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Economic Management and Roots of Inflation in Pakistan

Ayesha Noor and M. Aslam Chaudhary[1]

Abstract

This paper explores and analyzes the main determinants of inflation in Pakistan. A dynamic inflation model was developed to analyze the short run and long run behavior of the inflation. For estimation, the annual data series for the period 1972-2007 was utilized. The results indicate a positive relationship of price level with money supply, import prices, budget deficit and expenditures on services sector. The results of Error Correction Model suggest high speed of convergence to equilibrium, if there appears a dis-equilibrating shock. The study also highlights that inflation might be controlled by curtailing dependence on external factors i.e. reducing unnecessary imports. Based on study's results, it is suggested that the main financial cut should be on non-development expenditure, not on development expenditure. Moreover, the policy makers need to consider all factors analyzed by the study, to have effective control over inflation.

I. Introduction

The recent global and domestic economic crises, as well as financial mismanagement resulted in hyper inflation; of both food and non-food types. The other major problems are balance of payments deficit, rapid increase in petroleum prices, low growth, high unemployment and increasing incidences of poverty; are some of the major challenges for Pakistan[2]. The developing economies like Pakistan, which has a small economy, exports are limited to few major products and also concentrated too few markets, a large import bill

[1] *The authors are grateful to anonymous referee for valuable comments. In the light of the comments, the paper was revised which led to substantially improvements in the results and presentation of the paper. The authors are student and professor at Punjab University, Lahore and Forman Christian College (A Chartered University), Lahore, respectively. The paper is based upon M. Phil thesis of Ayesha Noor (2007).*

[2] *Pakistan is suffering from double digit inflation, over 8% unemployment; about 7% of GPD is deficit. Moreover, over 30% of population lives below poverty line. For further details see; Pakistan Economic Survey, 2008-09.*

and an ever growing population to feed, has badly hit by recent double digit inflation. The rapidly growing inflation has affected all segments of the society. It has become one of the top most burning issues in Pakistan. On average, GDP deflator was around 10% during 1990's, increased to over 22% during 2008-9. The consumer price index (CPI) increased over 26% during the same period. It is important to investigate and pin point the roots and causes of this issue so that remedial measures could be taken to control it. The expansionary economic policies of government and central bank over the last few years also resulted in aggravating the problem. However, not much effort was made to improve macroeconomic conditions[3]. The performance of the economy has been tempered to the extent that economic growth has fallen below 3 percent and deficit has become a serious bottleneck. Almost half of the day, the entire population and industrial sector are suffering from electric load shedding. It has not only affected livings but it also badly affected industrial production. The increasing inflation had also contributed towards increasing poverty norms.

It is an alarming signal for the economic managers and also draws their attention for immediate tackling this issue. Given the above cited background this study is focused to analyzed roots of inflation. Based upon the sources of inflation its' remedial measures will be proposed. For this purpose a model of inflation has been constructed and empirical data for the years 1972-2007 has been utilized for estimation of the model. The rest of the study is organized as given below. Part II is review of literature and it also provides theoretical background. In part III, econometric model and empirical results are discussed in part IV. Conclusion and policy implications are given in part V.

II. Theoretical Background and Literature Review

The following selective literature review provides an overview of various approaches utilized to analyze inflation, and it also reviews the empirical evidences pertaining to determinants of inflation. The monetarist approach primarily follows, which brought different elements of the Quantity Theory of Money (QTM) together. The Fisher and Cambridge versions of QTM were reformulated while stressing the connection between money and

[3] *The GDP growth reached its maximum level of 8.3% unprecedented in the history while investment increased to over 20%. Foreign exchange resources also touched a peak of over 16 billion dollars. Recently the GDP growth fell below 3 percent and poverty increased to over 35% of Population. (For further details see Pakistan Economic Survey (2006-07).*

prices. Thereafter a dynamic framework designed to explain price and business fluctuations was developed, which led to highlight interaction among different variables of inflation. The monetarist view reflected that inflation is always and every where a monetary phenomenon. The QTM was criticized because all the versions of the QTM could not adequately explain the great depression of the 1930s. Besides, it ignored variables such as structuralist point of view; particularly inflation theories related to developing countries, which were considered important to explain inflation in developing countries[4]. The phenomenon of inflation in Pakistan received comparatively lesser attention in the literature in earlier period. Even in 1970's, when Pakistan experienced high inflation, only limited number of studies were focused to investigate sources of inflation in Pakistan, i.e. up to the period till 1981.

