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Food Inflation and Poverty Nexus: An Empirical Ascertainment

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Reducing the poverty level is one of the prime objectives in the Millennium Development Goal (MDG) for all developing nations of the world. There are a number of factors contributing to enhance the poverty level. Among these factors, inflation is one of the major and highly concerned one that is eroding the development and growth level of Least Developed Countries (LDCs). Moreover, it leads to reduction in real value of money and termed as a serious hazard. More recently, the global food crisis has affected many poor across the globe. This study takes into account the food items related inflation and its link with the poverty at national as well as at global level. It also highlights the major causes of food inflation which would be quite useful for policy formulation process. For the purpose, time series data set has been taken into account ranging over the period of 16 years 1990-2015. Auto Regressive Distributed Lag (ARDL) Model is utilized to explore the short run and long run elasticities. The major findings suggested that a robust link exists between food inflation and poverty level.

Keywords: Food Inflation, Poverty, Auto Regressive Distributed Lag Model

1. INTRODUCTION

Food is important for every human being for their survival. The share of food relative to other items could vary between rich and poor. The poor households spend a major share of their expenditures on food. A rise in prices of essential food items erodes their purchasing power, and with the same income level, it is not affordable for them to purchase these goods. The volatile nature of food prices creates malnutrition and starvation and hence contributing towards raising the overall inflation rate. Therefore, the prices of household items are an issue of serious concern of today's world. (Chaudhry, et al., 2008)

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Achieving high growth rates and maintaining them at the optimum level have always been an agenda of the poor nations. A number of development programmes have been continuously launched to reduce poverty. However, implementation of developmental measures without a policy support leading towards inequality worldwide [Keidel (2007); Azzoni, *e.t al.*, (2004); Nouve and Wodon (2008); Deaton (1997); Tsimpo and Wodon (2008), James, *et. al.*, (2008); Easterly and Fisher (2004); and Son and Kakwani (2006) .

Inflation is categorized as food inflation and inflation of non-food items. The number of studies conducted on this particular issue has been increasing over the time because of recent wave of food prices hike. The world population, especially living in poor and developing regions is a victim of rising prices. Global statistics shows that one of the reasons attributed to food inflation is high oil prices in global markets which effects the life pattern and welfare of people living on or below the poverty line (Bandara and Selvanathan, 2001).

Given the statement of problem, we came across the fact that food inflation is the problem of South Asian regions particularly in Pakistan. With this background this study is aimed to empirically investigate the nature of link between food inflation and poverty. Moreover, to analyze the trends of food inflation in Pakistan over the last two decades,

The study is organized as follows: following the introductory section, literature review of theoretical as well as empirical studies is presented in section two. Section three highlights the state of inflation with reference to food items, while section four contains methodology and discussion on empirical results. Section five concludes the study and gives brief recommendations.

2. REVIEW OF EMPIRICAL STUDIES

There are a number of research studies conducted to investigate the problem of food inflation and its effects on economic growth. A brief review of literature is given here. Xiaohua (2014) has calculated the effect of increased world food prices on the welfare change. He viewed that when food prices increases leads to increase income as well in order to reimburse the welfare loss.

Sugema, *et. al*., (2010) analyzed empirically the impact of inflation on rural poverty for Indonesia. The employment of consumer demand theory and price index of poor found that rural households are more affected by the shocks occurring in the economy, and inflation is one of those shocks. The study also concluded that rising prices of food items have more adverse effects as compared to non-food items. Furthermore findings also highlighted that poor as compared to non-poor are more vulnerable to food inflation.

Doward (2013) has reviewed the trends of staple food prices globally and also showed the impact of food prices on the development and on the poverty level. This study also provides the loop wholes which should be addressed for getting higher productivity by the Agricultural sector.

Son and Kakwani (2006) investigated the relationship between price changes and poverty for Brazilian economy over the period 1999-2006. Three indicators of poverty were employed by the study including severity of poverty, headcount ratio and the poverty gap in Brazil. Major findings highlighted that the inflation occurring in the economy has affected more to the poor as compared to non-poor while the indices depicted that for last three years of the sample period, inflation affected more to the non-poor and favored the poor. As a methodology tool, this study decomposed total impact of inflation into two parts, distributional impact and the income effect. The findings also included that component of distributional effect is more active in determination of whether inflation affects poor or the non-poor.

