MODELING INFLATION EXPECTATIONS IN PAKISTAN

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ABSTRACT

This study examines the macroeconomic determinants of inflation expectations in Pakistan. We used 5-month moving average technique to generate future inflation in Pakistan using the monthly data for the period of Sep-03 to July-11. The study undertook FMOLS and ECM approach to assess the short run and long run impact of independent variables through hybrid new Keynesian type Phillips curve. The results suggest that inflation expectation generated through the 5-month moving average well captured the turning points in actual inflation. While in the exploration process of the determinants of expected inflation, the empirical results indicate that money supply, gold price, real effective exchange rate, real interest rate, and food inflation are main determining variables while output gap and nominal interest rate have no significant impact on expected inflation in Pakistan. Interesting conclusion drawn is that in the long run CPI index of fuel and energy is significant but in the short run the international crude oil price is significant. The importance of past inflation in determining expectations appears to be relatively low in the short run, but in the long run. The overall empirical evidence does suggest the presence of substantial inertia in the inflation process in the long run.

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1. Introduction

Inflation describes the process of sustained price increases for a wide range of goods and services. Thus, inflation originates from decisions by enterprises to increase the prices for their goods and services. While taking such decisions, enterprises do not only take into account the past development of prices and costs (wages, input prices, rents), but also their expected increase in costs and prices in the near future. In such a way, inflation expectations become a key determinant of inflation itself. This insight has deep consequences for the conduct of monetary policy and for fighting inflation in general. In order to combat inflation it is not sufficient to restrain current monetary and fiscal policy; the authorities have also to target inflation expectations and try to influence them in a positive way. Only when inflation expectations are anchored, the authorities will be able to achieve price stability.

A bulk of research has been done on different aspects of inflation expectation all over the world. Berk (2006), Leduc, Sill and Stark (2007), Mehra and Herrington (2008), and Leduce *et a*l., (2007) analyzed impacts of different variables on inflation expectation. Toyoda (1987), Kariya (1990), Berk (2000) and Pesaran and Weale (2006), transformed qualitative survey data into quantitative estimates. Gramlich (1983), Batchelor and Dua (1989), Roberts (1998), Thomas (1999), and Mankiw *et al*., (2003) compared inflation expectation among different types of agents. Carlson (1977), Batchelor and Dua (1989), and Mankiw *et al*., (2003), analyzed the distribution of inflation expectations.

In addition to these studies, there are also studies that explore the effects on the inflation expectation of other monetary policy instruments. For example, Hori and Shimizutani (2003) analyze a survey that directly asks respondents about the effect on inflation expectations of the quantitative easing of monetary policy implemented from 2001 in Japan. From the perspective of inflation targeting, Orphanides and Williams (2002) and Erceg and Levin (2003) studied peoples' learning processes and their inflation expectations. Many empirical studies have been conducted using inflation expectations to understand the phenomena of monetary policy in different periods. Leduc, Sill and Stark (2007), Demery and Duck (2007), Mehra and Herrington (2008) and Carrol (2003), agree on the importance of anchoring public expectations for the use of monetary policy, particularly in dealing with monetary policy shocks.

Inflation developments are posing a discouraging task to monetary policy authorities across the world – 'today's most perplexing economic debate' as it has been termed (Samuelson, 2009).

In Pakistan, perhaps more surprisingly than elsewhere the dilemma is at the razor's edge. Historically, Pakistan is not accustomed to lower inflation and thus has less tolerance towards higher double-digit inflation. In this backdrop, persistence of high double-digit inflation for third year in a row has become intolerable and the government is pursuing combination of several policy measures. From the above discussion the question arises is that is this inflation expectation which really matters, and what is the relationship of actual inflation and inflation expectation especially in Pakistan? PIDE Inflation Expectation Survey depicts a true picture of the relationship between inflation and inflation expectation for Pakistan. From December 2009 to August 2011, actual inflation and expected inflation remain almost the same.[1]