Generally fiscal policy has remained expansionary in Pakistan and budget was in deficit which did put pressure on the current account deficit, as well as on saving-investment gap. Financing the fiscal deficit through money creation added to inflationary pressure; since it was not utilized for productive purposes. It was mainly utilized to meet current expenditures. The saving schemes of the National Saving Centers were also meant to fill the deficit gap in current expenditures. The schemes were not actually to promote saving but a source to meet non-development expenditures; rather it diverted private savings to meet the need for current expenditures of the government. Such gaps keep on increasing and were as high as up to 7% of GDP[5]. Thus, such a policy continuously contributed towards inflation. The inflationary process was further fueled by expansionary monetary policy[6]. Besides, rising import prices were also an important factor for increasing prices (Chaudhary Aslam M., Munir A. S. Chaudhary & Ijaz, 2006). Besides, depreciation of foreign exchange rate also put upward pressure on price level. Moreover, ever increasing indirect taxes were also considered a source of inflation ((Khan and Qasim, 1996) and Hasan, Ashfaq K. and Muhammad A., (1995). Thus, both monetarist and structuralist variables of inflation need to be explored as sources of inflation in Pakistan.

The structuralist model of inflation appears to be good candidates of inflation in Pakistan. These variables affected real side of the economy such as food prices, wage spiral; import polices expansion in services sector,

[4] *For details see: Chaudhary M. A. and Ahmed N. (1996). Also see Khan (2007).*
[5] *For details see: Pakistan Economic Survey, GOP, (2008-09).*
[6] *See: Annual reports, State Bank of Pakistan, Karachi.*

increase in administered prices of utilities and basic necessities. During the post 1995 period, due to WTO related reforms a large number of tariff and non-tariff trade barriers were removed and opening up of national economy did not improve exports much but it surely increased imports. This outcome increased balance of payment deficit and put further pressure on ever increasing inflation (Chaudhary Aslam, Chowdhry Munir A. S. and Ijaz M., 2006). The mega cross over of goods and services across boundaries in the globalize world of today has introduced new contributory factors of importance to the inflationary phenomenon that it has become a new dimension. This factor has been mentioned merely to emphasize that the conventional monetarist, structuralists theories may not be able to fully explain all the realities of inflationary phenomena in the modern world and particularly in the developing countries.

Hossain (1987 & 1989) developed a monetary and structural model of inflation and concluded that monetary and structural variables of inflation are major source of inflation. The price of traded goods in international market, real income, real money supply, expected inflation and the terms of trade were the major determinants of inflation in Pakistan. Bilquees F., (1988) tested the monetarist and structuralist hypothesis to determine the factors that affect inflationary process in Pakistan. Results of the study strongly suggest the need for simultaneous consideration of both the monetary and structural factors to identify the possible determinants of inflationary process in Pakistan.