Abiola and Oldin (2008) analyzed the link between foreign aid, supply of food, and poverty eradication in Nigeria. Annual time series data set over the period 1975-2005 have been utilized and employed the econometrics techniques to find the determinants of poverty reduction. The study found that aid inflow, supply of food, spending by government, on education and health are major determinants of poverty eradication. Major recommendations highlighted that government should take care of health and education if the objective is to reduce the poverty. Loening, et. al., (2009) have smartly described that how food insecurity and increased food prices taken away the wellbeing of the people of Ethiopia

Shahnoushi, *et. al.,* (2009) analyzed the empirics of food inflation and monetary policy for the economy of Iran. The study applied annual time series data set over the period 1976-2006 and employed Vector Error Correction Method (VECM). The study found that a short run and long run equilibrium relationship exists between the money supply and food inflation. Furthermore significant impacts of monetary reforms have been observed on agriculture production and food prices (Shahnoushi, *et. al.*, 2009).

Walsh (2011) analyzed the role of food inflation for the inflation in Pakistan. The study highlighted the importance of food inflation for inflation measurement and targeting. It found that food inflation is sharper as compared to non-food inflation and it is more persistent as compared to non-food items inflation. The study recommended that policymakers, who aim to measure or target core inflation, must include food inflation as well.

Loening, et. al., (2009) studied dynamics of inflation and food prices for the agriculture economy of Ethiopia. The study utilized monthly data set for one decade back to 2009 and estimated Error Correction Methodology (ECM) to find the major determinants of inflation. The three major components highlighted include cereal prices, food prices and non-food prices. The study found that overall prices are determined by exchange rate, international food and non-food items prices (Loening, et. al., 2009)

Gonzalez, et. al., (2006) studied for Colombia the food price inflation forecasting under inflation targeting regimes. The study filled the gap in existing literature that is the lack of forecasting model in short run for inflation. By employing the technique of flexible least squares the study also compared the constructed model with that of model given by central bank. Forecast combination technique was also applied in this study, the findings highlighted that classifying the food items into processed items, unprocessed items and food away from home can help to improve the forecasting (Gonzalez, et. al., 2006).

Haye and Anwar (2009) analyzed the empirical relationship between food prices and inflation for Pakistan over the period 1971-2007. The study applied Auto regressive Distributed Lag (ARDL) methodology technique to conduct the empirical analysis and found that money supply is not neutral for determining the food prices in Pakistan. The recommendations include that monetary policy is very important for the control of core inflation and food inflation as well.

Zhang and Law (2010) tried to explore the causes of food inflation in China and studied how it affected the overall inflation rate of the country. The study found a contrary result as compared to generally believed results that food inflation is caused due to demand pressures rather than supply shocks. In this study it was argued that food items inflation is not a determinant of growth rate of wages in China. Furthermore the findings also suggested that inflation of food items did not affect the non-food items inflation index.

A survey analysis conducted for south Asia by Bendara and Selvanathan (2001) found moderate prices of food items in Bangladesh while for the rest of major countries in region including India, Pakistan and Sri Lanka food prices showed significant increasing trend over the time. The study also concluded that Pakistan, Bangladesh and Nepal have been affected by the global food crisis as the majority poor of these economies are buyers of food items not the sellers. The governments of these countries responded to these changes and implemented short run measures to remove this problem, but those remedies caused very serious long run problems for these countries.

3. MAJOR CAUSES, TRENDS AND IMPACTS OF FOOD INFLATION

3.1 Causes of Food Inflation

There are many causes reported for the food inflation, few of them are reported here. An Asian Development Bank (ADB) (2008) Report highlighted many causes attributed to the high prices of food items as Firstly, a number of structural changes including the shortfall of stock of cereals and rice across the world. The increasing prices of rice, wheat and other cereals indicate that their stock is below the demand pressures by households, another cause is the increasing prices of oils and the scarcity of oil reserves and its supply decisions by the oil producing authorities. This report also mentioned cyclical factors like natural calamities, floods and droughts in South Asian region as a reason to promote food inflation. Studies conducted by (Polaski, 2008), and ADB (2008) report and Economy Mirror (2010) highlighted that a second major cause of high prices of food items is mismatch between the demand and supply. Anandan, et. al., (2013) mentioned that higher bio fuel production/consumption and increased food consumption in emerging economies in addition to global monetary factors including US dollar exchange rate dynamics are also the major causes of food inflation.