While in Pakistan, expected inflation is addressed through Phillips curve, which is analyzed by few researchers who used expected inflation as a dependent variable. For example, Satti *et, al*., (2007), and Saleem (2010) found that future expectations of inflation play a very significant role in inflation determination. Afzal and Saima (2012) concluded that the reduced form Phillips curve structure reveals that the expected inflation is significant. Similarly, Yasmin and Afzal (2012) found that though the coefficient of expected inflation is small but is significant in case of hybrid new Keynesian Phillips Curve in the context of inflation target supported new Keynesian monetary model. Hassan (1999) tested the validity of fisher equation and used expected inflation as a dependent variable. It means that expected inflation has a significant importance in analyzing all the major problems in an economy especially in monetary policy. Now the importance of inflation expectation been acknowledged, not only by central banks and academic institutions but also by individual researchers.[2]

Two questions are important: first as the Federal Reserve Board chairman Bernanke (2007) states that undoubtedly, the state of inflation expectations greatly influences actual inflation and thus the central bank's ability to achieve price stability. What *do we mean, precisely, by "the state of inflation expectations"? How should we measure inflation expectations?"* Second question is that which factors determine the expected inflation. The answer of the two questions

[1] Figure 9 PIDE Inflaion expectation survey vol. 3 No.2/2011

[2] PIDE inflation expectation survey is being conducted since 2009. Recently IBA started survey in collaboration with State Bank of Pakistan (SBP) about expectations regarding inflation, interest rates, stock prices, and employment. Saleem (2010), the role of past and expected inflation is almost equal in determining the current inflation.

is important for the monetary policy in Pakistan with the most important objective of price stability. However, in case of Pakistan, to the best of our knowledge, the determinants of expected inflation have not been investigated yet which is the main purpose of this study. This study will address the following issues in Pakistan's economy:

(a) What are the determinants of inflation expectations and their effects on the economy particularly why inflation expectations appear to lead realized inflation? (b) Whether inflation expectations are monetary phenomena or real dominant variable that affect inflation expectation? (c) What are the properties of inflation expectation within a country like Pakistan?

The rest of the paper is structured as follows. Section 2 provides review of studies. Methodology and data have been explained in section 3. Section 4 carries the empirical results and the conclusions have been given in section 5.

2. Literature Review

Leduc, Sill, and Stark (2007) add eight-month ahead inflation expectations to an otherwise conventional macroeconomic VAR and examine the roles of shocks to expectations, monetary policy, fiscal policy, and oil prices in accounting for the sharp rise in inflation in the 1970s. They report that prior to 1979 shocks to inflation expectations had essentially permanent effects on both inflation and expectations. Since 1979, however, the impacts of expectations shocks have been temporary. Expectations shocks continue to impact inflation, but die out relatively quickly. The change across samples appears to be associated with monetary policy: prior to 1979, the real federal funds rate initially declined in response to the expectations shock but since 1979, the real rate has risen significantly in response to expectations shocks.

In two empirical studies using expectations based on market data Gurnayak *et al*., (2002, 2003) provide evidence that US nominal forward rates at long horizons react significantly to surprises in macroeconomic data releases and monetary policy announcements, while forward rates derived from inflation-indexed Treasury debt show little sensitivity to these shocks. This suggests the response of nominal forward rates is mostly driven by changes in inflation expectations. However, they note that in UK long-term forward rates have not demonstrated excess sensitivity since the Bank of England achieved independence.

De Carvalho and Bugarin (2006) identified several economic variables affecting the inflation expectations in three countries: Chile, Mexico, and Brazil. In their findings, public expectations in Chile were influenced by output gaps and the exchange rates. Mexico's inflation expectations were affected mainly by output gaps, administered prices, interest rates, exchange rates and the inflation target set by the central bank. However, Brazil demonstrated a unique behavior where it was the inflation targets that significantly influenced the expectations, while other variables such as interest rates, past supply and demand, and inertia conditions were influential.

