DETERMINANTS OF FOOD PRICE INFLATION IN PAKISTAN

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ABSTRACT

This study focuses on the identification of main determinants of food price inflation in Pakistan. Using the data from 1972 to 2008, Johansen's co-integration technique isutilized to find out the long run relationships among food price inflation and its determinants like inflation expectations, money supply, per capita GDP, support prices, food imports and food exports. Empirical findings prove the long run relationships among food price inflation and its determinants. All the determinants affect food price inflation positively and significantly except money supply which is insignificant with correct positive sign. Vector Error Correction Model (VECM) has been used for the analysis of short run dynamics. In the short run, only inflation expectations, support prices and food exports affect the food price inflation. The results reveal that both demand and supply side factors are the determinants food price inflation in Pakistan. However, our study supports the structuralist point of view of inflation as money supply shows insignificant results.

Keywords: Food Price Inflation, Demand side factor, Supply Side Factor

INTRODUCTION

In the recent years, food price inflation has risen very sharply at global level. According to Commodity Research Bureau (2009), the overall and food inflation rates at global level stand at 16.5 and 30.2 percent respectively by November 06, 2007. Reduced level of poverty, increase in per capita income and urbanization are main reasons of sharp increase in demand and prices of some basic food items. When income increases, dietary habits also change, people expand their expenditures to have more food and meat. For example, in China per capita consumption of meat at 20 Kg in 1985 increased to 50 Kg in 2007(Abhayaratne and Kasturi, 2008). There is 17 per cent boost in grain consumption from 2000 to 2005 among the oil producing and exporting countries because of their huge export earnings (World Bank, 2007). Demand for bio fuels in rich countries is also an important contributor towards higher prices of some basic food items. There seems a link between food and energy prices as since 2000, prices of oil and wheat have become triple and prices of corn and rice are double now (IFPRI, 2007).

Because of higher food inflation, households have to make reductions in some areas of food consumption leading to malnutrition. Malnutrition results in productivity losses of up to 10 percent of lifetime earnings and GDP losses of 2-3 percent in the worst affected countries (Alderman, 2005). High inflation erodes the benefits of growth and leaves the poor worse off (Esterly and Ficsher, 2001). It hurts the poor more, since more than half of the budget of low wage earners goes toward food. It redistributes income from fixed income groups to the owners of assets and businessmen and increases the gap between rich and poor (Khan et al, 2007).
Pakistan has also experienced high food inflation of 17.5 percent and 26.6 percent in 2007-08 and 2008-09 respectively. Moreover, food inflation remained more than 10 percent on average from 1972 to 2009, in the whole history of (West) Pakistan.

To determine the factors behind this persistent food inflation is a matter of great interest and concern for the academics and policy makers. No doubt one of the thorniest issues in the economy of Pakistan is to put effective control over this sharp pick up in the rate of food price inflation. But very little research work has been done separately to find the determinants of food price inflation with respect to Pakistan. Most of the literature focuses on determining the factors of general inflation (Bilquees, 1988; Hossain, A. 1990; Nasim, 1995; Khan and

Schimimelpfenning, 2006). There are few researchers who studied the food inflation only as part/factor of general inflation (Naqvi et al. 1994; Hasan et al. 1995; ABN AMRO Bank, 1996; Khan and Qasim, 1996). This paper will try to find both demand and supply side factors of food price inflation in Pakistan. Its findings may provide some important guide lines for policy makers to control the recent inflationary trends of food prices in the country.

The rest of paper is designed as follows: The relevant literature on food price inflation is discussed in section 2. Section 3 is devoted to the theoretical framework, methodology and econometric techniques used in this paper. Empirical results are discussed in section 4. Section five concludes the major findings of the study and suggests some policy implications.

LITERATURE REVIEW

The economic literature reveals that demand-side factors and supply-side factors are two major sources of inflation. These factors are discussed under two schools of thoughts, the monetarist and the structuralist.

The monetarist model has its theoretical foundations on the quantity theory of money which is part of the classical economic theory. It was presented by Friedman (1968, 1970 and 1971). 'Inflation is always and everywhere a monetary phenomenon' is the famous statement of this theory. Schwartz (1973) tested it empirically. Monetarists are in the view that increase in the money supply results in proportionate increases in the prices, assuming economic agents rational and output and real money balances constant.

The structuralist models of inflation emerged in the 1950s. These were supported by Streeten (1962), Olivera (1964), Baumol (1967) and Maynard and Rijckeghem (1976). According to these models, supply-side factors like food prices, administered prices, wages and import prices are the determinants of inflation.

