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MONETARY POLICY AND ITS INFLATIONARY PRESSURE IN PAKISTAN

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Abstract. Inflation has always been a central issue of socio-economic policy framework. The mechanism, through which it comes out, is of vital importance to explore for prudent policy formulation. The present study aims at investigating the impact of money supply growth on the rate of inflation in Pakistan. Annually time series data ranges form 1973-2013 is employed for the analysis. The model of the study works out the short-run and the long-run impact of money growth on the rate of inflation in Pakistan. ARDL technique is used, depending upon the time series properties of data that confer mixed order of integration. Diagnostic and stability tests confirm that models are econometrically sound and stable. The results go over the main points; interest rate and money supply are important policy variables for controlling inflation in the long-run while it is the national output level which put downward pressure on inflation rate in the short-run.

Keywords: Monetary policy, Price level, ARDL, Cointegration, Pakistan

JEL classification: E31, C50, C22

I. INTRODUCTION

Money supply and inflation, and their mutual relationships are the most prominent indicators of strength, potential and the prosperity of a country.

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The nature of monetary policy as well as the determination and maintenance of the price level always remain in the primary focus of social and economic planners. Moreover, it is most often observed and argued by the monetarists that money supply and rate of inflation are intricately related to each other. However, it is also observed that substantial increase in the quantity of money supply may either positively or adversely affect the overall economic progress. That is why, the two aspects, *i.e.* money supply and their interdependence, are always the subject matter of hot debates prevailing on the macroeconomic scene at various grades of the economic circle.

Contrary to traditional view of the economists that inflation can be eliminated completely, it is an ever existing and continuous phenomenon, *i.e.* inflation is always present in an economy. It is the rate of inflation which undergoes fluctuation from time to time and with respect to the prevailing circumstances. That is why the primary concern of the macro-economic policy makers is to control the rate of inflation and maintain it as certain optimum level which is largely dependent on the nature of monetary and fiscal policies, and the availability of natural economic potential.

Above discussion gives the impression of great importance to analyze the impact of monetary policy on inflation rate in different time horizons for Pakistan. After the introduction in the first section, Section II provides a profile about the money supply and inflation trends in Pakistan. Section III consists of a brief review of the existing literature. Methodological issues and sources of data are elaborated in Section IV. The empirical estimation of different models of money supply and inflation are brought into the analysis in Section V. Finally, conclusion of study along with possible policy recommendations are set forth in Section VI.

II. MONETARY AGGREGATES AND PRICE LEVEL

Monetary aggregates have become most important sector over the last few years, specially, in order to control inflation rate and to enhance growth. The annual changes in different definitions of money supply (M1, M2, and M3) are shown in the following Table 1. It presents yearly change in the amount of monetary aggregates (M1, M2, and M3) as well as in percentage change.

Figure 1 presents that money supply (M1) consists of the outstanding stock of currency in circulation, the demand deposit of scheduled bank and the other deposits with the State Bank of Pakistan. Increase in the share of M1 indicates that it has positive contribution to inflationary pressure on the economy of Pakistan. Figure 1 shows an upward trend in money supply

TABLE 1

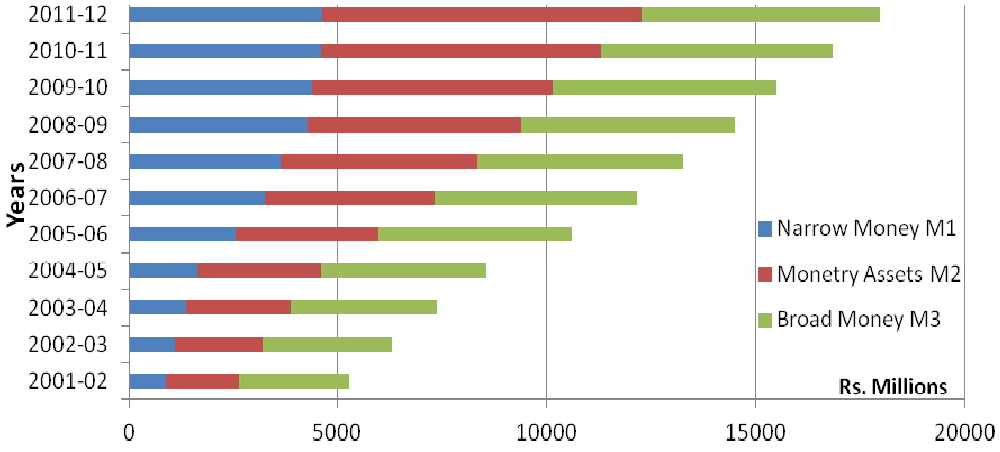
Money Supply in Pakistan (Rupees in millions)