The rising per capita income of the people brings a shift in their dietary pattern, while the growing demand against the underinvestment in most of developing countries is causing the high demand while the supply as compared to demand increase is not rising. Supply is low because of underinvestment in agriculture products, competition in use of lands for commercial or cropping purposes, furthermore disturbance in rains pattern has caused scarcity of fresh water for cropping etc., furthermore it mentioned that structural adjustment programmes launched by International Monetary Fund (IMF) and other lending agencies in developing countries during the late 80s and early 90s also put restrictions of low investment in agriculture sector of these economies. Furthermore some studies also attributed the prices of their currency against dollar as a cause of food inflation in developing countries. A report by P&BD group India (vol 17, 2010) also stated that limited storage capacity of food items, constraints on imports, hoarding and institutional limitations are also some additional causes of food inflation. Ahsan, et. al., (2011) presented their analysis regarding to Pakistan that the smuggling and hoarding of wheat to neighboring countries especially Afghanistan becomes one of the major cause to increase its prices.

3.2 Major Trends of Food Inflation in Pakistan and South Asia

In the context of developing countries, and specifically the Pakistan, a recent World Bank report listed it as one of the twenty countries "at risk" due to the estimated impact of food prices on urban poverty (Dessus, *et. al*., 2008). According to Economic Survey (2012-13) the food inflation was 7.4% in 2013, while it is 9.3% from July 2013 to April 2014. So it has again shown an upward trend after two episodes in 2007 and 2010.

Previously, the rise in general inflation rate has been partially attributed to the second episode of high food inflation during 2010. As a result of which, half of Pakistan's population has considered to be "food insecure,"[1] according to the World Food Programme (Chaudhry, et. al., 2008) Moreover, Economic Survey (2013) asserted that food inflation was 7.4% in 2013, while it was 9.3% from July 2013 to April 2014.

The volatile nature of major food products' prices including wheat, rice, corn and other food staples is worsening the state of poor households, especially in Least Developed Countries (LDCs). The mismatch (created because of ignored agriculture sector) between rising demands of households and decreasing supply (created by high input prices) puts a heavy pressure on prices of food items. This was also evident in Pakistan during 2009 that food inflation has endured eminent during the last a few months, it remained stable at about approximately 15% as compared to approximately 8% in 2009 (Pakistan Economic Survey, 2010-11).

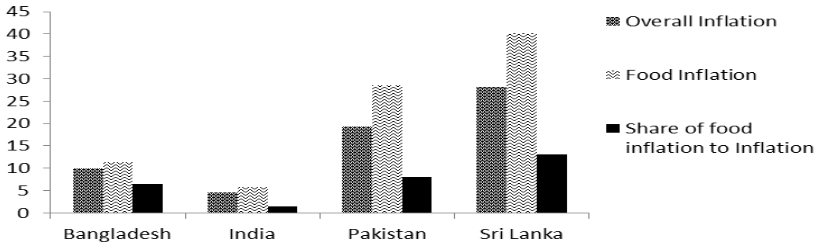
According to a World Bank report (2008) the falling trend was observed in the food prices till mid-1970s, which has seems to be disappeared, now as there have been approximately 200percent increase in food prices since mid 2008. The agricultural output will remain below to its target level in south Asian region but food prices will go down in

[1] Food insecurity is defined as, "a situation that exists when people lack secure access to sufficient amounts of safe and nutritious food for normal growth and development and an active and healthy life. It may be caused by the unavailability of food, insufficient purchasing power, inappropriate distribution, or inadequate use of food at the household level…Food insecurity may be chronic, seasonal or transitory. Definition taken from website of the Food Insecurity and Vulnerability Information and Mapping System (www.fivims.org).

most of South Asian countries including Pakistan till the 8th month of 2014, just because of favorable weather (World Bank report; South Asia Economic Focus (Spring 2014)).

