Impact of inflation on the monetary policy: case study of Pakistan

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ABSTRACT:

The study examined the impact of inflation on the monetary policy by using the time series data of 1980-2014. The data source are economic survey of Pakistan and Federal bureau of statistics. Consumer Price Index is the dependent variable (proxy of inflation) while independent variables used in the study are discount rate and broad money supply M_2. The methodology used in the study is ARDL, which shows long run relation among the dependent and independent variables. The results of ARDL suggests that for Discount rate there should be a negative relation with Consumer price index and this validates the long-run but negative relation of Discount rate with Consumer price index while the broad money supply shows the positive relation with the Consumer price index. Hence, study validates the short-run relation among the Consumer price index, Broad money supply and discount rate.

KEYWORDS:
Inflation, money supply, interest rate, price stability, tightening monetary policy

INTRODUCTION
Controlling inflation is an important objective of public policy, because rising inflation will decreases the economic growth and social welfare of the country (Aktam et al. , 2011). It is assumed that monetary policy affects in such a way that amount of money increases but with less productivity, which reffered a term inflation (Sean Ross, 2007). This means the currency is not in circulation and exchange of money is not there in the economy. The government and central bank push up the money stock, when they realized that debt or any other financial instrument is not in their hand and printing money is only option to get out of the situation (Sean Ross, 2007). The inflation discourages investment because of low return and it leads to decrease in the wages of the labour and decrease the production and economic growth which is impotant for any economy (Andre pascal, 2008). Monetarists concluded that expansion in the monetary policy affects the real variables in the short-run while it affects the nominal variables in the long-run (Chaudhry et al., 2012). In Pakistan the policy implementation is based on the responsiveness of institutions and market based structure and get the monetary goals (Chaudhry et al., 2012). The rise in inflation will lead to depressing the financial stocks because expected inflation rises will rise the long-term interest rates and tightening monetary policy will slow down the economic growth (Bordo et al., 2008). Amadeo, (2012) cited that when the prices of goods are increasing

and follows the rising trend is an inflation. Price stability is somewhat most important goal to be achieved for any state bank, Government or any institution. In the famous critique called lucas critique has devised that inflation is a monetary phenomenon and inflation is affected by money supply (1975). The past studies analyses this fact that the more the economy is open, the lesser inflationary bias of tightening monetary policy is to be devised (Rogoff, 1985 and Romer, 1993).

The economic survey of Pakistan suggests that the trend of policy rate follows in 2011 is 12bps and in 2012 it is 9.5bps. The policy rate in 2013 will be 10bps and 9.5bps in 2014. In 2015 it is about 7bps. The trend of inflation follows a declining trend in 2011-12 is approximately 11.01% against 13.66% in previous fiscal year. The more declining trend will be seen in fiscal year 2012-13 is 7.36%. In 2013-14 a slight increase in inflation equal to 8.62%. The fiscal year 2014-15 represents the inflation as a single digit, which is averaged 4.8%. The monetary policy adopted in current fiscal year is accommodative.

State bank of Pakistan in 2012-13 uses the easy monetary policy because of the past declining trend of inflation in Pakistan. It will increases the credit to private sectors. In the 2013-14 SBP transfers from easy to tight monetary policy because of medium inflationary trend is seen in recent past. Then in November 2014 the policy transfers from tight to accommodative because of stable growth in the economy. In that way the SBP introduced the new term "target rate" as a new policy rate.

In sum, many studies work on inflation and monetary policy and their conclusions were somewhat same. The Friedman (1968) explored that inflation is a monetary phenomenon. The Lucas (1975) said that inflation is affected through expansionary monetary policy. Seminal research on this issue has been seen in the study of Hossain (1990) gave the idea about inflation a monetary phenomenon. He concluded that monetary policy will impact the inflation. Several different studies also examined this impact and ensure that inflation is controlled by monetary policy stances. Some studies are not related to our economy Pakistan but the studies related to different economies as Nigerian, Australia, New Zealand, and united state of America etc.

The study used autoregressive distribution lag approach to show the long run and a short run relation among the variables. Error correction mechanism is employed to add the short run into a long run relation. The empirical study on this data is examined through graphs and examined through the trends of the variables.

The organization of the research paper is as follows: Section two gives the review of the past research papers and getting the main idea of that paper to be considering for help in manipulating own paper. Section three gives the data and methodology in which the data sources and available variables are described. And the methodology to be used is also described precisely in this part. The section four gives the results and discussions where we applied the tests on the available variables and the tables which are important for interpreting the models are to be described in this section. The section five gives the conclusions and recommendations in which the conclusions to be devised from this study is considered and related policy implications should be addressed in this section. In the last section, the references of all the reviewing past papers, books, discussion series or any other thing which we get the help to present this study.