Kozo (2010) compared the determinants of households' inflation expectations in Japan and the United States by using a VAR model that includes survey data on households' inflation expectations for Japan and the US. They investigated their determinants and influences on the economy and compare their properties in two countries for the sample period 1975: I to 2007: IV. They construct a four-variable VAR in which the endogenous variables are the output gap, the short-term nominal interest rate, realized inflation, and inflation expectations. The exogenous variables are energy price changes and (fresh) food price changes. Short-term non-recursive restrictions are imposed taking into account the simultaneous co-dependence between realized and expected inflation. They found that responding to changes in exogenous prices and to monetary policy shocks, inflation expectations adjust more quickly than does realized inflation. Compared with Japan, the effects of exogenous prices on inflation and inflation expectations in the US are not only large but also long lasting and shocks to expectations have self-fulfilling effects on inflation.

Patra and Ray (2010) pursues a computationally intensive approach to generate future inflation, followed by an exploration of the determinants of inflation expectations by estimating a new Keynesian type Phillips curve that takes into account country-specific characteristics using the data for the period April 1997 to December 2008 for India. They adopted a model-based approach to obtain inflation expectations. For identifying the determinants and the underlying lag structures that characterize the process of formation of inflation expectations, they employ Hendry's general to specific approach (popularly referred to as the London School of Economics or LSE approach). They concluded that lagged inflation, changes in fuel and primary articles prices and the output gap are the main determinants, followed by the real interest rate and

changes in prices of primary articles. While taking together, food and fuel price changes account for 40 percent of variations in inflation expectations, the output gap enters with a positive sign and is significant with 14 percent of expected inflation.

Castelnuovo (2010) estimated a reduced-form model that takes both domestic and global indicators of economic slack and inflationary pressures into account while tracking the U.S inflation expectation and the sample period is 1970:I-2006:III. They used Survey of Professional Forecasters, Federal Reserve Bank of Philadelphia for inflation expectation and lagged inflation, output gap, money supply growth rate, US inflation rate and US labor cost as domestic variables while output gap of six OECD countries, inflation rate of these countries and trade openness as global factors. Their main findings point towards the instability of the estimated parameters of empirical models. In particular, global indicators appear to have played a significant role until the mid-1980s, but they have subsequently been 'replaced' by the U.S. monetary policy stance as one of the main drivers of U.S. inflation expectations. This finding points towards the enhanced credibility that the Fed began to gain after the end of the Volcker experiment.

Cerisola and Gelos (2005) examined the macroeconomic determinants of survey inflation expectations in Brazil since the adoption of inflation targeting in 1999 with three different econometric methods (OLS, GMM, and fully modified OLS). They used the 12-month lagged inflation, 12-month-ahead inflation target rate, the primary fiscal balance as percent of GDP, the monetary policy, real effective exchange rate and real wage. The results suggest that the inflation targeting framework has helped anchor expectations, with the dispersion of inflation expectations declining considerably particularly during periods of high uncertainty. They also found that apart from the inflation target, the stance of fiscal policy, as proxy by the ratio of the consolidated primary surplus to GDP, has been instrumental in shaping expectations. The importance of past inflation in determining expectations appears to be relatively low, and the overall empirical evidence does not suggest the presence of substantial inertia in the inflation process.

3. Methodology and Data

The method to Inflation expectations proxy adopted in this paper estimated utilizing a five-month moving average (with two leads and two lags,) of actual inflation as suggested by Yuhn (1996). This measure of inflation expectations embodies the use of both backward and forward-

looking information in the formation of inflation forecasts. Yuhn (1996) motivates this methodology by pointing out that economic agents make their inflation forecast based on a finite information set that does not span too far into the future. This approach also allows both past and future data to be included in the final estimation, making it a more accurate representation of how economic agents make their inflation forecasts. Pain and Thomas (1997), Yuhn (1996) and Carneiro, Divino and Rocha (2002) all utilize a simple moving average modeling procedure to generate the required expected inflation time series. While using hybrid new Keynesian Phillips curve, the equation for expected inflation is:

$$\pi^{e}_{t} = \alpha_o + \alpha_1 \Delta\pi t_{-1} + \alpha_2 \pi^{f}_{t-1} + \alpha_3 reer_{t-1} + \alpha_4 y_{t-1} +$$

$$\alpha_5 ex_{t-1+} \alpha_6 \pi^{ff}_{t-1} + \alpha_7 r_{t-1} + \alpha_8 i_{t-1} + \alpha_9 op_{t-1} + \alpha_{10} gp_{t-1} + \alpha_{11} M_s + \epsilon_t \quad (1)$$