End year stock	Narrow Money M1	Percentage change	Monetary Assets M2	Percentage Change	Broad Money M3	Percentage Change
2001-02	876.84	15.1	1,761.37	15.4	2,640.94	14.1
2002-03	1,106.25	26.2	2,078.71	18.0	3,102.00	17.5
2003-04	1,371.64	24.0	2,486.56	19.6	3,517.60	13.4
2004-05	1,624.12	18.4	2,966.39	19.3	3,975.50	13.0
2005-06	2,564.60	19.7	3,406.50	15.2	4,623.40	12.3
2006-07	3,256.72	76.9	4,065.16	11.0	4,837.50	9.4
2007-08	3,639.50	18.8	4,689.14	12.0	4,942.40	11.4
2008-09	4,262.22	19.3	5,137.21	15.0	5,099.50	15.2
2009-10	4,372.50	20.4	5,777.23	19.0	5,345.60	16.3
2010-11	4,599.50	23.2	6,695.20	22.0	5,560.90	18.2
2011-12	4,619.10	24.1	7,641.79	23.0	5,710.40	19.1

Source: *Pakistan Economic Survey* (various issues)

FIGURE 1

Monetary Aggregates of Pakistan



Source: *Pakistan Economic Survey* (various issues)

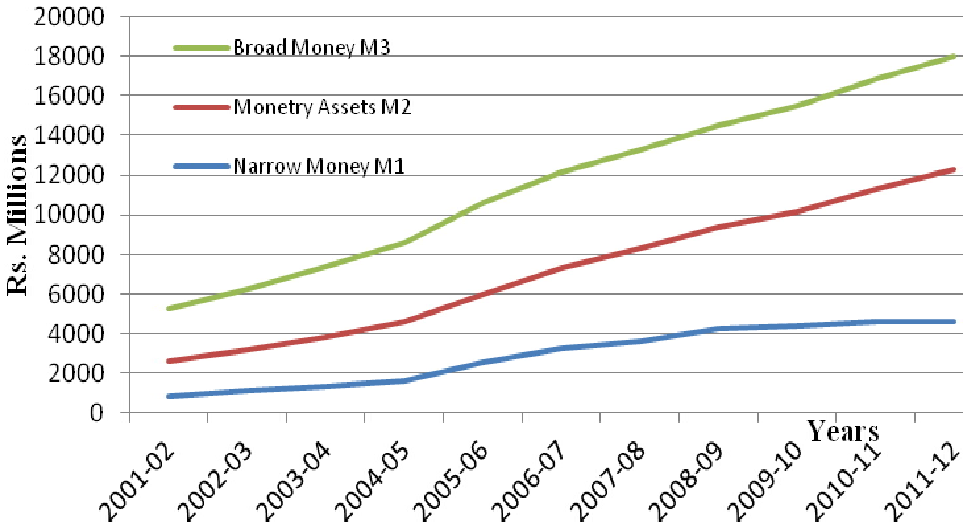
(M2). Money supply (M2), during 2006-07, expanded by Rs. 47.8 billion or 14 percent higher than the corresponding period the previous year. The main reason of this high monetary growth, during this period, was sharp rise in the net foreign assets (NFA) of the banking system and the growth in the net domestic assets (NDA) of the banking system accelerated at a lesser pace.

The overall money supply (M2) increased by 14 percent as against 12.1 percent in the same period last year. The monetary expansion was kept marginally below the projected nominal GDP growth over 14 percent in view of monetary overhang that had built up from excessive yearly monetary expansion since 2002-03.

Figure 2 presents the upward increasing trend in money supply (M3) during 1990 to 2011. During the 1990s, money supply increased at large level not only in public sector but also in private sector.