Recent statistics as collected by Gwartney et al.2011) for Pakistan indicate that during the month of April 29 consumer goods[i] showed upward trend of about 8%. These statistics were collected in a survey of 52 consumer goods over 118 towns of 79 districts of Pakistan. Furthermore the report also showed that a 5% increase in milk caused high prices of milk during the recent survey. Table 1 below shows the trends of food inflation, trends of overall inflation and share of food inflation in overall inflation for a sample of SAARC countries. It can be seen from the figure that Sri Lanka is leading in case of overall inflation and share of food inflation in overall inflation while both are least in case of India. After Sri Lanka the both effects are severe for the case of Pakistan.

Figure 1: Trends of Food inflation, overall inflation and share of food Inflation in overall inflation for four major SAARC countries

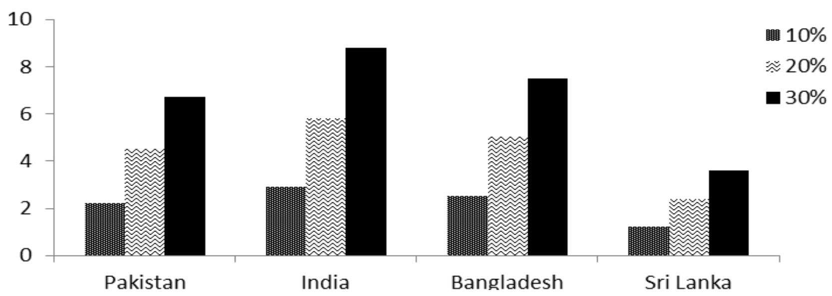


Source: the data has been collected from World Bank Report 2008

3.3 Impacts of Food Inflation

As far as the impacts of food inflation are concerned, the effects differ among the households because an impact depends on the fact that households are sellers of commodities or the buyers. The major group of people affected by the food inflation is the poor living in the country that is living below the poverty line or on the poverty line. Figure 2 below shows the increase in poor (in percentage point) due to increase in food prices for four leading SAARC countries including Bangladesh, India, Pakistan and Sri Lanka. It shows that for India the high food prices affect more to poverty indices. Next to India is the Bangladesh, and then comes Pakistan, while the impact of food price increases on poverty is lowest in case of Sri Lanka.

Figure 2: Impact of Food price increase on Poverty (2008)



Source: Federal Bureau of Statistics Pakistan and World Report of Agriculture and Development 2008

4. METHODS AND MATERIALS

This section is very important for an empirical analysis. The section provides the nature of data set, its sources along with model and methodology employed to get the desired results.

4.1 Data and Sources

The present study used secondary data taken from State Bank of Pakistan (SBP) publications, Economic Survey of Pakistan (various issues). Price data have been collected through the Free and Fair Election Network (FAFEN,) Retail Price Monitor (April 2011). Data on household consumption and Consumer price indices are collected from Federal Bureau of Statistics, Pakistan and from Household Integrated Income Survey (HIES).

Estimation is carried out by applying simple Ordinary Least Squares (OLS) method. For the solving the problem of spurious regression, the study has applied Augmented Dickey Fuller (ADF) tests to examine the time series properties of data that is checking the stationarity of data. In the second step the study has applied OLS method of estimation. Furthermore, in the third step, the study estimated and reported the short run diagnostic statistics along with the figures of Cumulative sum (CUMSUM) and Cumulative Sum of Square (CUSUMSQ) test to show the overall fitness of the model. Since food prices inflation is one of the determinants of poverty in developing countries, so we include the food price index in the model also prices in international market also determine the inflation and ultimately the poverty, so the money supply variable is also part of the model , prices in international market also affect the poverty level so exchange rate is here to capture its impact and finally interest rate plays vital role in poverty enhancement here through indirect channel.

$$POV_t = f\ (FPI\ , IR\ , EXR, MS)..(1)$$

Where POV is poverty level, FPI is food price index, IR is the real interest rate, EXR is exchange rate and MS is money supply. Variables used in estimation process are with natural logarithm.

5. ESTIMATION RESULTS

Table 1 below reports the results of unit root test. It shows that all the variables are non-stationary at level except exchange rate while become stationary at first difference.