Bhattacharia and Lodh (1990) supported the superiority of strctulists model in the case of India. Balkrishnan (1992) applied structuralist approach through error correction specification for modeling inflation in India. He concluded that labour and raw material costs were significant determinants of inflation in industrial sector. In agriculture sector, prices of food grains were determined by per capita output, per capita income in agriculture sector and government

procurement of food grains. Balkrishnan (1994) found that structulists model was better than monetarist's model.

Khan and Qasim (1996) studied general inflation and food price inflation separately. They found that inflation is co integrated with money supply (M2), import price and real GDP. Money supply (M2) and import prices affect inflation positively while GDP has negative relation with inflation. According to their findings, food inflation has also long run relationship with money supply, value added in agriculture and wheat support prices. Money supply and wheat support prices showed positive relation with food price inflation and agriculture output was negatively cointegrated with food price inflation.

Hasan et al. (1995) estimated the disaggregated inflation model with respect to different sectors (of Wholesale Price Index) according to their weights in aggregated inflation model. They studied three sectors of Wholesale Price Index (WPI) out five. These were food, raw material and manufacturing assuming that remaining two sectors energy and building material were exogenously determined. They concluded that supply shocks (production of agricultural goods) have negative impact on food price inflation. Impacts of support prices of wheat and expectations about future inflation were positive and highly significant on food price inflation. Money supply or monetary policy showed an insignificant impact on agriculture food prices while its impact on raw material and manufacturing was significant.

Khan and Schimimelpfenning (2006) found that monetary factors determined the inflation in Pakistan. Broad money growth and private sector credit growth were the key variables of inflation. They included money supply and credit to private sector as standard monetary variables, exchange rate and wheat support prices as supply side factors. Support prices influenced inflation only in short run.

Tweeten (1980) argued that the monetary shocks had little effect on the agricultural prices. Devadoss and Meyers (1987) were of the view that agricultural prices had faster response, as compared to the prices of manufacturing products, to a change in money supply in the U.S.A.

Saghaian et al. (2002) claimed money neutrality did not hold in the determination of agricultural prices in U.S.A. Xuehua et al. (2004) and Bruno et al. (2005) rejected the non neutrality of money supply in the determination of food prices.

Lorie and Khan (2006) conclude that there is only a weak evidence of the existence of long run co integration between domestic prices, international prices and support prices for key

agricultural goods in Pakistan. Only in the case of wheat, the evidence is strong. The elasticity of domestic prices to a change in the exchange rate is close to unity for all commodities.

The increase in demand for globally traded food crops is the basic reason of increase in food prices. Furthermore, increasing interest of global investors in hording commodity for future contracts has a contribution to the rise in food prices recently (Johnson, 2008),

According to the Asian Development Bank Report (2008), there are different structural and cyclical factors determining the food prices in developing Asian countries. Production growth has fallen below the consumption growth for several years. There is 43% decline in rice and wheat stocks if we compare 2000 and 2007. International rice markets are extremely thin because of large number of consuming countries and small number of producing countries (USDA, 2008).

Loening et al (2009) studied inflation dynamics and food prices in Ethopia. They found that international food commodity prices and producer prices determine the domestic food and non-food prices in Ethopia. Inflation expectations (inertia) affected food price inflation more as compared to non- food inflation. In the short and medium run, agriculture supply shocks and inertia affect the inflation in the country. They found no evidence of direct impact of excess money supply and world energy price inflation on both food and non-food inflation.

THEORETICAL FRAMEWORK, ECONOMETRIC METHODOLOGY AND DATA SOURCES

Economic literature on inflation provides some models that incorporate the demand and supply side factors (Hassan et al., 1995; Khan and Qasim, 1996; Callen and Chang, 1999; Bokil and Schimmelfennig, 2005 and Khan and Schimmelfennig, 2006). Following Khan and Schimmelfennig (2006), the stylized hybrid monetarists-structulists model given below is formulated to capture the effect of certain demand and supply side factors of food price inflation in Pakistan.

$$FPI_t \; ? \; f(FPI_{t-1}, M2G_t, PGDP_t, ASP_t, FX_t, FM_t) \qquad (1)$$

where

t= 1, 2, 3, …., 37. (time period ranging from 1972-2008)

FPI_t = Food Price Inflation (CPI food as proxy of Food Price Inflation) in time t

$FPI_{t?1}$ = One year lag of FPI_t (as proxy of inflation expectations)

$M2G_t$ = Growth Rate of Money Supply (M2) in time t

$PGDP_t$ = Per Capita GDP (in Pak rupees) in time t

ASP_t = Agriculture Support Price (rupees/40kg of wheat) in time t

FX_t = Food Export (as percentage of merchandise export) in time t

FM_t = Food Import (as percentage of merchandise imports) in time t.