LITERATURE REVIEWS

Chaudhary and Ahmad (1995) explored the balance of payment deficit will impact on the effectiveness of monetary policy and this in turn will create inflation. The study used annual data for 1973-1992. In case of Pakistan, the balance of payment deficit is an important component and it is an indication of economic growth. The method used in this study is ordinary least square with 2SLS technique. Here in this study, we examined the relationship among income, expected prices, lagged money supply, import prices and demand shift variable. Results are deducted and there we get a positive relation among these variables. Suggestions tell us that to control inflation; government must take powerful steps to build private businesses. And also reduce the budget deficit will decrease the inflationary pressures.

Gillani et al. (2009) examines the issue and finds the relationship of crime with different economic problems as inflation, unemployment and most important poverty. In case of Pakistan, we come to know that it is in the 23rd in the reported crimes list of the world. But if study checks unreported crimes list there would be worst situation. The study used granger causality test with constancy doctrine and get invalid results of 't' and 'f' tests. Toda and Yamamoto procedure is used in the study with seemingly unrealistic regression. The results show that there is a unidirectional relation among crime and other economic factors. Recommendation suggests that these economic factors should be demolished to reduce or decline the rate of crime in Pakistan.

Muritala (2011) combined examined the inflation and investment and check the impact on economic growth. The study is the case of Nigeria and as we know that Nigeria is a developing nation which is an import dependent country. This is the reason of inflation in an economy. As part from investment, there are two

sources like foreign direct investment and also a foreign portfolio investment. Among these two, foreign direct investment is important to raise the economic growth. The study used the data from 1981-2006 and the technique used is ordinary least square. The study check the significance of variables and F-statistics test shows us the specification of model is well suited. The results show that investment and economic growth has a positive relation while negative relation among inflation and economic growth. The recommendation of the study is to reduce the money supply and raised the investment opportunities to increase economic condition of the economy.

Siklos and Collins (2004) examined the three important countries like developing one. The study find that if monetary policy will create inflation or not. These all countries are inflation targeters and they are strict in targeting this inflation process. All countries have some similarities while they have some differences also. The study used taylor rule and check the significance of variables. The study suggest a smoothning interest rate and dampens the output gap.

Akram et al. (2011) found an issue of inflation and describes the dominant policy. All the two policies are aiming the price stability. As monetary policy creates expansionary money supply and it creates inflation and as fiscal policy make expenditures and excess of printing money evolved the inflation. The study is the case of vector autoregressive method and is the case of Pakistan. The study used the data of 1973-2009 and granger causality test is applied to the study. The results in the end will come to know that inflation is caused due to money supply and then inflation will cause fiscal changes. The study aims to check that monetary regime is suitable or not. The suggestions are that when you reduce the money supply, the inflation is not arising and fiscal policy didn't changes in that way.

Sulaiman et al. (2015) investigates that if monetary policy would increase to achieve growth of an economy. And lowers the inflation rate and that will be achievable is the need of this study. The variables used in the study are interbank rate and income minus consumption which is saving and we use a saving deposit as a second variable in the study. The study used the autoregressive distribution lag technique and the data is of 2006-2014. The study used augmented dickey fuller test and a test of Philips perron to check the integration. The variables in the study are stationary at first difference at 1% level of significance.

Anderson (2011) points out that monetary policy and different types of inflation. Consumer prices is the type used for inflation and they are sticky in nature while the other type will be asset prices which are flexible as compared to consumer prices. Here in the paper, we estimate the short-run and also a long-run relation of monetary policy and inflation. We use band spectrum procedure where we form separate bands and then run a separate regression for all the bands. The data used in the study is of quarterly period of 1977-2009. The study used discrete wavelet transform. The variables are gross domestic product and also an unemployment rate for model 1 while for model 2 there is share price inflation and there is a long-term yields of bonds. The results show that in model 1 gross domestic product has a negative relationship. The study check the heteroskedasticity and also tests for autocorrelation will be applied. The recommendation is that if government used expansionary money supply as an indication of inflation, the policy keeping this in their mind will be suitable.

