IMPACT OF MONETARY AGGREGATE TARGETING TO CONTROL INFLATION IN PAKISTAN

Humera Sherazi
Department of Economics, Lahore Garrison University Defense Sector C Phase VI
*Corresponding author: humera@lgu.edu.pk

***ABSTRACT*:** *This study will use monetary aggregates targeting policy to bring price stability in Pakistan. This research constructs a single equation model to empirically investigate monetary aggregate strategy. Empirical results of this study suggest that monetary aggregate targeting is significant in the long run. We will consider inflation rate as a dependent variable in the model which will be measured regarding CPI. The independent variables are money supply and real GDP growth. The study will use annual time series data from 1975 to 2013. This research uses Unit Root test to examine the stationarity of data. Based upon stationarity of time series data the technique of Autoregressive Distributed Lag Model has used.*

Key words: Monetary policy, the central bank, inflation targeting, JEL Classifications: C32, E31, E52

1. INTRODUCTION

The state bank of Pakistan is making efforts to adopt an appropriate monetary policy to handle inflation in the country. As keeping in view the conditions of country's financial market, the central bank has the option to use the policy instrument of broad money supply to attain the goal of price stability accompanied by stable economic growth.

The remainder of the paper is organized as follows. Section II consists of the literature review. Section III explains theoretical framework. In section IV we develop our model which analyzes the impact of the monetary aggregate strategy to overcome the problem of inflation both in the short and long-run concerning Pakistan. Section V gives estimation outcomes related to the model made. Section VI provides the conclusion.

2. REVIEW OF LITERATURE

Researchers [1] suggested that no significant long-term association exists between exchange rates and domestic price level. However, domestic prices were influenced by both supplies of money and intensity of economic growth. Researchers [2] theoretically and empirically analyzed the reliability of the present monetary aggregate. The authors analyzed the other monetary assets and proposed a new monetary aggregate named as M3. Researchers [3] explores that how exchange rate and supply of money influence volatility in prices. This study indicates with the increase in money supply the prices will rise. On another side, the exchange rate has an inverse impact on inflation. Researchers [4] have analyzed that some variables such as the supply of money, GDP, public expenditures and price of foreign goods have a direct impact on consumer price index while government revenues have an inverse relation with CPI. Researchers [5] explores that causality outcomes from Granger test suggest exchange rate and supply of money has uni-directional causality. Researchers [6] indicate there is a significant relationship among monetary strategy and economic growth if it accommodates the supply side of the economy by using the money supply while fiscal policy has an insignificant effect on economic growth by utilizing government revenues and expenditures as policy variables. Researchers [7] explore that in Pakistan the monetary policy affects real variables, i.e., output in the short-run and it affects the nominal variables, i.e., money and prices in long-run. Researchers [8] have analyzed money supply growth rate, and inflation is positively related for the long-term duration. Therefore, monetary policy also plays a pivotal role in controlling inflation. Researchers [9] explained that the policy makers should concentrate more on monetary policy as compared to fiscal policy to achieve economic growth.

The purpose of this study is to empirically analyze the impact of monetary aggregate targeting to handle the problem of inflation in Pakistan. Therefore, this study is undertaken to provide a guideline to overcome the issue of ever increasing inflation in the country.

3. THEORETICAL FRAMEWORK

In this study, the model investigates the impact of monetary aggregate targeting in controlling inflation in Pakistan. To explain the expected relation between money supply and inflation rate following figure has been established.