FIGURE 2

Trends in Monetary Aggregates



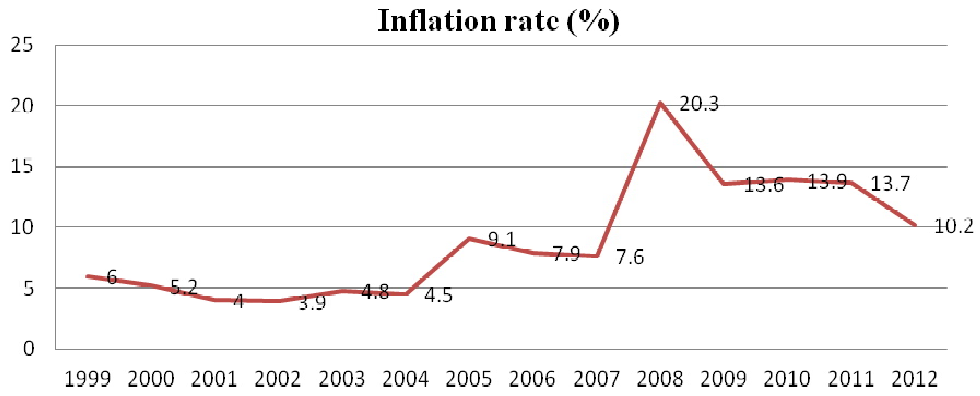
Source: *Pakistan Economic Survey*

In Pakistan, inflation rate was recorded as 3.3 percent during 1960s on an average and it geared up to 11.9 percent in the 1970s. The inflation rate fell again to an average of only 7.5 percent in 1980s. Since the early 1990s, inflation rate has been creating a serious matter for economists. A number of

reasons for this double-digit inflation rate are observed in 1990s which include supply shocks, monetary policy, tax policy, external shocks, pricing policy (*i.e.* procurement prices for agriculture products). While, expectations of people are the main factors that explain the inflationary pressures. The inflationary trends are explained with the help of Figure 3.

FIGURE 3

Trends in Inflation Rate



Source: *Pakistan Economic Survey* (various issues)

Analyzing the trends of inflation rate in Pakistan, there can easily be observed a fluctuating trend over the last 18 years. The pressure on prices increased due to inflation which shoots up to 13 percent mainly due to extremely high food inflation of 16.5 percent. The price pressure started to release from 1997-98 onwards due to an improved supply, strict budgetary measures and low international market prices. The inflation rate was at its lowest level in 2002-03, *i.e.* 3.9 percent. Owing to rise in the support price of wheat, shortage of wheat and increase in international prices (including the oil price), inflation reached at 9.3 percent in June 2005. The CPI based inflation during July-April 2007-08 was 10.3 percent on an average, as against 7.9 percent in the same period the previous year. Food inflation which is the largest component of the CPI, showed an increase of 15.0 percent. In the early period of 2008, inflation rate as measured by the changes in CPI reached at peak, *i.e.* 20.3 percent but in the late 2008, it started declining. This scenario changed in 2009 and inflation rate came down, *i.e.* 13.6 and in 2010, it was 13.9. Now in 2012, the inflation rate has been recorded as 10.2%.

III. LITERATURE REVIEW

The idea that persistent changes in price level are associated with change in money supply growth is one of the oldest and most established propositions in economics. The relationship between money growth and inflation rate is, ultimately, based on demand for money and supply of money**.** In low inflation countries there is positive association between money supply growth and inflation relative to real income in high inflation countries. Substantial changes in inflation rate in a country are certainly associated with money supply growth relative to real income. Money supply and its impact on inflation rate have been investigated by a number of researchers. Following is a comprehensive glimpse of an international literature on this issue.

Friedman (1963) argues that tight monetary policy maintained for a long time could check the inflation. The main emphasis of Friedman is on monetary description of inflation as his famous quotation is: "Inflation is always and everywhere a monetary phenomenon."

Friedman (1968; 1970; 1971) and Schwartz (1973) point out in the Monetarists Model that the past behaviour of money supply to output ratio will explain the prevailing rate of secular price changes.

Hossain (1986) constructed a simple monetary model of inflation. The basic assumption of that model was that any disturbance in real money stock (market) adjusted itself through change in price level. This study concluded that both exogenous and endogenous variables were observed that caused inflation in Pakistan.