Equation (1) can be rewritten for estimation purposes as follows:

$$FPI_t ?? ?_0 ?? ?_1 FPI_{t-1} ?? ?_2 M2G_t ?? ?_3 PGDP_t ?? ?_4 ASP_t ?? ?_5 FX_t ?? ?_6 FM_t ?? ?_t \quad (2)$$

Where $?_0$ is intercept and $?_1, ?_2, ?_3, ?_4, ?_5$, and $?_6$ are the coefficients of $FPI_t, M2G_t, PGDP_t, ASP_t, FX_t$ and FM_t respectively. $?_t$ is identically and independently distributed error term and t as defined in equation (1).

(A) STATIONARITY AND NON-STATIONARITY

In real life, most of the macroeconomic time series variables like income, consumption, money, prices and trade are non-stationary. Philips (1986) points out that if we treat the nonstationary series with Ordinary Least Squares (OLS), the results will be misleading for economic analysis. The model can lead to the problem of spurious (misleading) regressions with very high R-squared (approximating unity) and significant t and F-statistics (Granger and Newbold, 1974). If the series is stationary without differencing, then it is of integrated order zero, I (0) or stationary at level. A series is said to be integrated of order one, or I (1), if it is stationary after differencing once and of order two, I (2) if differenced twice. Augmented Dickey-Fuller test proposed by Dickey and Fuller (1979, 1981) is widely used in economic literature to investigate the stationarity of a time series data. Dickey and Fuller (1979, 1981) on the basis of Monte-Carlo simulation and under the null-hypothesis of the existence of unit root in

time series have tabulated critical values for t_d which are called 't (tau) statistics'. Augmented Dickey and Fuller unit root test can be applied under following two steps.

In step 1, OLS is regressed on required one of the following equations and save the usual t_d values.

$$?X_t ? ?X_{t?1} ? \sum_{j?1}^{q} ?_j ?X_{t?j} ? ?_{1t} \quad (3)$$

$$?X_t ? ? ??X_{t?1} ? \sum_{j?1}^{q} ?_j ?X_{t?j} ? ?_{2t} \quad (4)$$

$$?X_t ? ? ??t_1 ??X_{t?1} ? \sum_{j?1}^{q} ?_j ?X_{t?j} ? ?_{3t} \quad (5)$$

Where

$?X_t$ $?X_t$ $?X_{t?1}$

q ? Number of lags in the dependent variable

In step 2, the existence of unit root is decided on the basis of following hypothesis;

H_0 : ? ? 0 f for non-stationary if t_d= t

H_a : ? ? 0 for stationarity if t_d < t

Where t_d represents t statistics of ? and t (tau) are critical values tabulated by Dickey and Fuller (1979).

(B) JOHANSEN CO-INTEGRATION TEST

Co-integration is a popular econometric technique which is used to find long run relationship between variables. In this study Johansen co-integration method is used to investigate long-run relationship among the concerned variables. Johansen (1988) and Johansen and Juselius (1990) is a better technique than Engle and Granger (1987). Engle and Granger (1987) method finds out only one co-integrating vector through two step estimation approach. While on the other hand, number of vectors can be found using maximum likelihood testing procedure suggested by Johansen (1988) and Johansen and Juselius (1990) in the Vector Autoregressive (VAR) representation.

The general form of VAR can be written as following:

$$? _t ? ? ? ? _j ? _{t?1} ? \ldots\ldots ? ? _k ? _{t? k} ? ? _t$$

$$? ? ? \sum_{j?1}^{k} ? _j ? _{t?j} ? ? _t \qquad (6)$$

Where $? _t$ represents $(n?1)$ column vector of k variables whose order of integration is same, $?$ is a $(n?1)$ vector of constants, $? _t \ldots\ldots ? _{t?k}$ are representing parameters and $? _t$ is an error term which is independently and identically distributed.

The above equation (6) of general VAR model can also be rewritten in the following alternative way to represent the Vector Error Correction Model (VECM).

$$? ? _t ? ? ? \sum_{j?1}^{k?1} ? _i ? ? _{t?j} ? ? ? _{t?1} ? ? _t \qquad (7)$$

Where $? _t$ is a $(n?1)$ column vector of k variables, $?$ and $? _t$ are $(n?1)$ vector of constants and usual error term respectively. $?$ is difference operator. $?$ and $? _i$ are representing coefficient matrices. The coefficient matrix $? _i$ is also called an impact matrix which tells about the long run relationship. The other coefficient matrix $?$ captures the short run impact.