Where

π^{e}_{t} = 1-month ahead expected inflation rate

$\Delta\pi_{t-1}$ = 1-month lagged percentage change in CPI

y_{t-1} = one period lagged output gap approximated through a Hodrick- Prescott filter

π^{f}_{t-1} = 1-month lagged CPI index for fuel and energy

π^{ff}_{t-1} = 1-month CPI index for food as a proxy for the food inflation

r_{t-1} = ex-ante real interest rate [3]

I_{t-1} =nominal policy interest rate (to proxy for the stance of monetary policy).

reer = deviations of the real effective exchange rate trend values (where the trend is approximated through a Hodrick- Prescott filter

op_{t-1} = 1-month lagged per barrel crude oil price in US dollar in international market.

gp_{t-1} = 1-month lagged gold price in Rupee/10 gram.

M_s = 1-month lagged money supply (M_2)

ex_{t-1} = lagged 1-month nominal exchange rate

While ϵ_t is the white noise error term. The source of the data is the various issues of monthly statistical bulletin of State Bank of Pakistan.

UNIT ROOTS, JOHANSEN COINTEGRATION TEST, AND ERRORCORRECTION MODEL

Before the expected inflation relationship with independent variable can be tested for the existence of a long-term relationship, the time series properties of these variables need to be

[3] We use 6-month Treasury bill interest rate as a proxy for real interest rate.

examined. It is necessary to understand whether the stochastic process generating the time series can be assumed to be constant over time. The unit root test is applied to the variables in order to determine whether the time series data collected have stationary I(0) or non-stationary I(1) characteristics. Econometrically, a stationary process is a random process, which has a constant mean, a constant variance, and other statistical properties that do not vary with time. Parallel to this definition, a process whose statistical properties do change through time is defined as a non-stationary process. If the variables were proven to be non-stationary, it would be difficult to represent the relationship between the past and futures values of these variables within a simple algebraic model. If two such random variables are regressed on one another, the results can be misleading in that conventional significance tests may tend to indicate a relationship with a high R^2 and a low Durbin-Watson statistic even though no true relationship exists between the variables. Such cases create the so-called spurious regressions in which two independent and unrelated time series are found to be related.

In this study, we used KPSS (1992) test of unit root. Although the Augmented Dickey-Fuller test, developed by D. A. Dickey and W. A. Fuller in the 1970s, is the most common test used to determine whether a unit root is present in an autoregressive model. However, most tests of the Dickey-Fuller (DF) type have low power (see Dejong *et al.,* 1992). So we performed the Kwiatowski, Phillips, Schmidt, and, Shin (KPSS, 1992) test which is considered relatively more powerful. The test differs from other unit root tests in a way that the analyzed series, $t\ y$, is assumed to be stationary, I(0), under the null hypothesis. $H_o = y_t \sim I(0)$

For this reason, in order to confirm unit root by the KPSS test, the calculated statistics should be higher than the critical value. Therefore, contrary to the ADF test, the null hypothesis should be rejected to conclude for the presence of unit root in $y_t \sim$ I(1).

If the hypothesis of non satationarity is established for the underlying variables, it is desirable and important that the time series data are examined for cointegration. Toda and Philips (1993) have shown that ignoring cointegration when it exists, can lead to serious model misspecification. We use the maximum likelihood procedure of Johansen (1991, 1995) because it is based on well-established maximum Likelihood procedure. Johansen's method uses two test statistics for the number of cointegrating vectors: the trace test (λtrace) and maximum eigen value (λmax) test. λ trace statistic tests the null hypothesis (H_0) that the number of distinct cointegrating vectors is less than or equal to (r) against the alternative hypothesis of more than (r)

cointegrating vectors. The second statistic tests Ho that the number of cointegrating vectors is (r) against the alternative of (r +1) cointegrating vectors.