Khan and Qasim (1996) observed that Pakistan had experienced a sustained inflation in the double-digit level during the last three years. They made an attempt to provide some explanation regarding the persistent inflation and suggested the need for tightening of fiscal policy. High deficit led to massive borrowing from the banking system and from international sources, which is considered one of the principal sources of accelerating current inflation in Pakistan. Besides, Khan and Schimmelpfenng (2006), Khan H. A. et al. (2007) and Naqvi et al (1994) also found that the expansionary economic policies of the government led to accelerate inflation. This process is further stimulated by expansionary monetary policies of the central bank of Pakistan. Qayyum and Bilquees (2005) analyzed sources of inflation in the long term perspective. This model was based upon quantity theory of money and puts together the long-term determinants of the price level and the short-run changes in current inflation. The results of the study reflected that compared to the simple autoregressive model and the M2 growth augmented model, the

P-star model[7] can be used to obtain the leading indicators of inflation in Pakistan; because it has additional information about the future rate of inflation. Therefore, this paper provides a useful tool to the policy- makers to assess the future movement of inflation in Pakistan. However, in the literature it has also been pointed out that one of the important sources of inflation is import prices, which has been neglected in this study. Khan and Schimmelpfennig (2006) stated that monetary variables are leading indicators for inflation. Broad money growth and private sector credit growth are the key contributing factors towards inflation, which were ignored in the previous studies.

The literature on inflation pertaining to Pakistan indicates that there is hardly any up to date comprehensive study which may have explored all the variables of inflation[8]. Considering all above, all major indicators of inflation; structuralist- monetarist variables and new emerging literature on inflation, a model of inflation has been developed to point out sources of inflation in Pakistan.

III. Theoretical Background and Model Specification

Most of the studies while explaining inflationary process in LDCs have adopted the Harberger (1963). The Harberger Model is essentially an extension of the basic quantity theory framework which relates rate of inflation to rate of growth of money supply, the rate of growth of real income and cost of holding money balances. Following Harberger (1963) and Chaudhary and Ahmed (1996), a model of inflation, based upon Quantity Theory of Money has been developed. The quantity theory of Money holds the relationship:

$$MV = PY \qquad (1)$$

Where P is price level, Y is real income, M is exogenously determined money supply and V is the velocity of money.

Equation (1) may be re-written as:

$$V = PY/M \qquad (2)$$

[7] *It may be noted that the assumptions of the model are unrealistic and such models are developed for developed economies, which may not be applied to developing countries, until modified as per LDC's characteristics. It is the very reason that there is hardly any study which utilized this model to explain inflation in developing countries.*

[8] *Literature review is based upon over earlier work: see Noor A. (2007) and, Chaudhary and Ahmed (1986).*

Where V-1 the inverse of velocity , is the ratio of real income held as real balances and it depends upon the level of real income Y and the expected cost of holding real balance C.

Assuming a conventional demand for money function:

$$V\text{-}1 = Y\alpha\, C\text{-}ß \qquad (3)$$

From (2) and (3) we obtain equation 4 as[9].

$$M/PY = Y\alpha\, C\text{-}ß \qquad (4)$$

By cross multiplication & solving for M we can obtain:

$$M = PY\ Y\,\alpha\, C\text{-}ß \qquad \text{or}$$
$$M = PY\,(1+\alpha)\, C\text{-}ß \qquad (5)$$

The monetarist model predicts the existence of a stable demand function for real money balances. Their level is postulated to be a function of the level of real income. In addition the monetarist model postulates that money supply is exogenous and it can be controlled by the monetary authority. By assumption the demand for money tends to equate the supply of money. Therefore, fundamental symmetry between the demand for money function and the Harberger equation of inflation relates to the central assumption of exogenous money supply.

Taking natural log on both sides of equation (5), we get:

$$Ln(M) = Ln(P)+(1+\alpha)Ln(Y)-ßLn(C) \qquad (6)$$

Rearranging equation (6) for Ln(P);

$$Ln(P) = Ln(M) - (1+\alpha)Ln(Y)+ß\,Ln(C) \qquad (7)$$

Equation 7 may be tested empirically, which may be called model one.