Chaudhary and Ahmed (1995) analyzed the endogenous and exogenous nature of money supply. The results suggested that domestic finance of budget deficit, particularly, from banking system became inflationary in long-run in an economy. This explored the one to one strong relationship between money supply and inflation rate in an economy.

Moroney (2002) explored the quantity theory of money growth, inflation rate and GDP in long-run. Study showed that for the countries having high rate of money supply growth and inflation rate, the estimated M2 growth coefficient was close to one which strongly justified quantity theory of money and *vice versa*.

Abulrazag *et al.* (2003) presented an empirical investigation on money supply in the case of Qatar (UAE). Study used yearly data for the period of 1973 to 1998 and concluded that, in long-run, money supply was the

function of price level, real income, international reserves and government expenditure.

Brumm (2005) examined the relationship among money stock growth, output growth and inflation. The results showed that there was positive and significant relationship between money stock growth and inflation rate, and negative association between inflation and aggregate output growth. Empirical evidences strongly favour the Friedman's view that inflation is always and everywhere a monetary phenomenon.

Grauwe and Polan (2005) investigated quantity theory association between supply of money and inflation rate. It examined the two aggregates of money supply, *i.e.* M1, M2 (two proportions of quantity theory of money). Study showed positive and significant association between the long-run money supply growth rate and inflation rate. Same conclusions are drawn by Christensen (2001).

Qayyum (2006) explored the relationship between excess money supply growth and inflation rate for the economy of Pakistan and verified the Monetarists' views that "inflation is everywhere a monetary phenomenon." Study used time series data from 1960 to 2005 for the economy of Pakistan. Findings indicated that there was stable and one to one correlation between money supply growth and inflation rate.

Khan and Schimmelpfenning (2006) analyzed the main factors that might translate into inflation rate in Pakistan. Study employed the standard monetary variables such as money supply, credit to private sector as an active variable, exchange rate and interest rate in the model and used structural model of inflation which stressed on supply side factors as determinants of inflation. The outcome of the study was that monetary factors caused inflation in Pakistan. The same conclusions were drawn by Qayyum (2008).

Bakare (2011) investigated the determinants of money supply growth and its effect on inflation in Nigeria. It is found that 1% rise in money supply caused 5.6% increase in depicted inflation rate. Result referred to the strong supervision of money supply and money circulation (velocity) which caused high inflation in Nigeria.

Simwaka *et al.* (2011) presented an econometric investigation regarding the supply of money growth and inflation rate in Malawi. This study explored the factors of monetary aggregates that caused rise in inflation rate in Malawi.

Chaudhry *et al.* (2012) analyzed the nexus of monetary policy, inflation and growth in Pakistan using time series data properties from 1972-2010. The results indicate that credit to private sector, the variable of financial depth, real exchange rate and budget deficit are found elastic and significant variables to influence the real GDP in Pakistan. The pair-wise Granger causality results suggest that real GDP and real exchange rate are causing to each other bi-directionally. The real GDP also do cause financial depth, domestic credit and budget deficit uni-directionally. The real exchange rate is also causing the financial depth and budget deficit variables.

In this section, discussion regarding money supply and its impact on inflation rate is documented in detail. After a comprehensive literature review, conclusion is derived that increase in money supply has an inflationary effect on the economy. Different studies discussed the cause of inflation as growth in supply of money (Ogun and Adenikinju, 1995; Bakare, 2011; Qayyum, 2006; Khan and Schimmelpfenning, 2006). Therefore, inflation targeting policies are recommended by Fitzgerald (1991). Almost all studies are in the favour of positive and significant effect of money supply on inflation rate (Dwyer and Hafer, 1999; Moroney, 2002; Brumm, 2005; Grauwe and Polan, 2005; Qayyum, 2008; Bakare, 2011). Studies go with Monetarist view that inflation is always and everywhere a monetary phenomenon (Brumm, 2005; Qayyum, 2006; Okpara and Nwaoha, 2010; Bakare, 2011).

One of the interesting points which are common in all studies is that money supply is endogenously determined in short-run while in the case of long-run money supply is exogenously determined (Chaudary and Ahmed, 1995; Ahmed and Ahmed, 2006; Muhammad, 2010).

