IS PASSTHROUGH OF GLOBAL FOOD INFLATION TO FOOD INFLATION IN PAKISTAN SYMMETRIC?

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Abstract. This study investigates the nature of asymmetric passthrough of global food inflation to domestic inflation in Pakistan by using monthly data from 1993M2 to 2012M2. In this study, stationarity of the data is checked by applying Augmented Dickey Fuller (ADF) test. Ordinary Least Square (OLS) estimation results indicate that passthrough of global food inflation in consumer prices in Pakistan is asymmetric for the covered data period, *i.e.* domestic prices respond differently in the period of global surge in food prices as compared to fall in prices. The policy recommendation based on the results is that government should protect marginalized segments of the economy from abnormal effects of global food inflation to save them from food insecurity, poverty and vulnerability.

Keywords: Food prices, Asymmetry, Inflation

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I. INTRODUCTION

Inflation is one of the core macroeconomic problems that policy makers have to deal through demand management policies to protect inhabitants of a

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country from falling into poverty and vulnerability. Inflation is further divided into food and non-food inflation. Food inflation defined as percentage change in food price index has direct consequences on living standard of poor segments of a country because poor spend major share of their income on food.[1] With increase in food prices poor segments of the society cannot afford required calories thus affecting their health and productivity.

Pakistan has observed double digit annual CPI inflation during FY2008-12 whereas it was 7.4% in FY2013 and expectations are that in FY2014 it will be above 10%. Food inflation during FY2007-12 has been consistently higher than nonfood inflation as reflected in figure1. Food inflation in FY2009 was highest 23.7% and on average 10% in last 20 years. Nonfood inflation in FY2009 was highest 18.45% and on average 8.41% in last 20 years.

FIGURE 1

Food and Non-Food Inflation in Pakistan

Figure 1: Food and Nonfood Inflation in Pakistan
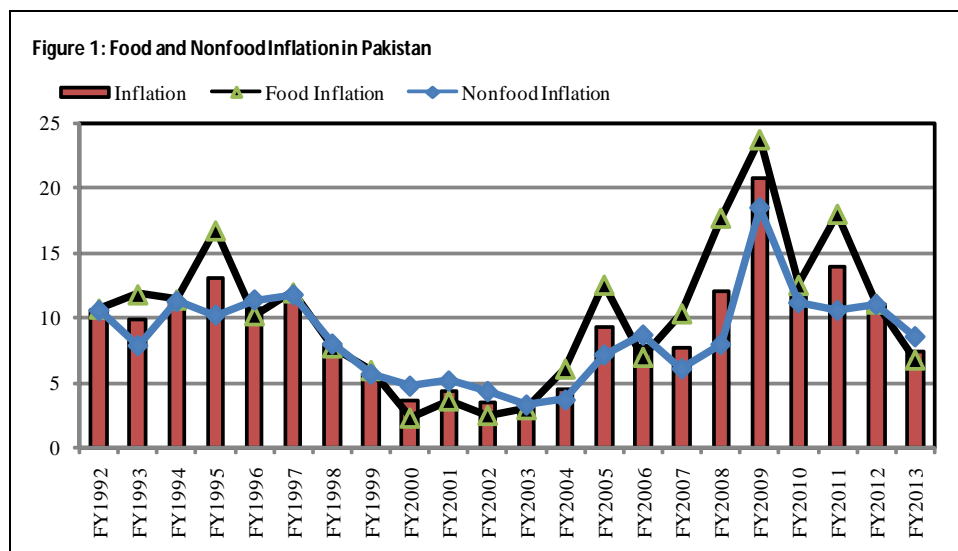
An important question is whether passthrough of global food inflation to domestic food inflation in Pakistan is symmetric or asymmetric? Asymmetric passthrough of global food inflation may have important

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[1]Food and non-alcoholic beverages group has 34.83 percent weight in Consumer Price Index (CPI) of base 2007-08 and its contribution in overall CPI inflation (7.8%) during July-April FY2013 was 29.8 percent.

implications for demand management policies as well as for controlling poverty and inequality in Pakistan. In case of asymmetric passthrough, poor face higher prices of food when global prices of food rise but they do not benefit from decline in global food prices due to price rigidities.