This simple transformation permits us to express the price level as a function of quantity of money, level of real income and cost of holding real money balances. The interest rate represents cost of holding real money balances. As we know structural variable are not a part of this model, which are important source of inflation for developing countries. Some structural elements are incorporated to assess the role of structural rigidities in determining inflation. The foreign sector, services sector and the fiscal sector

[9] *Chaudhary M. Aslam and Ahmad N. (1996) and Ahmed N. (1994). Also see Sunkel (1958).*

rigidities variables need to be tested as explanatory variables for inflation. Besides, external prices or prices of imported goods are also considered as contributing factors to accelerate inflation. Pakistan has an open economy but a small country meaning thereby that it is a price taker of imported goods since it has virtually no influence on the price determining factors of imported goods; specially those important to the manufacturing sector and energy prices[10]. Another most frequently used indicator is the unit value index of import prices in domestic currency terms. Import price index represents a composite index incorporating the combined effect of external forces magnified by the internal structure. The unit value of imports is postulated to be positively related to inflation. Exchange rate is another determinant of inflation which shows that due to depreciation/devaluation. The payment for imported items increases i.e. exports become cheaper for rest of the world but imports become expensive. Besides, budget deficit is also a determinant of inflation, and it is argued that increase in budget deficit positively affects the inflation.

Incorporating all above theoretical discussion, the equation (7) may be written as model 2, for empirical investigation.

Model: 2

$$\text{Ln } P_t = \beta_o + \beta_1 \ln Y_t + \beta_2 \ln M_t + \beta_3 \ln R_t + \beta_4 \ln BD_t + \beta_5 \ln ER_t + \beta_6 \ln MP_t + e_t$$

Where:

P_t = Inflation Rate, Y_t = Real gross domestic product,

R_t = Interest Rate, M_t = Money Supply (M_2), BD_t = Budget Deficit,

ER_t = Exchange Rate and MP_t = Import Prices

The growth in the services sector which primarily employees human resource as input, if not accompanied by a parallel growth in the output, it would lead to demand pull inflation. For this very reason, we have used only the value of services sector (YS) in the model instead of using the entire GDP.

The model 2 can be rewritten as model 3, as given below.

Model: 3

$$\text{Ln } P_t = \beta_o + \beta_1 \ln YS_t + \beta_2 \ln M_t + \beta_3 \ln R_t + \beta_4 \ln BD_t + \beta_5 \ln ER_t + \beta_6 \ln MP_t + e_t$$

[10] *See: Romer (1993).*

The above cited dynamic inflation models can be empirically estimated to identify sources of inflation in Pakistan.

IV. Empirical Results

Different procedures are applied to analyze the preliminary analysis of the data series. First, we plot the log form data series against time, including inflation series, money supply, and output of the services sector, import prices, exchange rate, budget deficit and interest rate, respectively. Augmented Dickey Fuller Test (ADF) is utilized to check the stationarity of the data series. The results are reported in table 1. The ADF Test is performed by estimating the following equation with and without trend variables (t):

$$\Delta Y_t = \alpha + \beta_t + \rho Y_{t-1} + \lambda_i \quad \Sigma_{i+1}\text{-}N\, \Delta Y_{t-i} + u_t$$

After estimating the equation, we test the hypothesis as to whether $\rho = 0$. In ADF Test, lagged difference is included to remove possible serial correlation in the error terms. This test confirms the order of integration of individual series. The ADF test statistic corresponds to the t-value of parameter ρ for the individual series. To test the hypothesis that $\rho=0$, calculated t-values are compared with tabulated value, as given in Mackinnon (1991).

The data for inflation rate (LNP), money supply (LM2), output of the services sector (LYS), import prices (LMP), exchange rate (LX), budget deficit (LBD) and interest rate (LR) are used in log form. The ADF test is applied on the log form with an intercept, a linear trend and with out linear trend; cases are included in the ADF test equation of these variables to allow for trend stationary. The level form for inflation rate (LNP), money supply (LM2), output of the services sector (LYS), import prices (LMP), exchange rate (LX), budget deficit (LBD) and interest rate (LR) are not stationary. The results show that all variables are Integrated of order one i.e. I (1). The first difference seems to remove the stochastic trends from the data. In case of each series an appropriate lag length is used so that serial correlation is removed from error term, which is confirmed by the LM test of serial correlation. The results presented in table 1 shows that null hypothesis of unit root ($\rho=0$) can not be rejected for any variable in the level form. However, the null hypothesis of unit root is rejected for all variables in the first differenced form at 5% level. Thus, our test results show that all variables are integrated of order I (1).