IV. DATA AND METHODOLOGY

This section consists of data and methodology to assess the effect of money supply on inflation rate. To analyze this relationship, ARDL techniques have been used for the estimation of results.

DATA

The data for this study are taken from Pakistan Economic Survey (Various Issues), Ministry of Finance, Fifty Year Economy of Pakistan (SBP) and World Bank (World Development Indicators). The data ranges from 1972-73 to 2011-13 is used for the analysis. Study uses inflation rate (IR) as dependent variable while Money supply (M2), interest rate (*i*), Gross

domestic product (GDP) are taken as explanatory variables. Variables are used into their log form to find out the elasticities.

TIME SERIES PROPERTIES OF DATA

At the formal level, stationarity can be checked by finding out if the time series data contains a unit root. The Dickey-Fuller (DF) and ADF tests can be used for this purpose. If the time series data is non-stationary but becomes stationary after differencing, then it is said to be integrated order one, *i.e.* I(1).

MODEL SPECIFICATION

The following model is formulated for the estimations of the results of money supply and inflation. This model finds the short-run and long-run impacts of money supply on inflation in Pakistan as follows:

$$IR_t = \beta_1 + \beta_2 (\text{M2}) + \beta_3(\text{GDP}) + \beta_4(i) + \mu_t$$

Where, μ_i = Disturbance term; β_0 = intercept term; β_1, β_2, β_3, β_4 = stimulus coefficients that measuring percentage change in response.

Whereas, the unrestricted vector error correction model is presented as below:

$$\Delta(IR)_t = \alpha_0 + \sum_{i=1}^{a} \alpha_{1i}\Delta(IR)_{t-i} + \sum_{i=0}^{b} \alpha_{2i}\Delta(M_2)_{t-i} + \sum_{i=0}^{c} \alpha_{3i}\Delta(GDP)_{t-i}$$
$$+ \sum_{i=0}^{e} \alpha_{4i}\Delta(i)_{t-i} + \alpha_5(\text{IR})_{t-1} + \alpha_6(\text{M}_2)_{t-1} + \alpha_7(\text{GDP})_{t-1} + \alpha_8(\text{i})_{t-1} + \mu_t$$

Above ARDL equation shows the short-run and long-run relationship between inflation, money supply, GDP and interest rate. $\alpha 0$ is the intercept term, while α_1, α_1, α_2, α_3, α_4 are the short-term coefficients of variables and α_6, α_7, α_8 are the long-term coefficients of the variables. Whereas, μ is the disturbance term and it includes all the ignored variables in the equation.

WALD-TEST (F-STATISTIC)

After regressing ARDL equation, we apply the Wald test (F-Statistic). The Wald test (F-Statistic) is used to establish the long-run relationship between dependent and independent variables.

The Null Hypothesis is given as follows:

$$\alpha_6 + \alpha_7 + \alpha_8 = 0 \qquad \text{(No long-run relationship exist)}$$

And Alternative Hypothesis as:

$$\alpha_6 + \alpha_7 + \alpha_8 \neq 0 \qquad \text{(A long-run relationship exist)}$$

If the calculated value of F-statistic is greater than the tabulated value then the null hypothesis is rejected and consequently alternative hypothesis is accepted and *vice versa*.

The long-run relation between dependent and independent variables is shown by the following equation:

$$(IR)_t = \beta_0 + \sum_{i=1}^{c1} \beta_{1i}(IR)_{t-i} + \sum_{i=0}^{c2} \beta_{2i}(M_2)_{t-i} + \sum_{i=0}^{c3} \beta_{3i}(GDP)_{t-i} + \sum_{i=0}^{c5} \beta_{4i}(i)_{t-i} + \mu_t$$

Equation shows the short-run relationship between dependent and independent variables as follows:

$$\Delta(IR)_t = \gamma_0 + \sum_{i=1}^{j1} \gamma_{1i}\Delta(IR)_{t-i} + \sum_{i=0}^{j2} \gamma_{2i}\Delta(M_2)_{t-i} + \sum_{i=0}^{j3} \gamma_{3i}\Delta(GDP)_{t-i} + \sum_{i=0}^{j5} \gamma_{4i}\Delta(i)_{t-i} + \lambda(\text{ECM})_{t-1} + \mu_t$$

In short-run equation the error correction term lagged $(\text{ECM})_{t-1}$ is added to adjust the results.