The following VECM representation of concerned variables is specified for this study to determine short run relationships.

$$?FPI_t ? ? _0 ? \sum_{j?1}^{n} ? _{1j} ?FPI_{(t?1)} ? \sum_{j?1}^{n} ? _{2j} ?M2G_t ? \sum_{j?1}^{n} ? _{3j} ?PGDP_t ? \sum_{j?1}^{n} ? _{4j} ?ASP_t ? \sum_{j?1}^{n} ? _{5j} ?FX_t$$
$$? \sum_{j?1}^{n} ? _{6j} ?FM_t ? ? ECT_{t?1} ? ? _t \qquad (8)$$

If the coefficient ($?$) of ECT_{t-1} is significant, it means that short run relationship exists among the variables. The value of coefficient ($?$) explains the speed of adjustment towards the long run equilibrium. Its negative sign explains convergence to the long run equilibrium and positive sign indicates divergence from the long run equilibrium. According to Kremers et al.

(1992) and Banerjee et al. (1998), significance of ECT_{t-1} with a negative coefficient is another proof and efficient way for establishing co-integration relationship.

(C) Data Sources

Annual data from 1972 to 2008 of concerned variables has been used in this study. CPI food has been used as a proxy of food price inflation (FPI). Data of CPI food has been collected from various issues of Pakistan Economic Survey. Data of wheat support price as proxy agricultural support prices (ASP) has also been collected from various issues of Pakistan Economic Survey. Data of per capita gross domestic product (PGDP), growth rate of money supply (M2G), food exports (FX) and food imports (FM) have been taken from World Development Indicators (WDI) online database by World Bank (2009).

ESTIMATION OF THE MODEL AND EMPIRICAL RESULTS

Time series data covering the period of 1972 to 2008 has been used for the analysis. Before we proceed for co-integration and short run dynamics of food price inflation and its determinants, it is necessary to check the stationarity of data to determine the order of integration of concerned variables.

(A) STATIONARITY OF DATA

In this study, ADF unit root test has been used to check the stationarity and order of integration of time series data of the variables of our interest. Schwarz Information Criterion has been used for maximum lag selection for applying ADF unit root test. The results of ADF test are presented in table-1.

Table-1: Augmented Dickey-Fuller (ADF) Test for Unit Root

Augmented Dickey-Fuller (ADF) Test at Level				
Variables	Without Trend	Prob. Values	Trend & Intercept	Prob. Values
FPI_t	5.2796	1.000	1.9729	1.000
$M2G_t$	-1.8991	0.3277	-2.2862	0.4262
$PGDP_t$	0.9646	0.9952	-2.9655	0.1601
ASP_t	3.0683	1.0000	1.2472	0.9999

FX_t	-1.5254	0.5096	-2.6561	0.2597
FM_t	-2.5653	0.1096	-3.1421	0.1127
Augmented Dickey-Fuller (ADF) Test at 1st Difference				
Variables	Without Trend	Prob. Values	Trend & Intercept	Prob. Values
$?FPI_t$	-1.5548	0.4927	-4.0928*	0.0156
$?M2G_t$	-7.8567**	0.0000	-	-
$?PGDP_t$	-3.4095*	0.0173	-	-
$?ASP_t$	-2.5412	0.1148	-3.7743*	0.0302
$?FX_t$	-8.2416**	0.0000	-	-
$?FM_t$	-6.0840**	0.0000	-	-

Note: * represents significant level at 1%.

** represent significant level at 5%.

The results displayed in table-1 show that all the variables are non-stationary at level because t-statistics of ADF tests for all variables are statistically insignificant. However all variables are stationary at their first differences at 5% level of significance. Order of integration is also determined by unit root tests. Results indicate that all variables are integrated of order one I(1) as they are stationary at first difference.

(B) OPTIMAL LAG LENGTH

Lag selection criterions like sequential modified likelihood ratio (LR), Final prediction error (FPE), Aikaike information criterion (AIK), Schwarz information criterion (SC) and Hannan-Quinn information criterion (HQ) suggest an optimal lag length of one which has been used in our analysis. Results of these criterions are reported in table-2.