The results obtained in this part provide grounds to move to the co-integration method to estimate the inflation function. The estimation of the inflation

function by applying co-integration technique is the subject matter of the next section.

Table-1: Augmented Dickey-Fuller Test Results for Unit Root

Level Form			First Difference Form			Results
Variable On Level	**With Trend**	**Without Trend**	**Variables on First Difference**	**With Trend**	**Without Trend**	
	ADF-Stats	ADF-Stats		ADF-Stats	ADF-Stats	
LnP	-2.4831	-2.8807	Δ LnP	-5.9722*	-5.9147*	I(1)
LM2	-2.3138	-0.4647	Δ LM2	-4.4092*	-4.4696*	I(1)
LYS	-2.1999	-1.1791	Δ LYS	-4.32425*	-4.4011*	I(1)
LMP	-3.3643	-0.2799	Δ LMP	-4.2596*	-4.5582*	I(1)
LX	-2.4768	0.5251	Δ LX	-4.5833*	-4.7398*	I(1)
LBD	-3.0598	-2.1612	Δ LBD	-6.6803*	-4.5323*	I(1)
LR	-0.2930	-1.5713	Δ LR	-3.8501*	-3.7413*	I(1)

Note: ** Denote significant at five percent. 2. I (1) indicates unit root in level form and stationary after first difference.*

1. The Long-run Inflation Function: A Co-integration Analysis

The main purpose of the study is to analyze the determinants of inflation in Pakistan. Main explanatory variables tested are; money supply, import prices, output of the services sector, exchange rate, budget deficit and interest rate etc., which are included in the model based upon theoretical grounds. The empirical analysis shows that the proxy for interest rate that is call money rate and exchange rate has been found to be insignificant, and thus we drop these regressors to arrive at our preferred specification.

Before running cointegration test we need to specify the lag structure. This is important because a lag structure which is too high may over parameterize and, therefore, reduce the power of cointegration test. However if the lag structure is too short it may not produce the residuals which are white noise. In order to investigate the optimal lag structure Schwarz Bayesian

Criterion (SBC) as suggested by Enders (1995, p.88) and Davidson (1998), for various lags were performed. The appropriate lag length of VAR is one. In order to determine the number of significant cointegrating vectors, we use Johansen's (1988) likelihood ratio test that is based on Maximum Eigen Value and Trace Test Statistic. The results from Johansen cointegrated test (both the Eigen value and the Trace test) are presented in table 2. All variables included for the test have the same order of integration.

Table-2: Johansen Cointegration Test (Maximum Eigen Value Test).

Null Hypothesis	Alternative Hypothesis	Test Statistic	5% critical values
r = 0	r = 1	17.75248*	17.20
r = 1	r =2	11.41882	14.36
r = 2	r = 3	4.212246	11.37
r = 3	r = 4	3.000633	08.11
r = 4	r = 5	0.758025	04.13

Trace Test

Null Hypothesis	Alternative Hypothesis	Test statistic	5% critical values
r = 0	r ≥ 1	85.52309*	68.52
r = 1	r ≥2	44.64647	47.21
r = 2	r ≥ 3	18.3537	29.68
r = 3	r ≥ 4	8.65464	15.00
r = 4	r ≥ 5	1.745422	3.76

Note: 1 * Indicates significant at the 5% level. The variables are: P, LM2, LMP, LYS & BD.