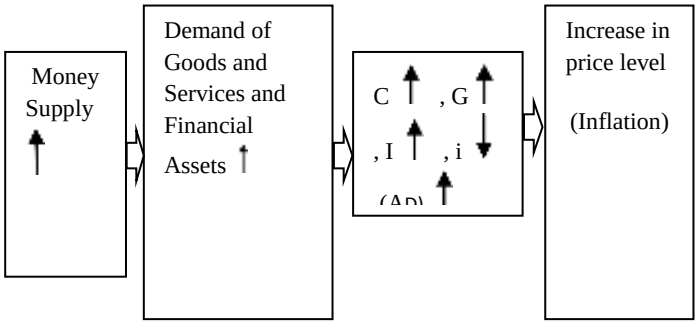
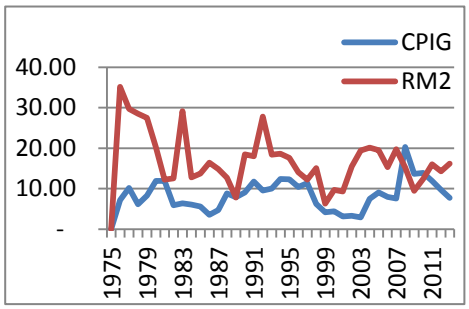


Figure (a): Association between Inflation Rate and Money Supply

According to existing available literature regarding money supply monetarists believe that inflation is a monetary phenomenon. The above figure (a) explains that if the supply of money increases in the economy it affects the demand for goods, services and financial assets (bonds, etc.). Consumption will increase from consumer side putting upward pressure on aggregate demand. There exists an inverse relationship between demand for bonds (financial assets) and bond's interest rate. The increase in demand for bonds leads to decrease the rate of interest. It generates new investments. The increase of aggregate demand leads to more output growth and rise in prices.



Source: Author's contribution

Figure (b): Relation between Inflation and Money Supply

The trend in Fig. (b) Depicts that there exists a positive relationship between money supply and inflation rate.

4. METHODOLOGY FOR ESTIMATION

This study uses the technique of ARDL model and the ensuing error correction model. The study uses annual time series data. The data used in this study covers a 38 years' period, i.e., 1975- 2013. This study investigates following hypothesis.

H_0: There exists no long-run relationship between inflation rate, real money supply and growth rate of the real gross domestic product.
H_1: There exist long-run relation among inflation rate, real money supply and growth rate of the real gross domestic product.

Model: Monetary Aggregate Targeting

The model investigates the role of monetary aggregate targeting in controlling inflation rate in Pakistan.

$$\mathbf{CPIG_t = a_o + a_1 M2_t + a_2 RGDPG_t + \varepsilon_t} \quad (1)$$

---------- -- **(4)**

Where: CPIG = Growth Rate of Consumer Price Index, (2005 = 100), M2 = Real money supply, measured in rupees billion, RGDPG = Growth Rate of Real Gross Domestic Product, ε_t =error term. The above model indicates that amount of real money supply and growth rate of the real gross domestic product determines the level of inflation in Pakistan. It is expected that increase in money supply will generate more funds to invest in the economy, new investment will be generated, and new employment will be taken place, all this boost aggregate demand which in return will accelerate inflation in the economy. The negative sign of a_2 shows that growth of real GDP is inversely related to inflation in Pakistan. ARDL representation related to equation (1) is formulated as follows:

$$\Delta CPIG_t = b_o + \sum_{i=1}^{m1} b_{1i}\Delta CPIG_{t-i} + \sum_{i=0}^{m2} b_{2i}\Delta M2_{t-i} + \sum_{i=0}^{m3} b_{3i}\Delta RGDPG_{t-i} +$$

$$b_4 CPIG_{t-1} + b_5 M2_{t-1} + b_6 RGDPG_{t-1} + \varepsilon_t \text{ ------- -- } \mathbf{(2)}$$

Further, the error correction model for above equation is empirically analyzed. A general error correction representation for model based on equation (2) is discussed below

$$\Delta CPIG_t = b_o + \sum_{i=1}^{m1} b_{1i}\Delta CPIG_{t-i} + \sum_{i=0}^{m2} b_{2i}\Delta M2_{t-i} + \sum_{i=0}^{m3} b_{3i}\Delta RGDsPG_{t-i} +$$

$$\lambda EC_{t-1} + u_t \text{ -----} \quad -- \quad \text{--- (3)}$$

5.Empirical Results of The Model

Calculated F-test statistics when one lag is imposed is 10.9094. At the 5 percent level of significance, the calculated test statistics becomes higher in comparison to the upper critical limit of 5.29. These results show that when the order of lags is 1 in equation (2), the calculated F-Statistics exceeds the upper bound and the null hypothesis explaining no long-run relation between variables given in equation (1) is not accepted. So, the result provides proof regarding the existence of relation amongst inflation rate, real money supply and growth rate of real gross domestic product for long time duration.