We use the fully modified least squares (FMOLS) estimator developed by Phillips and Hansen (1990) because the FMOLS estimator is an instrumental variable estimator with I(1) regressors and thus robust in the models with I(1) variables and endogenous regressors. Additionally, the FMOLS is applicable in models with either full rank or cointegrated I(1) regressors and even in models with stationary regressors. Another attractive feature of the FMOLS method that makes it more appropriate to this paper is its admission of both I(0) and I(1) regressors in the same equation and the fact that it does not require for predetermination of the cointegration rank . In such cases the limit theory of the fully modified (FM) estimates of the stationary components of the regressors is equivalent to that of OLS, while the FM estimates of the non-stationary components retain their optimality properties (i.e. they are asymptotically equivalent to the maximum likelihood estimates of cointegrating matrix) (Phillips, 1995).

The data on CPI indexes, money supply, and gold price, nominal and real interest rate have been collected from the SBP (State Bank of Pakistan, the central bank) monthly statistical bulletin. To proxy output gap, large-scale manufacturing index is used and is taken from monthly Statistical Bulletin of SBP. While the data for oil price in international market is taken from the website of US Energy Information Administration.[4] The sample period is from January 2003 to September 2011 with monthly frequency.

4. Empirical Analysis

The KPSS unit root test result is given in table 1. All the variables are in log form and taken the lagged values. The results show that all the variables are non-stationary in level form because the null of stationarity of the KPSS is rejected for all variables for without trend and for with trend. To determine the order of integration, we applied KPSS unit root test to examine the variables in their first differences. The null of stationarity is accepted for all the variables for their first differences. Therefore, all the variables are first difference stationary I (0) thus integrated of order 1.

[4] Source: www.eia.gov/ /petroleum/marketing/monthly.

Table 1. Unit Root Test (KPSS)

	KPSS Level		KPSS First Difference	
VARIABLE	Without trend	With trend	Without trend	With trend
π^e	0.96	0.11	0.16	0.06
π^{ff}	1.26	0.27	0.29	0.07
π^f	1.23	0.27	0.67	0.07
GP	1.26	0.21	0.12	0.03
I	1.17	0.18	0.07	0.07
$\Delta\pi$	0.35	0.18	0.04	0.04
OP	0.86	0.16	0.07	0.04
R	0.99	0.16	0.79	0.01
Y	0.92	0.31	1.07	0.02
Ms	1.27	0.30	0.17	0.03
Reer	0.69	0.11	0.05	0.04
Finf	1.23	0.27	0.67	0.07

Note: 1%, 5% and 10% critical values for KPSS are 0.73. 0.46 and 0.35 for *without trend.* 1%, 5% and 10%critical values for *with trend* are 0.216, 0.146 and 0.1199. These critical values are from Kwiatkowski-Phillips-Schmidt-Shin (1992, Table 1, p.166).

Second step of Johansen Co-integration technique involves the selection of appropriate lag length using proper information criterions. We have used Final Prediction error, Akaike information criterion, and Hannan – Quinn information criterion in our study and results are reported in Table 2. Favorable lag length that is selected in current analysis is assumed to be 2 at which the values of information criterions are minimum.

At third step, the study has found number of co-integrated equations using trace statistics and maximum eigenvalue statistics. According to probabilities given in tables 2 and 4, the analysis rejects the null hypothesis that there is no co-integrated vector (None), there is at most 1 co-integrated vector (At most 1), there is at most 2 co-integrated vectors (At most 2), there is 3 co-integrated vectors (At most 3) and also there is at most 4 cointegrated vectors (At most 4). It means that there are 5 co-integrated vectors in long run results. It shows high association between explanatory and dependent variables used in current study

Table 2. Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistics	0.05 Critical Value	Prob.**
None *	0.786921	508.4936	285.1425	0.0000
At most 1 *	0.637768	367.7992	239.2354	0.0000
At most 2 *	0.565331	275.3914	197.3709	0.0000
At most 3 *	0.478178	199.5729	159.5297	0.0001
At most 4 *	0.403403	140.3838	125.6154	0.0046
At most 5	0.293204	93.38108	95.75366	0.0720