Error correction model (ECM_{t-1}) is the speed of adjustment from short-run to long-run equilibrium. In this equation, λ shows the speed of adjustment. The error correction shows the disequilibrium value.

V. RESULTS AND DISCUSSIONS

After the data and methodological issues, the study estimates the short-run and long-run impacts of monetary policy on inflation rate in Pakistan.

DESCRIPTIVE STATISTICS OF DATA

The descriptive statistics are represented in Table 2. Average values are measured with means and median. The Jarque-Bera (JB) test of normality provides combined results of skewness and kurtosis. Jarque-Bera (JB) test of normality shows that variables are normally distributed.

TABLE 2

Descriptive Statistics

Variables	GDP	I	IR	M2	RM
Mean	3006686	8.642564	10.64679	1351264.	135586.3
Median	1077943	8.800000	9.094895	544732.0	43910.17
Jarque-Bera	35.01189	1.434803	9.699595	16.91541	81.88817
Probability	0.000000	0.488019	0.007830	0.000212	0.000000
Observations	40	40	40	40	40

Source: Authors' calculations

STATIONARITY OF DATA

The stationary can be checked with the help of ADF test. Table 3 shows the calculation for ADF Test at the critical level of five percent. The results of the data show mixed order of integration.

TABLE 3

ADF Unit Root Test

Variable	At level	At 1st Difference	Conclusion
GDP	–0.914946	–5.9399	I (1)
IR	–7.712870	–8.9422	I (0)
M2	–1.011641	–4.9399	I (1)
I	–3.097144	–4.9422	I (0)

Source: Authors' calculations based on E-Views 7.0.

Table 3 is the representation of the Augmented Dickey Fuller test, *i.e.* ADF test. The ADF statistics calculated for checking the stationarity of variables time series variables.

BOUNDS TEST FOR COINTEGRATION

In the first step the existence of the long-run relationship among the variables is needed. We have used Bound Testing Approach in order to examine the long-run relationship. Table 4 interprets the findings of Wald-Test (F-

Statistics) for long-run relationship. The value of F-statistics based on Wald test is given in second column. The upper bound values are reported in third column of Table 4. The results of the test indicate that there exits long-run relationship among the variables in the model.

TABLE 4

Bound Testing for Cointegration

Equation	F-Statistic	Upper Bound Critical Value	Conclusion
IR / GDP, M2, *i*	13.73 [0.00]	5.96 (1%)	Integration exists

Source: Authors' calculations.

NOTE: f-statistic: 13.73 (Significant at 1% marginal values). Critical Values at $k = 5 - 1 = 4$ is cited from Narayan (2005), Case v: unrestricted intercept and unrestricted trend. The numbers in parenthesis shows the probabilities of F-statistic.

LONG-RUN AND SHORT-RUN IMPACT OF MONEY SUPPLY ON INFLATION RATE

The short-run and long-run estimates of money supply impact on rate of inflation are reported in Table 5. Results show a positive impact of money supply on the rate of inflation that is statistically significant. This finding of the study is consistent with the theoretical and empirical evidences that argue that money supply is always a monetary phenomenon (Friedman, 1963; Kemal *et al.*, 1980; Hossain, 1986; Chaudhary and Ahmed, 1995; Qayyum, 2006).

TABLE 5

Long-Run Impact of Monetary Policy on Inflation
Dependent variable: INF

Regressor	Coefficient	Standard Error	T-Ratio
i	–0.112	0.80611	1.6947
M2	5.933	13.76	2.4310
GDP	–6.063	14.30	–0.42399
C	5.226	21.42	0.24393

Source: Authors' calculations

TABLE 6

Short-Run Impact of Monetary Policy on Inflation Rate
Dependent variable is INF

Regressor	Coefficient	Standard Error	T-Ratio
di	0.033239	0.25455	0.13058
dM2	1.7542	4.0498	0.43316
dGDP	19.6047	8.2844	2.3664
dC	1.5451	6.4694	0.23883
ecm(–1)	–0.29565	0.18399	–1.6069

Source: Authors' calculations

With an increase in inertest rate which is the cost of holding money, stimulates the money demand for holding to decease that results in low level of prices of goods and services (Khan and Schimmelpfenning, 2006). The effect money demand is captured by real GDP. Whereas the factors that determine the real income level are different from the factors that determine money demand. So the price level remains unrelated with the level of real income (Qayyuam, 2006) as results show a negative relation but that is insignificant. The results are also in line with the finding of Khan and Qasim (1996).