Table-2: VAR Lag Order Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-932.2801	NA	7.77e+15	53.61601	53.88264	53.70805
1	-733.2516	318.4457*	7.22e+11*	44.30009*	46.16651*	44.94438*
2	-700.1105	41.66312	1.03e+12	44.46346	47.92966	45.65999

* Indicates lag order selected by the criterion

LR: sequential modified likelihood ratio test statistic (each test at 5percent level)

FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

(C) CO-INTEGRATION AMONG THE VARIABLES

As the variables have same order of integration, therefore Johansen co-integration can be applied to find the long-run relationship of food price inflation, growth of money supply, per capita GDP, agricultural support prices, food exports and food imports. The results of Johansen's co-integration test have been reported in table-3.

Table-3: Unrestricted Co-integration Rank Test (Trace)

Unrestricted Co-integration Rank Test (Trace)				
H_0	H_1	Trace Statistics	0.05 Critical Value	Prob.[a]
r = 0*	r = 1	141.9786	95.75366	0.0000
r = 1*	r = 2	82.89489	69.81889	0.0032
r = 2	r = 3	45.08015	47.85613	0.0891
r = 3	r = 4	18.41380	29.79707	0.5356
Unrestricted Co-integration Rank Test (Maximum Eigen value)				
H_0	H_1	Max-Eigen Statistics	0.05 Critical Value	Prob.[a]

r = 0*	r = 1	59.08367	40.07757	0.0001
r = 1*	r = 2	37.81475	33.87687	0.0161
r = 2	r = 3	26.66635	27.58434	0.0652
r = 3	r = 4	12.69969	21.13162	0.4803

[a] MacKinnon-Haug-Michelis (1999) p-values

* Denotes rejection of the null hypothesis at the 0.05 level

Both the Maximum Eigen Statistics $?_{\max}$ and Trace Statistics $?_{trace}$ are used to find co-integration and the number of co-integrating vectors. Both statistics confirm the existence of co-integration and same number (two) of co-integrating vectors. The Trace-test Statistics is 141.98, which is greater than the critical value of 95.75 at 5 percent significance level. Therefore, null hypothesis $r ? 0$ is rejected against the alternative hypothesis $r ? 1$. The null hypothesis of $r ? 1$ is also rejected in favour of alternative hypothesis of $r ? 2$ because trace statistics 82.89 is greater than the critical value of 69.82 at 5 percent level of significance. The Max Eigen-test Statistics is 59.08, which is greater than the critical value of 40.08 at 5 percent significance level. Therefore, null hypothesis $r ? 0$ is rejected against the alternative hypothesis $r ? 1$. We also reject the null hypothesis of $r ? 1$ against alternative hypothesis of $r ? 2$ because Maximum Eigen Statistics 37.82 is greater than the critical value of 33.88 at 5 percent level of significance.

After confirming the long run relationship among food price inflation, growth of money supply, per capita GDP, agricultural support prices, food imports and food exports, the long run coefficients are reported in table-4.

Table-4: Long Run Relationships

Dependent Variable = FPI_t			
Variable	Coefficient	T-Statistic	Prob-Value
Constant	-44.90991	-4.941833	0.0000
FPI_{t-1}	0.735522	15.78609	0.0000
$M2G_t$	0.073152	1.499076	0.1447
$PGDP_t$	0.001740	5.343473	0.0000
ASP_t	0.055197	4.131034	0.0003
FX_t	0.479935	3.675908	0.0010
FM_t	0.272316	2.384839	0.0238

R^2= 0.9986
Adj-R^2 = 0.9984
F-Statistic= 3656.589
Prob(F-statistic)= 0.0000
Durbin-Watson = 2.1329

The results reported in table-4 show that impact of all dependent variables, except money supply growth, on food price inflation is positive and statistically significant. All the coefficients have expected positive signs. According to results, on average one unit change in FPI_{t-1}, which represents inflation expectations or inertia, will increase CPI food by 0.7 units. Although money supply growth is not impacting food price inflation significantly but its coefficient bears the correct positive sign. Per capita GDP has significant and positive impact on food price inflation. One unit (one rupee) average increase in per capita GDP increases food price inflation by 0.0017 units. Wheat support price also has inflationary and significant impact on food price inflation. One unit (one rupee) average increase in this variable results in 0.05 unit increase in food CPI. Food exports and food imports are also impacting food CPI significantly and positively. One percentage point increase in food exports and food imports cause 0.48 and 0.27 unit increase in food CPI respectively.