Trace test indicates 5 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. Unrestricted Cointegration Rank Test (Maximum Eigen value)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.786921	140.6944	70.53513	0.0000
At most 1 *	0.637768	92.40778	64.50472	0.0000
At most 2 *	0.565331	75.81852	58.43354	0.0005
At most 3 *	0.478178	59.18909	52.36261	0.0087
At most 4 *	0.403403	47.00275	46.23142	0.0413
At most 5	0.293204	31.57814	40.07757	0.3266

Max-eigenvalue test indicates 5 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 4 exhibits the results of the FMOLS regressions. In general, the estimation results are robust and track inflation expectations reasonably well. Lagged inflation (ΔΠt-1), changes in fuel and primary articles prices. Gold price (Gp), nominal exchange rate (ex) and the money supply (Ms) are the main determinants, followed by the food inflation.

Table 4. Estimated Equation for drivers of inflation expectation.

Variable	Coefficient	T-stat	Probability
C	-4.54	-3.07	0.0029
ΔΠt-1	0.20	2.95	0.0045
Y_{t-1}	-0.006	-3.07	0.0029
Π^{f}_{t-1}	0.55	-2.85	0.0055
Π^{ff}_{t-1}	1.60	1.92	0.057
R_{t-1}	-0.05	-0.95	0.3403
I_{t-1}	-0.16	-0.77	0.4419
$Op_{t-`}$	-0.04	-0.66	0.5099
Gp_{t-1}	0.17	1.68	0.0963
Ms_{t-1}	0.71	2.25	0.0268
$Reer_{t-1}$	0.37	1.46	0.1473
Ex_{t-1}	-0.012	-4.04	0.0268
R-squard = 0.26	D.W stat = 2.39		

The estimates suggest that the coefficients on lagged inflation (ΔΠt-1) contributes significantly with the coefficient of (0.20) to explain the formation of inflation expectations. The negative sign implies that an increase percent change in previous period will increase the expected inflation in the preceding period.

Surprisingly output gap coefficient shows ambiguous result with negative sign. One interpretation may be that we have taken large-scale manufacturing index as proxy for output, which reflects itself as not a true representative of monthly output growth in Pakistan.

We have included three international variables, which are hypothesized to positively affect the expected inflation. These are real effected exchange rate (reer), nominal exchange rate (ex) and international price of crude oil and interestingly exchange rate is statistically significant

explaining the fact that exchange rate changes has an immediate impact on expectations. Oil price is an important factor that determined the expected inflation but in case of Pakistan, the impact of changes in oil price is reflected in CPI index of fuel and energy (π^{f}_{t-1}) which is statistically significant. The intuition behind this is that in Pakistan oil and energy prices are not directly proportional to international prices. A larger coefficient implies that as a result, the effect became permanent and increased along the longer periods as the oil prices affected other important commodities, such as electricity and transportation. It confirms the phenomenon like inflation that the expected inflation is also imported in Pakistan.

We also included gold price as a variable due to two reasons. Firstly, Pakistan is a consumption-oriented society, and gold is very important commodity. Secondly, gold is also considered as a real asset to invest. Due to these reasons the results also confirms that gold price is statistically significant variable to effect the expected inflation. An important finding from the point of view of the subject of this paper is the influence of the monetary variables which proxies the stance of monetary policy. In contrast to earlier studies, this found that monetary aggregates appeared to contain the best information about future inflation. Our experience with using monetary aggregates, including real interest rate, nominal interest rate, and money supply, is ambiguous and unsatisfactory. Money supply (M_2) is significant but the real interest rate and nominal interest rate or policy rate are insignificant. Money supply is significantly affecting the expected inflation with a positive sign that implies that an increase in money supply in the current period will increase expected inflation in the next period.

It is worthwhile to note the coefficient of constant, which is statistically significant and value of R^2 (0.26), both of these collectively indicate the possibility of addition on the right side variables in the model. In short, our model though needs a lot of improvements yet it serves as a base for modeling expected inflation and gives a new insights in the most critical problem inflation and expectation of inflation in Pakistan.