Hameed and ume-amen (2011) focused the monetary policy and what we called as an economic growth. The study explored that as we increase the interest rate, the reduction in inflation will be achieved. When there is high or even moderate inflation is occurred, the economic growth will be suffered. The interest rate has a positive relationship with gross domestic product. Money supply will affect the economic growth and in turn affects inflation. The data used in the study is of 1980-2009 and ordinary least square methodology is used. The study show that money supply and economic growth is positively correlated and is statistically significant. The study suggest that increase the interest rate. So that inflation could be demolished and contractionary monetary policy is used in the economy.

Michael et al.(2009) found the relationship among inflation, monetary policy and stock market conditions. This paper explored that in the long-run these didn't impact on stock prices or market conditions. But in the short-run they effect the stock prices. The aim of this study is to check the macroeconomic shocks affect the stock market when there is a boom or bust situation. The study used latent-variable vector autoregressive hybrid model. Because it clearly tells us about stock market booms and busts. Estimate the model with monte- carlo procedure. The data is of monthly of 1952-2005. The results show that inflation had a negative impact on stock market and it is statistically significant while monetary policy has positive relation with stock market. Study recommend that monetary policy should induce to reduce inflation which raised the financial stability of the economy.

Amin et al. (2012) address the issue of inflation uncertainty and find its relationship with inflation rate. The study used monthly data from 1957 to 2007 evidenced from Pakistan. This study aims not only to check the impact but also the direction of volatility. Inflation rate leave a positive impact on inflation uncertainty. The inflation rate is used as a dependent variable in a study and conditional mean as an independent variable. Conditional mean is used instead of inflation uncertainty in the study. The study used generalized autoregressive conditional heteroskedasticity technique to alter the results of the given data. LM autoregressive conditional hetrokedasticity test is applied to check the presence of generalized autoregressive technique. Q-statistic test is used for serial correlation. In the end of the study we used LM autoregressive conditional heteroskedosticity test up to 10 lags. Granger causality test is applied and it accepts the Freidman-ball hypothesis that it is unidirectional relation. There is a positive relation between inflation and inflation uncertainty. Stable inflation will minimize uncertainty which is somewhat important for flourishing our economy.

Ayyoub et al.(2011) discuss about inflation and economic growth for Pakistan's economy. Inflation is mainly due to different reasons like as shoot the food prices up, depreciate the exchange rate and also indirect text is the cause of inflation. The study explored that gross domestic product growth is used instead of economic growth and made a dependent variable for this study. The variables that show high impact will be considered and these are investment growth rate, consumer price index inflation, trade openness, labor force participation rate, and log of population in millions. The study used ordinary least square and for checking auto correlation, Durbin Watson statistic test is used. When the results are examined, we come to know that consumer price index inflation is negatively related to gross domestic product growth. While other variables show positive relation with gross domestic product growth. Price stability is the best policy to be implemented to ensure economic growth in Pakistan.

Berument et al.(2007) develop a model which shows economic openness and its relation with output and inflation by using quarterly data of 1957 to 2003. The study used cross country analysis and investigates 29 countries. The study shows that growth rate of output is held dependent variable and money growth rate, growth rate of real price of oil, openness measure are acting as independent variables. The study shows that ratio of sum of exports and imports to gross domestic product are used as a proxy variable for openness measure. The study involves some type of seasonal dummies. The study said that estimated openness coefficient is expected to be negative. The study used Ljung box q statistic test which tells us that only 11 countries are statistically significant at 10 %, dickey fuller test is applied to a study which suggest us that all are statistically significant at 1%. The study give the results which vary across the countries because different countries have different economic conditions and they react according to their own country.

Gladebo et al. (2015) examined the relationship between inflation and monetary impulses in case of Nigeria by using quarterly time series data spanning from 1980Q1 to 2012 Q4. The study used inflation as dependent variable while money supply , exchange rate , interest rate , oil prices and Gross domestic product as independent variables. The study used autoregressive distribution lag technique to justify error correction model. The study found that except oil prices and exchange rate which react differently, other variables met the long-run expected signs. The study recommend that government should stimulate the productive capacity of the economy especially agriculture sector. So, that the food production increases aggregate supply of food and prices will come down which reduces the rate of inflation. Chaudhary et al. (2012) investigates the monetary policy, inflation and economic growth in Pakistan. The study published in the journal of commerce and social sciences. The study used co-integration and causality analysis during the period of 1972-2012. The study collects data from international financial statistics. The study used variables as Real gross domestic product is a dependent variable while consumer price index, real exchange rate is an independent variable. Call money rate is used instead of interest rate. The study used Augmented dickey fuller test and examined ordinary least squares results R2 = 0.96 and Durbin Watson test d = 0.39. The study shows that R2 > d which means spurious regression exists. When the augmented dickey fuller test is conducted, the rise in real exchange rate lowers the real gross domestic product because of adverse balance of trade of Pakistan. The study found that there is a long-run relationship among them. The study recommends that for financing the budget deficit, government should do increase the money supply and collect balance of payments by exports.