The likelihood ratio (LR) test, both λ-max and λ-trace support the hypothesis that there is one cointegrating vector at 5% level of significance in each case. The empirical results suggest that there exist only one unique long run relationship among inflation and its determinants. The long-run inflation function presented here is obtained by normalizing the estimated cointegrated vector on inflation (Ln P). Significance of the variables confirms their validity in the model and suggests that there is a long run stable relationship between inflation and exogenous variables. The results of estimated long-run inflation function are reported in the following equation.

$$LnP_t = 1.4247 + 0.3836*(LM2) + 0.3520*(LYs) + 0.0584*(LMP) + 0.3400*(LBD)$$

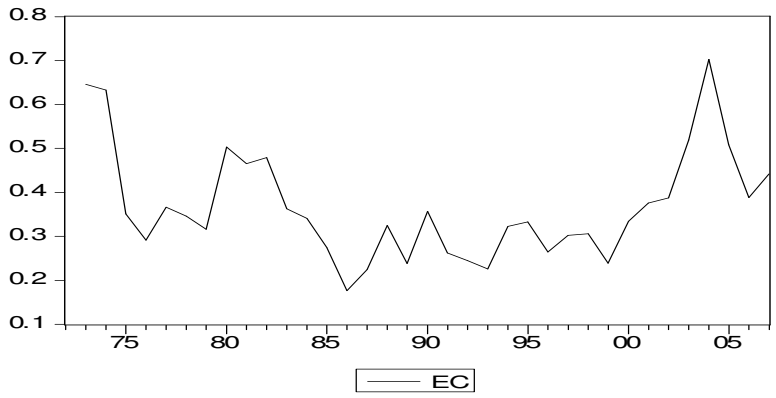
(S.E)	(0.11242)	(0.2169)	(0.0259)	(0.08913)
[T-Value]	[3.412]	[1.623]	[2.255]	[3.815]

The estimated coefficients of LM2, LMP, LYS and LBD have expected signs and are significant at acceptable level. The estimated equation indicates that inflation is mainly determined by the money supply, import prices and budget deficits. The impact of the increase in the output of the services sector is not significant. The estimated elasticities are 0.38, 0.35, 0.06 and 0.34, respectively.

2. The Short-Run Dynamic Model of Inflation: The Error Correction Approach

After establishing the cointegration relationship an error correction model (ECM) is established to determine the short-run dynamics of the regression model. Following Hendry's approach known as "general to specific" we include different lags from top to low of explanatory variables and error term EC (-1). The error term (EC) consists of the residual from the long-run inflation function. The graph of the error series is presented in the following graph.

Figure 1: EC



The Error term is well behaved, it is stationary at level form confirmed by ADF and the white noise is ensured by LM test. The following error correction model (ECM) is established to determine the short-run dynamics of the regression model.

$$\Delta LnP = \beta 0 + \beta 1 \Delta LnP(-1) + \beta 2 \Delta LM2 + \beta 3 \Delta LM2(-1) + \beta 4 \Delta LMP + \beta 5 \Delta LMP(-1) + \beta 6 \Delta LYS + \beta 7 \Delta LYSP(-1) + \beta 8 LBD + \beta 9 LBD(-1) + \lambda EC(-1) + Et$$

After estimating this model, we gradually eliminate insignificant variables. The results suggested that out of these regressors, only eight variables established short-term relationship with inflation, significantly. All others insignificant variables are dropped from the ECM. This provides that in short-run LnP(-1), LM2(-1), LMP, LMP(-1), LYS, LYS(-1), LBD(-1) and EC(-1) have emerged significant variables, while others do not prove their existence in the short-run. The following ECM is found to be the most appropriate and fits the data well.

$$\Delta LnP = \beta 0 + \beta 1 \Delta LnP(-1) + \beta 3 \Delta LM2(-1) + \beta 4 \Delta LMP + \beta 5 \Delta LMP(-1) + \beta 6 \Delta LYS + B7 \Delta LYS(-1) + \beta 8 \Delta LBD(-1) + \lambda EC(-1) + Et$$

All the variables are in first difference. The results of final estimated parsimonious dynamic error correction model are given in below.