The error correction estimates indicate the time required for inflation to converge to its long-run equilibrium. The short-run results indicate that income has only significant short-run results.

TABLE 7

Diagnostic Test

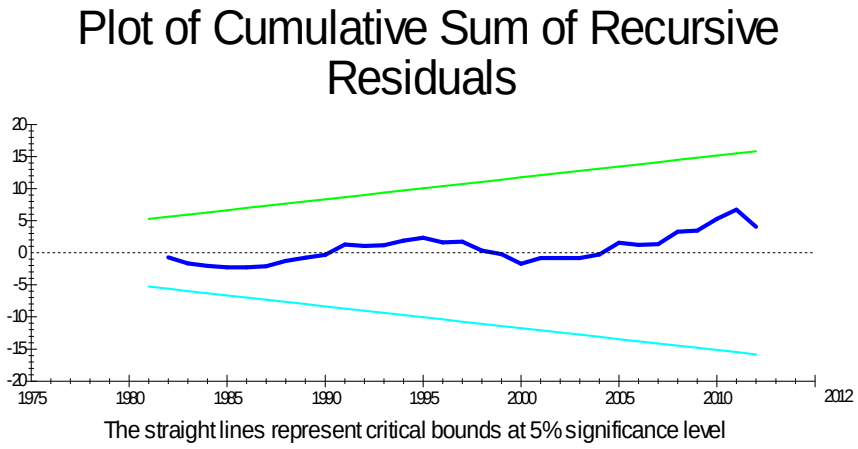
* Test Statistics *	* LM Version *	* F Version *
* A: Serial Correlation	*CHSQ(1) = 0.31032 [0.577]*	F(1, 31) = 0.25524 [0.617]
* B: Functional Form	*CHSQ(1) = 0.057099 [0.811]*	F(1, 31) = 0.046651 [0.830]
* C: Normality	*CHSQ(2) = 1.2093 [0.546]*	– Not applicable –
* D: Heteroscedasticity	*CHSQ(1) = 2.6221 [0.105]*	F(1, 36) = 2.6682 [0.111]

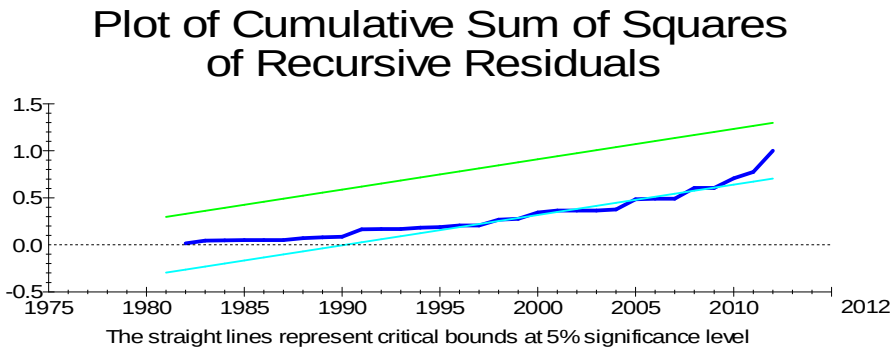
Source: Authors' calculations

DIAGNOSTIC AND STABILITY TESTS

The diagnostic and stability test are performed to check the econometrics soundness of the model. Our model passes the entire tests and is free from any biasness.

STABILITY TEST





VI. CONCLUSION

The present study is designed to investigate the short-run and long-run impact of monetary policy on inflation rate in Pakistan by using the time series data and employs ARDL techniques for the estimation of the results. The study figures out important policy variables that would be helpful in prudent policy formulation for controlling inflation in Pakistan. Results of

the study go in favour of monetarist approach that money supply is the main cause of inflation while any increase in interest rate is responsible for reducing inflationary pressure in Pakistan. While increase in national income fulfills peoples demand for the commodities and slows down the inflationary pressure, the results reveal. This leaves a clear message for economic planners that inflation targeting policies may be helpful through controlling the interest rate, money supply and country output level.

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