Although there is bulk of literature on the effects of oil price shock and food price shock on the domestic prices, there are relatively a few studies that investigated the asymmetric effect of foreign price changes on domestic prices, in developing economies (Cunadoa and Graciab, 2005; Shawarby and Selim, 2012; Ianchovichina *et al.*, 2012; Zoli, 2009; Peeters and Albers, 2013). In Pakistan, a large number of studies were conducted on passthrough of global food and oil price inflation on domestic inflation but asymmetric pass though of foreign inflation on domestic inflation has not been directly investigated.

In rest of the paper, section II presents review of recent empirical literature on the subject, section III discusses methodology applied in the paper and data sources, section IV explains the empirical results of the study and section V concludes the study based on empirical results of the study.

II. LITERATURE REVIEW

Cunadoa and Graciab (2005) found some evidence of asymmetric relations of global oil prices shocks on domestic activities like domestic prices over the period 1975Q1-2002Q2 for some Asian countries (Japan, Thailand, South Korea and Malaysia, Singapore). It follows Mork (1989) and Mork *et al.* (1994) in which oil price increasing and decreasing variables are entered in the same equation for checking the asymmetric relationship and find that some countries — Japan, Thailand, South Korea and Malaysia — experience asymmetric impact of global oil prices on domestic prices.

Zoli (2009) empirically tested the asymmetric relationship of global oil and food price shocks on domestic inflation in 18 European emerging economies. It used two different VAR models for the period 1990-2008. The results suggested that increase in global food and oil price shock increased the domestic inflation in these countries but decrease in world food prices did not tend to decrease domestic prices in the same way, giving the idea of asymmetric relation of domestic prices due to response of global positive (increase) or negative (decrease) shocks.

Peeters and Albers (2013) analyzed asymmetric impact of global oil and food price shocks on domestic prices in South Mediterranean for the sample period 2006M3-2010M4. They tested the world food price shocks both

positive and negative on CPI inflation in these countries and found that increase in global food price increased the CPI inflation but decrease in world food price did not decrease the CPI inflation, showing the sign of asymmetric relationship.

Shawarby and Selim (2012) conducted a study to find asymmetric kind of relationship between global food prices and domestic inflation in Egypt. They estimated the model for the period 2007M7-2011 M7 and found the evidence of asymmetric relationship showing, *i.e.* Egypt's economy was highly affected by increase in global prices and had somehow gone downwards rigidity while decreasing global food prices.

Ianchovichina *et al.* (2012) accessed the asymmetric relationship of global food price shocks on domestic inflation specifically food inflation in the countries like Middle East and North Africa(MENA) for the period 1998M12-2011M6. It concluded that in all MENA countries global food price shock had asymmetric relationship on domestic food prices specifically.

In case of Pakistan a large number of studies have investigated the impact of foreign food and energy inflation on domestic inflation (*e.g.*, Khan and Ahmed, 2014; Ahsen *et al.*, 2011; Ali *et al.*, 2012; Jaffri *et al.*, 2013), however, asymmetric passthrough of global food inflation on domestic food inflation has not been estimated. Therefore, current study is intended to contribute in the existing literature through empirical investigation of asymmetric passthrough of global food inflation.

