	0.0872
At most 2	0.098940	4.584087	9.164546	0.3321

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Table 3				
Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.489677	29.59931	22.29962	0.0040
At most 1	0.270199	13.85925	15.89210	0.1016
At most 2	0.098940	4.584087	9.164546	0.3321

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Hence the results of both the trace test and the maximum Eigen value test suggest the presence of long run relationship between price level, money supply and real GDP in an economy. Cointegrating vector for the stated variables is given as with t-values in parenthesis.

$$P_t = 2.274 + 0.849M_t - 0.602Y_t$$

$$(9.18) \quad (-2.44)$$

Based on these results price level in Pakistan is significantly related with movement in money supply and real GDP in the long run. This implies that any effort by the central bank to increase the output will in the long run result in inflation. Negative association between inflation and output implies that any increase in output in the short run resulting from demand stimulus results in a decline in the output and higher prices overlong run. But in the short run there could be

fluctuations away from the equilibrium because of shocks. To test for the short run dynamics we estimated the error correction model which resulted into following equation

Table4			
Error Correction:	D(LDEF)	D(LM2)	D(LRGDP)
CointEq1	-0.238567 (0.09890) [-2.41226]	0.353015 (0.11767) [3.00010]	0.146244 (0.05018) [2.91462]

Error correction results show (Table 4) that in the short run when there is disequilibrium, and both money and output adjust to restore equilibrium. The coefficient of variables suggest that the 23% of disequilibrium is corrected each year by changes in GDP deflator, 35% is corrected by changes in money supply and 14% is corrected by changes in real GDP in the short run.

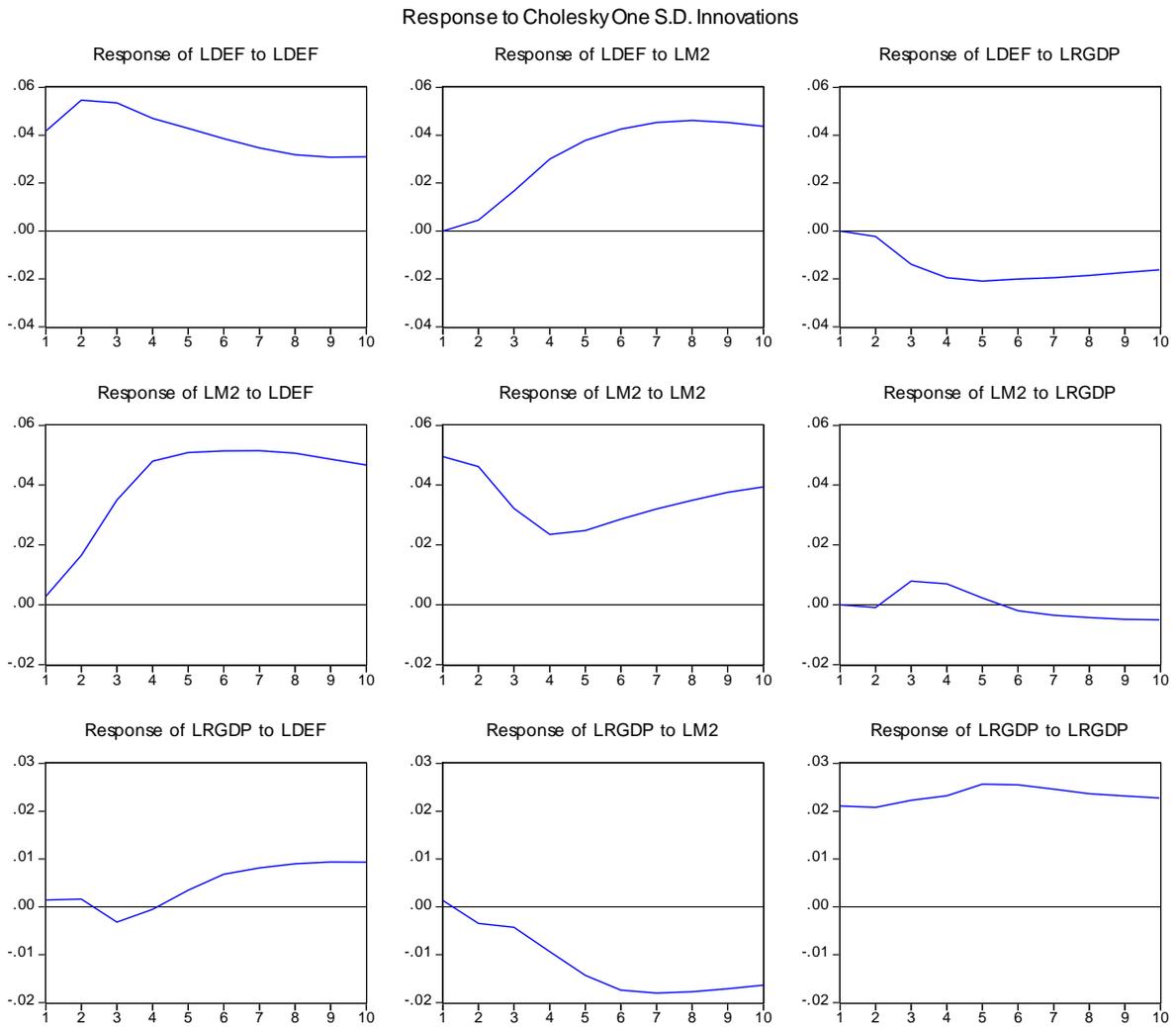
The VAR results (Table 5) show that inflation is not strongly associated with the short-run movements in the money supply. Due to missing information (AIC is the minimum using these lags) about other lags, it is not possible to ascertain other lag levels which affect inflation in the short run.