We check the results for the stability test by examining the CUSUM and CUSUM square test, which confirms that the model is stable (see appendix)

Table 4. Error Correction Estimation Result

Dependent Variable	Coefficient	T-stat	Probability
C	-6.04	-3.35	0.0014
Ψ	-0.34	-2.74	0.0081
ΔΠt-1	0.01	1.62	0.1095
Y_{t-1}	-0.001	-0.41	0.6761
Π^{t}_{t-1}	-0.47	-1.81	0.0757
Π^{ff}_{t-1}	3.69	2.07	0.0434
R_{t-1}	-0.21	-3.09	0.0031
I_{t-1}	-0.02	-0.15	0.87
$Op_{t-`}$	0.18	2.88	0.0055
Gp_{t-1}	-0.11	-0.45	0.6525
Ms_{t-1}	0.47	1.89	0.0631
$Reer_{t-1}$	0.98	2.43	0.01

Table-4 shows the result of error correction model, the error correction term has the negative sign and statistically significant (at 5% level). The coefficient value of error correction term is 0.34, which suggest that 34 per cent of disequilibrium of previous month will eliminate within the current month. The error correction model gives very interesting and meaningful result as compare to long run results depicted in table 3. Real interest rate and international oil price which was insignificant in long run has become significant in the long, meaning that both variable have short run impact but no effect in the long run.

The monetary policy has more power in the short run as compare to long run because in the short real interest rate is also significant along with money supply, which was significant in the long run also.

5. Conclusion

The role of expectations in the inflation process has been hotly debated over the years. Although economists agree that inflation expectations matter, there is not yet consensus about which inflation expectations matter (Mankiw, 2007). Does current inflation depend on the *current* expectation of *future* inflation (forward-looking new Keynesian models) or on the *past* expectations of *current* inflation (backward-looking models)? Failure to investigate this issue fully could lead to flawed economic policy. The Pakistan economy has experienced a relatively high inflation with an average inflation rate of about 11.22 percent over the period sep-03 to jul-11. In this context, expectations related to inflation played a cruel role in determining the actual inflation.

The purpose of this study was to examine the factors, which helps to determine inflation expectations in the Pakistan economy over the period 2003-2011. Empirical analyses on the formation of expectations can be divided into two categories: first, those studies that have been done by asking people about the future values of inflation (survey studies). Second, those studies

that have tried to extract expectations from past data, on the assumption that people look to experience as a guide to the future. This study followed both the approaches and found that the expectation hypothesis is accepted for the both models.

The 5-month moving average method is adopted to get expected inflation, which shows quite satisfactory results. The estimated results ensure quite a useful picture of the matter under discussion. We can argue that there are two monetary instruments that influence the inflation expectations that State Bank of Pakistan can use to anchor expectations. First, the Bank can utilize real interest rates and money supply as the main variable to anchor the public expectations as it has a significant influence on their formation. This could be conducted through strengthening its policy on interest rate and money supply even further. The effect of interest rates and money supply on future inflation expectations provides evidence that the Bank has taken the appropriate step to conduct its monetary policy through managing real interest rates and money supply. This study paved a way for further research for the relationship between policy rate and expected inflation by using techniques that are more sophisticated.

Due to the unavailability of monthly data, we are unable to assess the role of administered prices because in developing economies the role of administered prices is very important in determining the inflation expectations and confirmed by many studies. Similarly we have not included the role of fiscal policy in determining the inflation expectations only due to lack of availability of monthly data.

The significant impact of two global variables paved a way for assessment of other global variables like, balance of payments and inflation in the largest trade partner. In the last it is necessary to mention that in the rest of the world a bulk of research is under taking on the expected inflation by using different types of surveys conducted frequently in almost all developed and developing countries. There is a need to incorporate survey results in the research to order to obtain more authentic and reliable results, which are the need of hour for policy making in Pakistan.