ΔLnP	=	0.0193	-	0.257*ΔLnP(-1)	+	0.131*ΔLM2(-1)	+	0.104*ΔLMP +
S.E.		(0.189)		(0.123)		(0.074)		(0.028)
T-value		[1.015]		[-2.092]		[1.762]		[3.662]

	0.068*ΔLMP(-1)	+	0.846*ΔLYS	+	0.416*ΔLYS(-1)	-
S.E.	(0.033)		(0.197)		(0.216)	
T-value	[2.068]		[4.288]		1.921]	

	0.114* ΔLBD	-	0.36* EC(-1)
S.E	(0.021)		(0.064)
T-value	[-5.36]		[-5.635]

R- bar-square = 0.737 F (9, 33) = 09.4156

The error correction coefficient estimated at (-0.36) with (t = -5.634) enters into short run dynamic equation at highly significant with theoretically correct sign[11]. The estimated coefficient of EC indicates that approximately 36 percent of the dis-equilibrium in determination of inflation is corrected

[11] *The validity of the estimated model is tested by using standard diagnostic tests; for autocorrelation etc. The definition of variables is presented in appendix I.*

immediately, i.e. in the next year. It suggests a high speed of convergence to equilibrium if there appears a disequilibrating shock.

In estimated dynamic error correction model, the coefficient of lagged changes in inflation is negative and significant, which shows, the changes in previous period inflation negatively affect on short-term changes in inflation. It may reflect that inflation phenomena cannot be treated as the result of present period decision only. It also reflects there is some sort of cyclical movement in inflationary situation. The coefficient of lagged changes in money supply is also positive and significant. The fluctuations in the previous period in money supply positively affect the current changes in inflation. The results of the analysis suggested that the impact of changes of the money supply on the determination of the general price level works through transmission lags. Thus, inflation increases due to the expansion of money supply.

The coefficients of import prices and one period lagged import prices are significant with positive sign showing that under the global village scenario Pakistan is also affected by world inflation. It may reflect the situation that when price of imported goods like oil, machinery, equipment and other raw materials increases, consequently these prices raises the cost of production and as a result it contribute to increase domestic prices upward. These ascendances may be rapid or gradual depending upon the nature of commodities and their use.

Another finding of the analysis is that the current and previous period's changes in output of the services sector also affect the level of inflation positively in short term just like long run. This may be due to a reason that the increase in volume of the services sectors increases the aggregate demand of goods and services, where as there is not much increase in the output or addition in the commodity producing sector. So as a result of rise in aggregate demand, due to market forces price level also moves upward and the inflationary situation is generated. The estimated coefficient of the budget deficit is negative in short run; however, over the long run it has positive impact on inflation. It may be due to foreign assistance, which provides relief in short run and in long run it enhance the inflationary pressure on the economy.

V. Conclusions and Policy Implications

This study is an attempt to identify and analyze the main determinants of inflation. For this purpose an inflation model was developed and estimated for Pakistan for the period 1972-2007, using annual data series. Based upon the empirical evidences, it was also aimed to provide remedial measures to control the inflation. Considering theoretical developments and empirical evidence, econometric model was developed containing the wide range of determinants of inflation including Services Sector, Money Supply, Budget Deficit, Interest Rate, Exchange Rate and Import prices. A dynamic inflation function was specified to analyze the short run and the long run behavior of the determinants of inflation in Pakistan. To estimate the model we applied the co-integration technique. As a first step, we have employed well known Augmented Dickey Fuller (ADF) tests to each of the series of data and determined the order of integration. After confirming the order of integration of each variable, Johanson (1988), Likelihood Ratio (LR) tests, such as maximum Eigen-value test and Trace statistic were used to determine a long run equilibrium relationship among the variables. Finally Error Correction Model (ECM) was estimated to study the short run dynamics of inflation behavior.