(D) Short Run Dynamics

VECM has been used to find out the short run dynamics. The results of short run dynamics of the variables are reported in table-5. According to these results only three variables inflation expectations ($?FPI_{-t-1}$), agricultural support prices ($?ASP_t$) and food exports ($?FX_t$) are showing statistically significant effect on food price inflation. All other variables are statistically insignificant in short run.

Table-5: Short Run Relationships

Dependent Variable = $?FPI_t$			
Variable	Coefficient	T-Statistic	Prob-Value
Constant	-0.163500	-0.219200	0.8284
$?FPI_{t-1}$	0.800563	3.808210	0.0009
$?M2G_t$	0.059029	1.530154	0.1396
$?PGDP_t$	0.001114	1.477726	0.1530
$?PGDP_{t-1}$	0.000463	0.536597	0.5967
$?ASP_t$	0.058287	4.446252	0.0002
$?ASP_{t-1}$	-0.006688	-0.219333	0.8283
$?FX_t$	0.354770	2.831904	0.0094
$?FX_{t-1}$	0.134124	1.919740	0.0674
$?FM_t$	0.275443	1.794954	0.0858
$?FM_{t-1}$	0.009114	0.071144	0.9439
ECT_{t-1}	-0.991143	-3.614136	0.0015
R^2= 0.915113 Adj-R^2 = 0.874 F-Statistic= 22.54085 Prob(F-statistic)= 0.000 Durbin-Watson = 2.092			

The error correction term of our short run model is also statistically significant with a negative sign. It is another proof that long run relationship exists among the variables we used in this study. The negative value of coefficient of ECT_{t-1}, which is (-0.9), indicates the very high speed of convergence towards equilibrium. It may be justified because food price inflation, even more than general inflation, is very sensitive to policy shocks like administered prices (support prices), trade policy (export of food) and inertia (inflation expectations). Empirical results of this study reveal that all explanatory variables have positive relation with food price inflation. The entire variables showed correct sign and are statistically significant except money supply. Money supply affects food price inflation positively but its impact is not significant. It shows food price inflation in Pakistan is not a 'monetary phenomenon'. A number of empirical studies for Pakistan as well as for other countries support the results about money supply (Tweeten, 1980; Bhattacharia and Lodh, 1990; Balkrishnan 1992, 1994; Hasan et al. 2005; Loaning et al. 2008). One year lag of food CPI is used to check the impact of expectations about food price inflation. It is highly significant with positive sign both in long run and short run. As food is the basic need of human beings, people are very conscious about its future prices. They develop their expectations on basis of current food prices and the past experiences. Inflationary expectations are basic reasons of price-wage spiral which creates inflationary effects for the economy. These findings are in line with the studies of Hasan et al. 2005, Bernanke 2007, Loaning et al. 2008 and Ueda, 2009. Agriculture support prices are also affecting food price inflation positively and significantly both in long run and short run. It is generally considered that increase in support prices of wheat is responsible for food price inflation in Pakistan. The results are in conformity with some earlier studies (Balkrishnan, 1992; Khan and Qasim, 1996; Lorie and Khan 2006; Khan and Schimimelpfenning, 2006). Increase in per capita GDP as proxy of growth has positive and significant impact on food price inflation. In Pakistan services and manufacturing sectors are growing more rapidly as compared to agriculture sector. Percentage share of these sectors in GDP is increasing with the passage of time. Share of services sector in GDP was 41.9% in 1972 which increased to 53% in 2008. Percentage share of manufacturing sector in GDP also improved from 15.8% to 19.1% during 1972 to 2008. The percentage share of agriculture in GDP is decreasing gradually. It was 35.5% in 1972 which has decreased to 20.4% in 2008 (WDI, 2008). In this situation, per capita GDP has fairly positive relation with food price inflation. Food imports and food exports also exert positive and significant impact on food price inflation

because prices and demand for food items have been increasing at global level. Exchange rate depreciation is also increasing the prices of food imports. Results of our study show that food imports are inflationary in the long run only. In the short run food imports do not affect food price inflation significantly. Khan and Qasim (1996) also found the similar impact of import prices on inflation. Food exports disturb supply situation in national markets resulting in inflation. Food exports also increase food price inflation through inflation expectation and hoarding channel.