Table 1 ARDL (1, 1, 0) Model Long Run Results

Regressors	Coefficients	Standard Error	T-Ratios[Prob]
M2	0.15003	0.0624	2.4043[0.022]
RGDPG	-0.2506	0.14202	-1.7646[0.087]
C	9.6038	1.5559	6.1725[0.000]

R^2=.57693, $\bar{R}^2$= 0.52405, F (4, 32) = 10.9094 [.000]

The table depicts that the coefficient of real money supply (M2) is significant and as expected it contains positive sign. The coefficient of the growth rate of real gross domestic product (GRGDP) is also statistically significant and has negative sign satisfying existing literature. These findings are similar to the results of Researchers which explains the existence of a direct relationship between inflation and supply of money. According to Ahmed et al. (2014), two factors are responsible for high inflation in Pakistan: a continuous rise in money supply growth and unfastened credit policy. To employ the stability tests, the ECM presentation of equation (3) related to model is empirically analyzed. The estimated results are given in table 2.

Table 2: Error Correction Representations for ARDL (1, 1, 0) Model

Regressors	Coefficients	Standard Error	T-Ratios[Prob.]
ΔM2	-1.5820	0.47306	-3.3442[0.002]
ΔRGDPG	-0.17536	.094123	-1.8631[0.071]
Constant	6.7203	1.5151	4.4357[0.000]
ECM(-1)	-0.69976	0.13802	-5.0699[0.000]

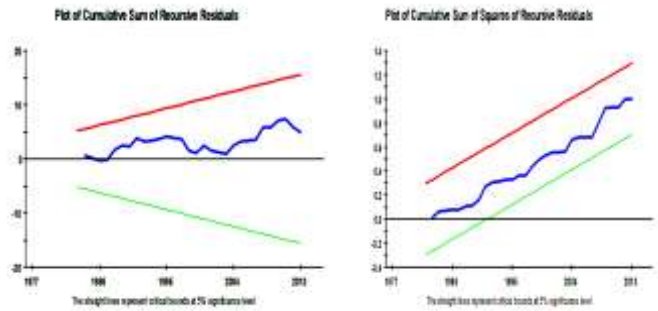
R^2=0.48409, $\bar{R}^2$= 0.4196, F (3, 33) = 10.0086 [.000]

The table 2 displayed the findings of ECM. It depicts that during short time duration real money supply (M2) shows a significant effect on CPIG but surprisingly it is negatively related to the inflation rate. This is maybe because according to John Maynard Keynes variation in money supply may not bring proportional change in price level because the velocity of money (V) and quantity of money (Q) are not exogenous and stable in the short-run. Because an upward shift in money supply may accelerate total output or become a reason for the decrease in velocity of money. Due to the presence of time lags the effect of demand shocks on consumer prices becomes slow. Therefore, according to Researcher [12] describes the role of money supply to explain the rise in prices is feeble in short-run but becomes better in long-run. Also, Researcher [13] explained that during short time duration M_2 does not play the role of trustworthy monetary policy instrument. Furthermore, because of the instability of money demand, it becomes difficult to measure M_2. The short-run impact of RGDPG on inflation rate is negative, and it is significant at 7 % level. The coefficient of error correction model is extremely significant and has an accurate negative sign.

It indicates that there exists correlation among variables given in equation (1) for a long period. The coefficient of ECM term indicates quick adjustment procedure. About 70 % imbalances in inflation rate during last year equilibrium point will be corrected in recent year.