Table 5			
Result of VAR for Inflation, Money Growth and GDP Growth			
Variables	ΔP_t	ΔM_t	ΔY_t
ΔP_{t-1}	0.544 [3.630]	-0.018 [-0.103]	-0.134 [-1.768]
ΔP_{t-2}	0.091 [0.521]	0.016 [0.076]	-0.233 [-2.641]
ΔM_{t-1}	-0.105 [-0.859]	0.229 [1.569]	0.026 [0.415]
ΔM_{t-2}	0.028 [0.249]	-0.038 [-0.286]	0.095 [1.665]
ΔY_{t-1}	0.029 [0.097]	-0.248 [-0.689]	-0.097 [-0.631]
ΔY_{t-2}	-0.379 [-1.326]	0.246 [0.725]	-0.019 [-0.135]
<i>Constant</i>	0.060 [1.825]	0.114 [2.904]	0.072 [4.313]
R^2	0.431	0.344	0.335
<i>Adjusted R²</i>	0.320	0.216	0.206
<i>F Statistic</i>	3.389	2.699	2.595

Results of impulse response function indicate the unstable relation in VAR. Inflation responds positively in response to its own shock and shocks in money supply and it yield a negative response for shocks in real GDP. This suggests intendency of inflation to adjust to the equilibrium. Money supply adjusts only in response to shocks in real GDP but it gives diverging

relation with shocks on inflation and itself. GDP on the other hand adjusts to unexpected shocks in inflation but give unstable relation in response to shocks in money supply and itself.

Impulse Response Function



Conclusion:

From the empirical investigation we came up with the conclusion that money supply impacts inflation in the long run. Hence our finding support the monetarist proposition that inflation is a monetary phenomenon. On the contrary money supply does not affect price level in the short run. Important conclusion that emerges from the study is that system does not converge to equilibrium for long period if shocks appear in any of the three variables.

References

- Agha, Asif Idrees and Khan, Muhammad Saleem, (2006) *An Empirical Analysis of Fiscal Imbalances and Inflation in Pakistan*, SBP Research Bulletin, Volume 2, Number 2.
- Billmeier, Andreas (2004), *Ghostbusting: Which output gap measure really matters?* IMF working paper, WP/04/146
- Bilquees, F. (1988) *Inflation in Pakistan: Empirical Evidence on the Monetarist and Structuralist Hypotheses*. The Pakistan Development Review 27: 2.
- Brock, W. (1974), *Money and Growth: The Case of Long-Run Perfect Foresight*, International Economic Review, 15, 750-765.
- Bukhari, S. Adnan H. A. S and Khan, Safder Ullah (2008), *Estimating Output Gap for Pakistan Economy: Structural and Statistical Approaches*, SBP Working Paper Series, No. 24
- Burton, David and Stanley Fischer, (1997) *Ending Moderate Inflation in Moderate Inflation: The experience of central and Eastern European Transition Economies*, edited by Carlo Cottarelli and Gyorgy Szapary, Washington: International Monetary Fund and National Bank of Hungary
- Chaudhary, M. Aslam, and Naveed Ahmed (1996) *Inflation in Pakistan*. Islamabad: Department of Economics, Quaid-i-Azam University.
- Chaudhary, M. Aslam, and Naveed Ahmed (1996) *Sources and Impacts of Inflation in Pakistan*. Pakistan Economic & Social Review, Vol. XXXIV, No. 1, pp. 21-39.
- Chaudhary, M. Aslam, and Anjum, Shahid Waseem (1996) *Macroeconomic Policies and Management of Debt, Deficit, and Inflation in Pakistan*. The Pakistan Development Review, 35:4 pp. 773-786.