(E) DIAGNOSTIC TESTS

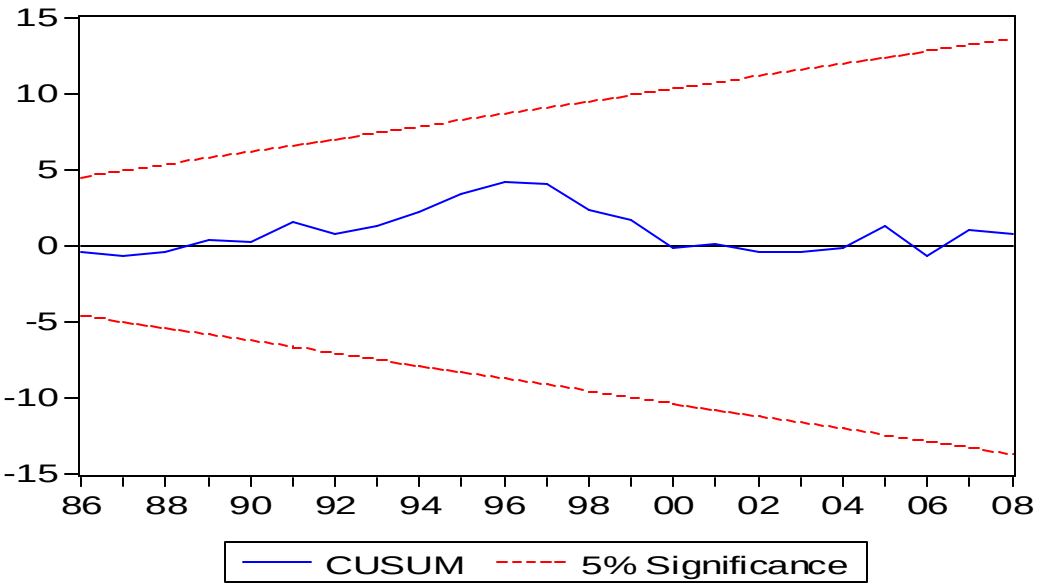
We applied the necessary diagnostic tests on our model to check the problems of normality, serial correlation, heteroskedasticity and model specification. The results of these tests are reported in table-6.

Table-6: Diagnostic Tests (Long run Model)

Normality Test (Jarque-Bera Statistics)	Jarque-Bera Statistics = 1.5011	Probability = 0.4721
Serial Correlation (Breush-Godfrey Serial Correlation LM Test)	F-statistics = 0.1859	Probability = 0.6696
ARCH Test (Autoregressive Heteroskedasticity Test)	F-statistics = 0.0147	Probability = 0.9044
Heteroskedasticity Test (White Heteroskedasticity Test)	F-statistics = 1.4383	Probability = 0.3075
Model Specification Test (Ramsey RESET Test)	F-statistics = 0.8148	Probability = 0.3744

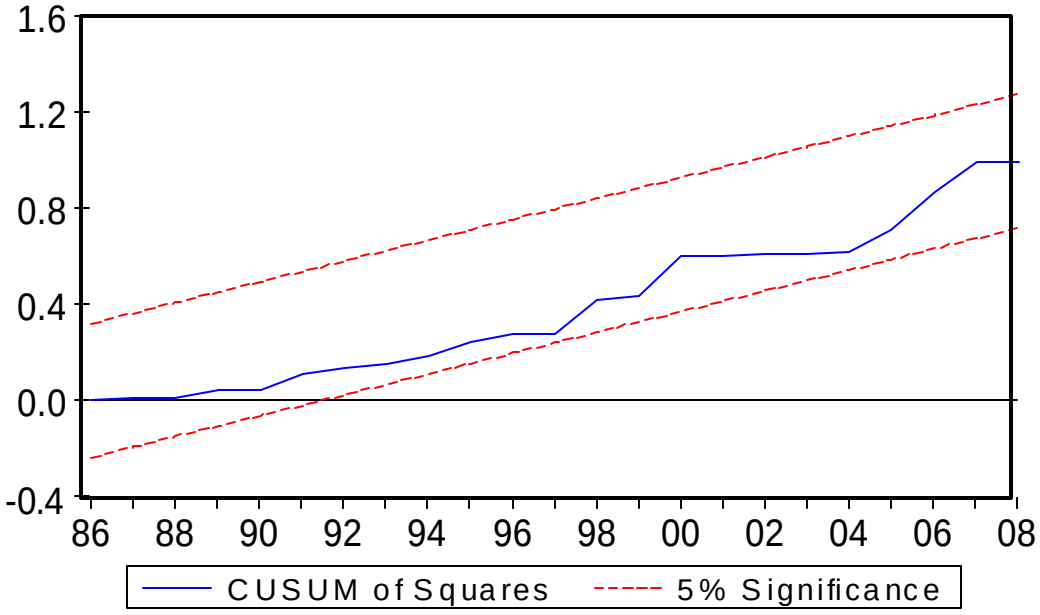
The results in this table indicate that there is no problem of heteroskedasticity and the residuals obtained from our long run model are normally distributed. Our model is well specified according to Ramsey's RESET test. The test statistics and probabilities from Breush-Godfrey Serial Correlation LM Test and White Heteroskedasticity Test indicate respectively that there is no problem of serial correlation and heteroskedasticity. The
ARCH Test also negates the presence of autoregressive conditional heteroskedasticity.