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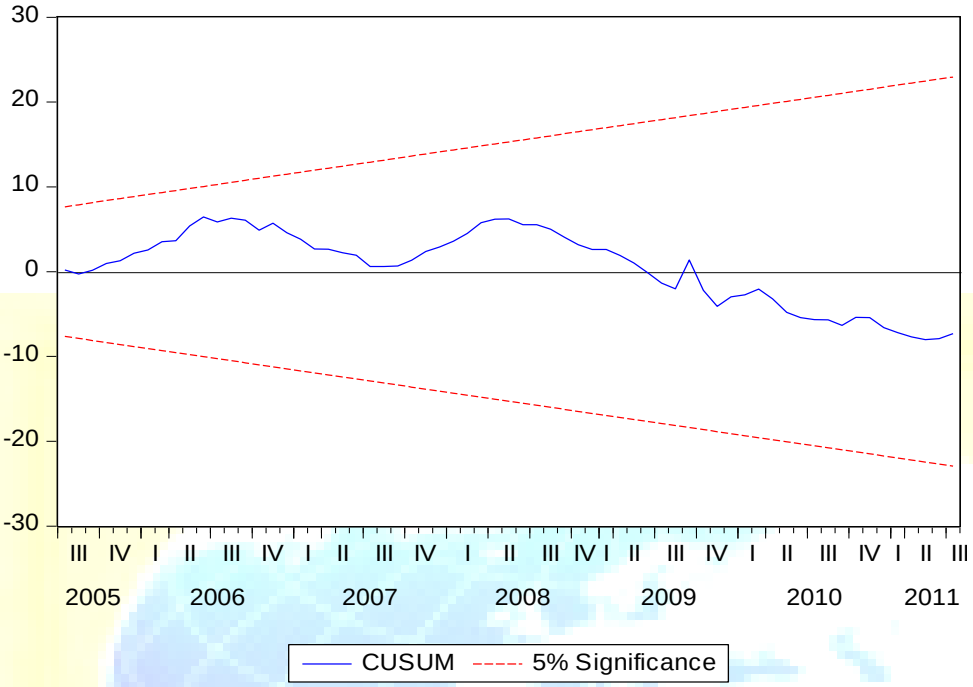
Appendix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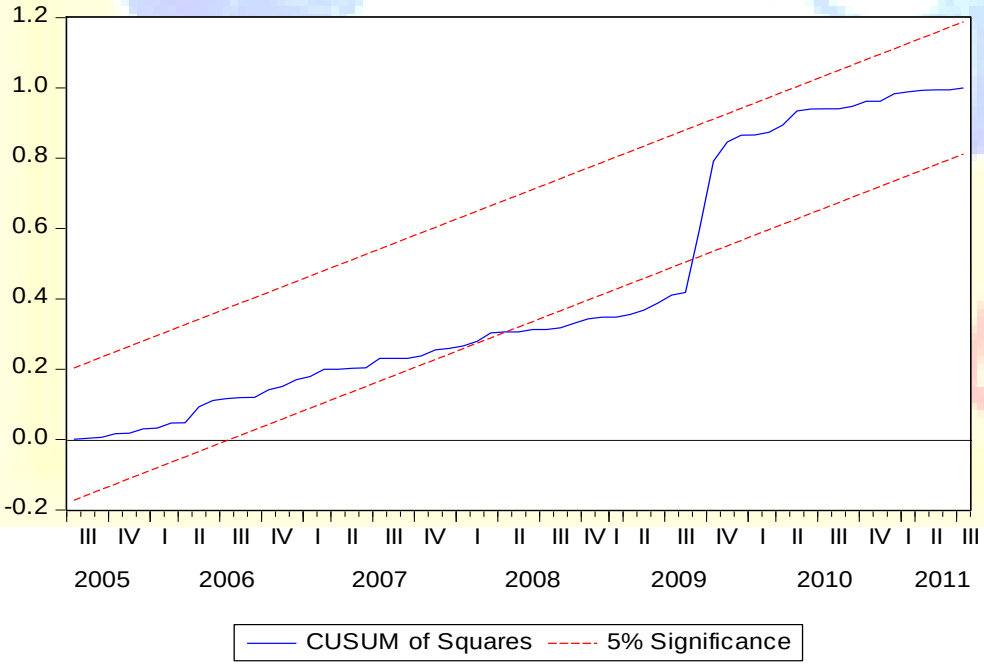
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