Cukierman, Alex (1992) *Central Bank Strategy, Credibility, and Independence: Theory and Evidence*, Cambridge, Massachusetts: MIT Press.

Dickey, D.A. and Fuller, W.A. (1981), *Likelihood Ratio Statistics for autoregressive time series with a unit root*, *Econometrica*, 49, 1057-1072

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

Engle, R. F., and C. W. J. Granger (1987) *Cointegration and Error Correction: Representation, Estimation, and Testing*, *Econometrica* 50, 251–76.

Fischer, S. and F. Modigliani (1978a) Towards Understanding of the Costs of Inflation, In K. Brunner and A. H. Meltzer (ed.) *The Costs and Consequences of Inflation*. Carnegie-Rochester Conference Series on Public Policy, Vol. 15, 5–42.

Friedman, Milton (1963) *Inflation: Causes and Consequences*. New York: Asia Publishing House.

Hossain, Akhtar, (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

Johansen, S. (1988) *Statistical analysis of cointegration vectors*, *Journal of Economic Dynamic and Control* (12) pp 231-54.

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

Keynes, J. M. (1940). *How to pay for the war*, London: Macmillan.

Khan, Abdul Aleem; Bukhari, Syed Kalim Hyder and Ahmed, Qazi Masood (2007) *Determinants of Recent Inflation in Pakistan*, Social Policy and Development Center, Research Report No. 66

Khan, Mohsin S and Schimmelpfennig, Axel (2006), *Inflation in Pakistan*, *The Pakistan Development Review* 45:2 185-202

Kibritçioğlu, A. (2002): “Causes of Inflation in Turkey: A Literature Survey with Special Reference to Theories of Inflation”. Forthcoming in: *Inflation and Disinflation in Turkey*, ed. by Kibritçioğlu, A., L. Rittenberg, and F. Selçuk, Aldershot: Ashgate, pp. 43-76 .

Krugman, P. (1995). *Development, Geography and Economic Theory*. MIT Press.

Lutkepohl, Helmut and Xu, Fang, *Role of Log Transformation in Forecasting Economic Variables*, CES_{IFO} Working Paper, No. 2591

MacKinnon, James G. (1996) *Numerical Distribution Functions for United Root and Cointegration Tests*. Journal of Applied Econometrics 11:6, 601–18.

Malik, W. S. (2006). *Money, Output, and Inflation: Evidence from Pakistan*. The Pakistan Development Review , 1277-1286.

Moinuddin. (2007). *Choice of Monetary Policy Regime: Shoul SBP Adopt Inflation Targetting*. SBP Working Paper Series , No. 19.

Nasim, Anjum (1995), *Determinants of Inflation in Pakistan*. Karachi: State Bank of Pakistan

Pakistan, Government of (2007-08) *Pakistan Economic Survey*, Ministry of Finance, Government of Pakistan.

Sarel, Michael (1995), *Non Linear Effects of Inflation on Growth*, IMF Working Papers, WP/95/56

Sidrauski M. (1967), *Rational Choice in Patterns of Growth in a Monetary Economy*, American Economic Review: Papers and Proceedings, 57, 534-544.

Silver, Mick. (2007) *Do Unit Value Export, Import, and Terms of Trade Indices Represent or Misrepresent Price Indices?* IMF Working Paper, WP/07/121

Tobin, J. (1965), *Money and Economic Growth*. Econometrica, 33, 671-684.

Todaro, M. P. (2008). *Economic Development*. Pearson Education.

Zaidi, S. A. (2005). *Issues in Pakistan Economy*. Karachi: Oxford University Press.