Banaian et al.(2008) examined the inflation targeting. The study used different countries and use the inflation targeting technique and Armenia is one of these. We study the case of Armenia. The study used taylor rule. Armenia is a forward looking inflation targeter country and had a strict inflation policies to be applied. Using GMM test in the study and then estimate reaction equation function. The estimates used in the study are fragile and results indicated that a suitable monetary policy has to be adopted.

DATA AND METHODOLOGY

The data and variables are not used only for empirical evidence but also for the validity of the inflation as a monetary phenomenon. Different studies in the past analyses the impact of inflation on monetary policy. The variables used in the study are Inflation as a dependent variable and broad money supply, discount rate are used as an independent variables. Study used the consumer price index (CPI) as a proxy of inflation. Broad money supply is used to check the performance of monetary policy and Discount rate explains the bank's lending rate etc. The data of CPI, M2 and Discount rate is collected from Pakistan bureau of statistics and economic survey of Pakistan (different issues). The data span is of 1980-2014.

The following model describes the whole scenario of this study:

$$CPI = \beta_o + \beta_1 M + \beta_2 DR + \varepsilon$$

Where consumer and it inflation as variable of

VARIABLES	RESULTS OF INTEGRATION
M_2	I(0)
CPI	I(2)
DR	I(1)

CPI is the price index shows the dependent this model

while M shows the broad money supply or M_2 which is independent and it affects the dependent variable. It affects in positive way or negative it should be explored in this study. DR means Discount rate which is also an independent variable. β_o is a constant and β_1 and β_2 are the coefficients of the variables. The ε term shows the error term or a residual in the model.

The study employed different tests to check the unit root problem and then the ARDL (auto regressive distribution lag) approach is applied to examine the relationship among the variables. The co integration technique is based on the results of integration and if the variables are integrated of different orders, we applied the ARDL approach of co integration to test the long run relationship. The error correction methodology is also employed in the study to check the short-run relationship among the variables. The error correction mechanism is used to reconcile the behavior of the short-run with the long-run behavior (Chaudhry et al., 2012)

RESULTS AND DISCUSSIONS:

For checking the considering time series is stationary or not, we applied different tests as ADF (augmented Dickey and Fuller test) and PP (Philip's Perron test). The study examined all the variables on the trend and intercept term. The study gets the results for ADF and PP test as follows:

Table1.

The table 1. Shows the results for Augmented Dickey and Fuller test and Philip's Perron test. Where the * shows that variable is significant or become stationary at 1%. And ** shows that variable is significant at 5%. And *** shows that variable is significant at 10%. The study suggests that money supply is significant at level, 1st

VARIABLES	Augmented Dickey-Fuller test			Philip's Perron test		
	Level	1st Diff.	2nd Diff.	Level	1st Diff.	2nd Diff.
M_2	4.007**	-4.571*	-7.078*	-1.935	-4.973*	-16.315*
CPI	-0-098	-2.18	-6.802*	2.164	-2.203	-6.753*
DR	-2.395	-5.688*	-10.271*	-2.395	-5.689*	-21.866*

difference and also at 2nd difference in evaluating ADF test but in Philip's Perron test it is not significant at level and significant at 1st and 2nd difference. The values of CPI suggest that in both tests ADF and PP, it is significant at 2nd Difference. Most of the economic time series are stationary or significant at 1st difference but there are exceptions. The variable discount rate shows that in ADF and PP, the results are same that both are significant at 1st and 2nd difference.

Table 2.

Table 2. shows the results of integration which suggests us to use ARDL approach of co-integration because of its nature. ARDL (autoregressive Distribution Lag) is applied if there are different results of integration. The ARDL approach examined the relationship among the variables is a long-run or a short-run. When the ARDL approach is applied there is some value of F-statistic and upper bound. If the value of F-statistic is greater than upper bound, it means there exists no long-run relationship among the variables. In the Microfit5 we applied the ARDL approach and gets that the F-statistic value is 1.9926 and the value of upper bound is greater than this F-statistic value. The value of upper bound is 5.4391 at 95% upper bound. This authenticates there is no long-run relation among these variables.