For determining the goodness of fit regarding Auto Regressive Distributed Lag Model some tests are accomplished. The diagnostic tests related to normality, serial correlation, functional form and heteroscedasticity associated with the model. The above-discussed model passed all the diagnostic tests. Further, to examine the stability of short-run and long-run coefficients of the model this study uses stability testing technique. This technique is identified as the cumulative sum of recursive residuals (CUSUM) and the cumulative sum of squares of recursive residuals (CUSUMSQ) stability tests. The CUSUM and CUSUMSQ statistics are updated recursively and plotted against the breakpoints of the model. Given that the plots related to statistics remain within the critical bounds of 5% significance it is considered that the coefficients regarding available regression are smooth. The graphs are used to demonstrate these tests. The graphs of CUSUM and CUSUMSQ to verify steadiness for the short and long duration related to the above-given model are represented in figures given below.

Figure 1 (A) Figure 2 (B)



+

Above figures indicate that the graphs of CUSUM and CUSUMSQ statistics all fall within the determined boundaries indicating the stability of all models.

6. Conclusion

In a nut shell, this study concludes that to achieve the sustainable and long-term economic growth the prerequisite is to control instability in the inflation rate. The expansion in money supply generates inflation rate. The SBP can handle the problem of inflation by adopting the strict monetary policy. The SBP has direct control over money supply.

The results of this study indicate that monetary aggregate targeting is significant and its adjustment process is fast. Therefore, this study suggests that monetary aggregate targeting is appropriate for Pakistan, but SBP may have the option to choose between varied monetary policy instruments according to existing economic circumstances.

REFERENCES

[1] Siddiqui, R., & Akhtar, N. The Impact of Changes in Exchange Rate on Prices: A Case Study of Pakistan. *The Pakistan Development Review, 38*(4), 1059-066, 1999.

[2] Khan, M.-u.-H., & Hussain, F. Monetary Aggregates in Pakistan: Theoretical and Empirical Underpinnings. *SBP Working Paper Series*(7), 2005.

[3] Umeora, & Emmanuel, C. Effects of Money Supply and Exchange Rates on Inflation in Nigeria. *Journal of Management and Corporate Governance, 2*(4), 2010.

[4] Bashir, M. F. Determinants of Inflation in Pakistan: An Econometric Analysis Using Johansen Co-Integration Approach. *Australian Journal of Business and Management Research, 1*(5), 71-82, 2011.

[5] Rehman, M. Analysis of Exchange Rate Fluctuations: A Case Study of PKR Vs. USD. *Journal of Managerial Sciences, 8*(1), 41-60, 2012.

[6] Musa, Y., & Asare, B. Long and Short Run Relationship Analysis of Monetary and Fiscal Policy on Economic Growth in Nigeria: A VEC Model Approach. *Research Journal of Applied Sciences, Engineering, and Technology, 5*(10), 3044-3051, 2013.

[7] Munir, K., & Qayyum, A. Measuring the Effects of Monetary Policy in Pakistan: A Factor Augmented Vector Autoregressive Approach. *Empirical Economics Springer, 46*(3), 843-864, 2014.

[8] Ahmed, Q. M. Determinants of Recent Inflation in Pakistan: Revisit. *Pakistan Journal of Commerce and Social Sciences, 8*(1), 170-184, 2014.

[9] S. N., Jawaid, S. T., & Arif, I. Comparative Analysis of Monetary and Fiscal Policy: A Case Study of Pakistan. *NICE Research Journal, 3*, 58-67, 2009.

[10] Rizvi, S. B.-u.-H., Mohsin, D. A., & Zakaria, D. M. (2012). Factors of Inflation on Pakistan Economy: An Empirical Investigation. *J. Asian Dev. Stud, 1*(1).

[11] Khan, A. H., & Qasim, M. A. Inflation in Pakistan Revisited. *The Pakistan Development Review, 35*(4), 747–759, 1996.

[12] Akinbobola, T. O. The Dynamics of Money Supply, Exchange Rate and Inflation in Nigeria. *Journal of Applied Finance and Banking, 2*(4), 117-141, 2012.

[13] Saleem, N. Adopting Inflation Targeting in Pakistan: An Empirical Analysis. *The Lahore Journal of Economics, 15*(2), 51-76, 2010.