The cointegration analysis indicates that long run relationship exists between dependent and explanatory variables. It was found that there is a positive relationship between money supply and the price level and both move in the same direction. The analysis also indicates that a positive long run relationship exists between inflation rate and import prices which imply that import prices are an important determinant of inflation in Pakistan. Increase in import prices creates significant affects on general price level in the same direction. One of the main causes of inflation is an increase in price level due to external factors i.e. imported inflation. The coefficient of the services sector is positive, although not significant in long run. The empirical evidences also indicate that budget deficit is positively related to inflation. Increase in budget deficit implies that government expenditures exceed its income/ revenues; major proportion of it consist off non-development expenditures which increases aggregate demand and therefore results in an increase in general price level.

The results of error correction model indicated that the coefficients are significant with expected sign. It suggests a high speed of convergence to equilibrium if there appears a disequilibrating shock. Moreover, error

correction model reflects that the inflation phenomenon cannot be treated to be the sole effect of decisions taken in present situation. The lagged impact of variables continues to contribute to inflation. The analysis also reflected that money supply component of the monetary policy should be framed considering both its immediate and long term effects on the economy to have a more effective control on the general price level in the country.

The study also highlights that one main source of inflation is an increase in import prices. We may control inflation by curtailing our dependence on external factors i.e. reducing unnecessary imports. The empirical results also showed that as income of the services sectors increases, demand for goods also increases that brings an upward movement in general price level which is a general phenomenon in developing countries. This may reflect the case of demand pull inflation in Pakistan and can be controlled by increasing output level in the economy, removing inefficiencies and reducing current expenditures. Thus, the policy makers should consider this aspect carefully and proper attention should be given on increasing output in the commodity producing sector. Besides, Pakistan is continuously suffering from budget deficit which is not good for the economy; therefore, it must be kept under control to reduce inflation. It is suggested that the main financial cut should be on non development expenditure, not on development expenditure. However, in Pakistan there is always cut on development expenditures. As a result the squeezing development expenditures and ever rapidly increasing current expenditures lead to inflationary pressure. The policy makers need to consider all the above cites factors to have effective control over inflation.

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Appendix-I: The Definition of the Variables and Data Sources

The variables used in this study include: Inflation Rate (P), Output of the services sector (YS), Money Supply (M), Interest Rate (R), Budget Deficit (BD), Exchange Rate (ER), and Import Prices (MP). The study covers the period from1972 to 2007.

Inflation Rate (P): Inflation rate is derived from combined consumer price index (general). The CPI data is taken from various issues of the annual report of State Bank of Pakistan.

Output of the Services Sector (YS): It is derived from gross output of services sector of the economy at market prices i.e., the total flow of services which are created/ provided during the period. It is collected from different annual issues of the Pakistan Economic Survey, Ministry of Finance, Government of Pakistan.

Money Supply (M): It is the broad money (M2), which is used for the money supply. This data series is taken from various issues of the annual report of State Bank of Pakistan.

Interest Rate (R): It is a call money rate, which is a proxy variable for interest rate. This data series is also taken from various issues of the annual report of State Bank of Pakistan

Budget Deficit (BD): Budget deficit is used in nominal series; it is collected from different annual issues of the Pakistan Economic Survey, Ministry of Finance, Government of Pakistan.

Exchange Rate (ER): Nominal Exchange rate is used for the exchange rate variable and this data series is taken from various issues of the annual report of State Bank of Pakistan.

Import Prices (MP): Unit Value of import is used to capture the impact of import prices. This data series is also taken from various issues of the annual report of State Bank of Pakistan.

Appendix-II: Diagnostic Test.

The validity of the estimated model is tested using the standard diagnostic tests. The residual passed the diagnostic test of no autocorrelation [$\chi 2(1) = 0.489$], no hetroskedasticity [$\chi 2(4) = 12.013$], normally distributed [$\chi 2(2) = 1.86$], no ARCH [$\chi 2(1) = 0.659$] at the 5 percent level of significance. The parameter stability of any estimated function has been the more crucial test, this stability in the model confirmed by the cusum and cusum of squares.