Testing for existence of a level relationship among the variables in the ARDL model
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F-statistic	95% Lower Bound	95% Upper Bound	90% Lower Bound	90%UpperBound
1.9926	4.3022	5.4391	3.4500	4.4735

The results in the microfit are the followings:

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
CPI(-1)	.67832	.13591	4.9911[.000]
DR	-.023216	.033498	-.69307[.494]
M2	.5811E-6	.7758E-6	.74907[.460]
INPT	4.1255	1.7770	2.3216[.028]

The results shows the values of the coefficient of the variables and their standard errors and the T-ratios are also exhibit in the microfit. The coefficient of discount rate shows a negative relation with CPI (inflation rate). While the M_2 shows a positive relation with the inflation rate. This test shows that M_2 and DR has no long-run relationship with the CPI. Now for short-run we employed the Error correction mechanism in the microfit. In this test we sees that whether ECM coefficient value is negative or not and it's value must be less than 1. If these two assumptions of ECM are satisfied, there should be the existence of short-run relation. The results are as follows:

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
dM2	.5811E-6	.7758E-6	.74907[.460]
dDR	-.023216	.033498	-.69307[.494]
ecm(-1)	-.32168	.13591	-2.3669[.025]

The value of ECM shows that it is less than 1 and it is negative equal to -0.321. The results suggests there is a short-run relation among these variables.

If the log is introduced in the model because of 2nd difference of Consumer price index (CPI). The results are as follows:

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Testing for existence of a level relationship among the variables in the ARDL
model
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F-statistic  95% Lower Bound  95% Upper Bound  90% Lower Bound  90%UpperBound
3.5813           4.2606           5.4150           3.4191           4.4678


W-statistic  95% Lower Bound  95% Upper Bound  90% Lower Bound  90% UppeBound
13.5830          12.7818          16.2449          10.2573          13.4035
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The results show that the value of F-statistic value is lower than upper bound. The value of upper bound is 5.415 which is greater than F-statistic value. There exists a long run relation if the log term is introduced in the model. For ECM the results are as follows:

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Regressor              Coefficient       Standard Error       T-Ratio[Prob]
dDR                    -.0016176           .8168E-3          -1.9804[.058]
dM                      .1320E-7           .4904E-8           2.6916[.012]
ecm(-1)                -.042346            .022287           -1.9000[.068]
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The results show that ecm value is negative and its value is less than 1. The validation of short-run relation exhibits in the ecm value which is equal to -0.0423. Discount rate is inversly related with CPI inflation and the results will show the same phenomenon. Various studies examined the relationship of discount rate and inflation and their results are similar to current study. David smith (2004) and Gladebo (2015) examined the relationship of discount rate and inflation and their results are similar to our study and there is an inverse relation among the discount rate and inflation. Cuma bozkurt (2014) examined the relationship among the money supply and inflation and the results are similar to our study that money supply is positively related with inflation. Different studies authenticates the results of our study.

CONCLUSIONS AND RECOMMENDATIONS:

This study wants to investigate the impact of inflation on monetary policy by using the time series data of 1980 to 2014 and applied the co-integration technique. In case of Pakistan, which is the developing economy and face numerous problems now-a-days. The problems are poverty, inflation, unemployment and rising money supply. The study gives a valid long-run relation among the inflation, money supply and discount rate. And the short-run relation has been validated by Error Correction Mechanism.

The study employed ADF and PP test to check that null has a unit root. The ARDL approach investigates the relation of CPI with M_2 and Discount rate. The results said that there should be negative relation among the CPI and Discount rate. And this relation is a long-run relation while the relation among the CPI and M_2 is a positive long-run relation. The Error Correction Mecanism presents the negative and less than 1 value of ECM which indicates the short-run but negative relation of CPI with Discount rate and Positively related with M_2.

Keeping in view te results of this study, following points of recommendation are to be noted for policy makers before creating any policy:

1. State bank of Pakistan should use that monetary policy which is a tightening monetary policy to reduce the inflation in Pakistan.
2. Inflationary pressures arised from supply side factors and these are less respondent to the tightening monetary policy. So, for this purpose Government should admininister its supply side factors.
3. Government should raise money supply in just the urgent need to increase the revenues otherwise it will empower more inflationary pressure on the country.
4. Many studies concluded that expansionary money supply will lead to inflation. The main point is to reduce the inflation.
5. Stable inflation will lead to inflation uncertainity and it flourishes the economic situation of the country.
6. Controling inflation should not influenced by politicians.

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