The plots of the CUSUM and the CUSUMsq, displayed in figures-1 and figure-2, are within the critical boundaries at 5 percent level of significance which confirm the stability of the coefficients and correct specification of model.



The straight lines represent critical bounds at 5 percent significance level.

Figure-1: Plot of Cumulative Sum of Recursive Residuals



The straight lines represent critical bounds at 5 percent significance level.

Figure-2: Plot of Cumulative Sum of Squares of Recursive Residuals

CONCLUSION AND POLICY IMPLICATIONS

(A) Conclusion

In the recent years, food price inflation has risen very sharply at global level. It has increased the living cost of households especially in developing countries like Pakistan which results in malnutrition and, therefore, productivity losses. It hurts the poor more because they spend more than half of their budget on food.

Time series data from 1972 to 2008 of relevant variables was used for empirical analysis. First of all, stationarity of time series was checked by using Augmented Dickey-Fuller (ADF) unit root test. All variables were integrated of order one I(1) as they became stationary at their first differences at 5% level of significance. As the variables had same order of integration, therefore Johansen co-integration was applied to find the long-run relationships. Maximum Eigen Statistics $?_{\max}$ and Trace Statistics $?_{trace}$ were used. Both statistics confirmed the existence of co-integration and same number (two) of co-integrating vectors.

The impact of all dependent variables on food price inflation was positive and statistically significant except money supply growth. All the coefficients had expected positive signs.

The results revealed that both demand and supply side factors determined food price inflation in Pakistan. However, on the basis of empirical results we may conclude that food price inflation is not a monetary phenomenon in Pakistan (money supply growth is statistically insignificant). While the supply side factor or structural factors have dominant role in determining the food prices.

Vector Error Correction Model (VECM) had been used for the analysis of short run dynamics. In the short run, only inflation expectations, support prices and food exports affected the food price inflation. The negative value of coefficient of ECT_{t-1}, which is (-0.9), indicated the very high speed of convergence towards equilibrium.

(B) Policy Implications

Findings of the study show that 'inflation expectations' has dominant role in determining food price inflation both in long run and short run in Pakistan. Therefore, there should be

continuity and consistency in government's economic policies so that people may rely on these polices and do not expect inflationary trends in the future.

Support prices are the second major source of food price inflation in Pakistan. Government should pursue a moderate policy in raising support prices. Alternative to support price policy, government may provide subsidies on inputs as on fertilizers, pesticides, diesel and electricity. Government should also encourage and support farmers to adopt modern technology for higher production with lower production cost.

Economic growth (increase in per capita GDP) is also contributing towards food price inflation according to this study. It is because the percentage share of services and manufacturing sectors to GDP is growing rapidly as compared to agricultural sector in Pakistan. Government should formulate proper policy for agriculture sector to fill the output gap. Sufficient credit facilities should be provided through formal and informal channel. Government should take measures to improve infrastructure, agriculture markets and land ownership system. Modern technology should be introduced to improve the production of food grains, meat, poultry and dairy products.

According to our analysis, imports of food items are also inflationary because of higher prices of food item at global level and exchange rate depreciation. As a policy measure, we need to exploit our unrealized yield potential in production of food items as God has gifted us with all necessary resources.

This study reveals that food exports affect food price inflation positively not only in the long run but also in the short run. Government should ban the exports of food items until they are over and above the domestic needs. For price stability in the country, buffer stocks of essential food items like wheat, sugar and pulses should be maintained. There should be maximum control on smuggling of wheat, rice and live stock to neighboring countries.

Empirical results of this study prove that growth in money supply or expansionary monetary policy does not affect food price inflation significantly in Pakistan. In this situation it is suggested that government should encourage the expansion in private sector credit, especially towards the agricultural and its related sectors. There should be the availability and easy access of loans for all farmers for all types of their needs such as expenditure on the use of modern technology, inputs, marketing and storage facilities. Increase in public expenditures on the

provision of infrastructure for rural areas will also be helpful for optimal utilization of the potential of agriculture sector.

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