Table1: Result of Augmented Dicky Fuller Unit Root Test

Variables	Level	First Difference	Decision
POV	-1.66979	-4.43208*	I(1)
MS	-0.368259	-8.13598*	I(1)
FP	-0.974499	-3.45687*	I(1)
IR	-1.812309	-4.45868*	I(1)
EXR	-2.35689*	-6.26548*	I(0)

Note: *Shows significance at 5% level

Regression results are presented below in Table 2. The results show that food price inflation measured by growth rate of consumer prices of food items has positive and significant impact on poverty index. With 1% increase in CPI there is 1.78 % increase in poverty.. The impact of money supply is positive and robust as well. It is because of the fact that money supply is not neutral in determining the food prices inflation; it affects food inflation positively and hence affects poverty indirectly. Our findings the impact of food inflation is in line with the findings of Hye and Anwar (2008) for the Pakistan. This implies that policy makers must keep the money supply into consideration while making the decisions regarding the poverty control or implementing the poverty reduction programmes. The real interest rate has positive but insignificant impact on poverty index. Similarly the effect of exchange rate on poverty is negative and robust. The coefficient of determination is approximately 0.74, showing that 74% variations in poverty are explained by the food price inflation, real interest rate, exchange rate and money supply. Durbin Watson DW stat is given indicates there is no autocorrelation in the estimated relation. The F. Statistics is relatively high showing the overall significance of our model.

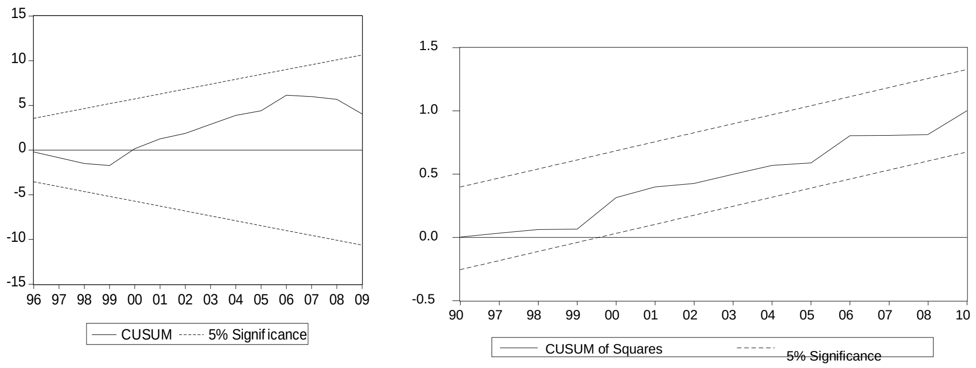
Table 2: Regression Results

Variables	Coefficient	t- Statistics
C	-2.1354	-2.0321
D(FP)	1.7868 **	2.4957
D(MS)	1.1783 *	2.1028
D(IR)	2.0568	11562
EXR	0.4636	1.2535
R^2 = 0.745 DW = 2.0254 F-Stat = 84.5		

Note: * shows significance at 1%, ** at 5% and *** at 10% level of significance

The figure 3 below shows the Cumulative Sum (CUSUM) and Cumulative Sum of Square (CUSMSQ) graphs. This test is conducted to find the structural stability of variables. Explain briefly what they shows

Figure 3: Plots of CUSUM and CUSMSQ Recursive Residual Test



6. CONCLUSIONS

The empirical analysis conducted with an aim of finding the relationship between poverty and food price inflation. The theoretical arguments given in the favor of cause and impacts show that food price inflation is also a serious problem which affects adversely the poverty level of the economy. The empirical results revealed that there is a robust and positive link between the inflation of food items and poverty level for the Pakistan over the period of 1990 to 2010. The study found that food prices inflation is a major cause of poverty in developing nations like Pakistan. Policy makers should keep into consideration the money supply as a policy measure to check the poverty. Furthermore, this study also suggests that bringing the short run solution of food inflation is not more fruitful; long run policies would be more inferential for steady state equilibrium in an economy like Pakistan.

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[i] Including the poultry products, pulses, tomato, potatoes, rice, vegetable ghee and fruits