III. METHODOLOGY AND DATA

The study follows Shawarby and Selim (2012) and Gelos and Ustyugova (2012) to estimate asymmetric passthrough of global food inflation on domestic food inflation in Pakistan.[2]

$$
\begin{aligned}
INFFOOD_t \;=\;\; & \gamma_0 + \gamma_{1i}\sum_{i=1}^{12} INFFOOD_{t-i} + \gamma_{2i}\sum_{i=0}^{12} YGAP_{t-i} + \\[2mm]
& \gamma_{3i}\sum_{i=0}^{12} FFINF_{t-i} + \gamma_{4i}\sum_{i=0}^{12} FIINF_{t-i} + \gamma_{5i}\sum_{i=0}^{12} FEINF_{t-i} \\[2mm]
& + \gamma_6 DUMFFINF + \varepsilon_t
\end{aligned}
$$

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[2]Jaffri *et al.* (2013) have estimated similar model to estimate passthrough of global food and energy inflation on domestic inflation in Pakistan.

Where

   INFFOOD   difference of natural log of domestic food price index (month on month inflation)

   YGAP   difference of natural log of industrial production index and its HP trend

   FFINF   difference of natural log of foreign consumer price index for food and beverages

   FIINF   difference of natural log of foreign consumer price index for industrial materials

   FEINF   difference of natural log of foreign consumer price index for energy

   DUMFFINF Dummy variable (equal to one when global food inflation is negative) multiplied by $\Delta LFFCPI$

To test the effect of decrease in international food prices on the slope of international prices in the above model if the summation of the coefficients of $FFINF_{t-i}$ and *DUMFFINF* is positive then it leads to the conclusion that when international food price inflation is negative the impact on the domestic food prices continue to increase which means asymmetric effect of world food inflation on domestic food inflation exists (Shawarby and Selim, 2012).

All the explanatory variables are expected to affect inflation positively. The sample used in this empirical investigation covers monthly data for the period from 1993 M02 to 2012M02 with total of 229 observations. All the relevant data were obtained from electronic and published data of International Financial Statistics (IFS), World Economic Outlook (WEO), and Monthly Statistical Bulletin of State Bank of Pakistan (SBP).[3]

IV. ESTIMATION RESULTS

Table 1 shows that all variables included in the model are stationary at level. In the presence of stationarity, we can safely apply Ordinary Least Square (OLS) Method to obtain Best, Linear and Unbiased Estimates (BLUE) of the parameters (Gujrati, 2007).

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[3]IMF's Foreign Consumer Price Index (100%) weight is subdivided into foreign consumer price index for food (18.5%), foreign consumer price index for industrial inputs (18.4%), and foreign consumer price index for energy (63.1%).

TABLE 1

Results of Augmented Dickey Fuller (ADF) Test

Series	With intercept	With intercept and trend
INFFOOD	–13.45(0)***	–13.54(0)***
FFINF	–10.146(0)***	–10.183(0)***
FIINF	–10.568(0)***	–10.578(0)***
FEINF	–9.34(0)***	–9.430(0)***

*** are used to represent significance of ADF test statistics at 1% level of significance.

Optimal lags selected by SIC are given in parenthesis.

TABLE 2

Estimation Results of Model
Dependent Variable: *INFFOOD*

Variables	Coefficients	t-values	Probability
C	0.0026	2.10**	0.0365
INFFOOD(–3)	0.0958	1.51	0.1303
INFFOOD(–12)	0.2185	3.46***	0.0007
YGAP(–1)	0.0212	2.30**	0.0225
YGAP(–7)	0.0317	3.38***	0.0008
FFINF(–1)	0.1085	3.19***	0.0016
FFINF(–3)	0.0959	3.08***	0.0023
FFINF(–8)	0.0732	2.23**	0.0269
FFINF(–10)	0.0438	1.36	0.1739
FIINF	0.0619	2.01**	0.0462
FEINF	0.0145	0.95	0.3443
DUMFFINF	–0.1509	–2.57**	0.0109

$R^2 = 0.255$ Adj. $R^2 = 0.215$

F-Stat = 6.22 (0.0000)   Jarque-Bera $Chi^2(2) = 3.99$ (0.1359)

Breusch-Godfrey LM $Chi^2(1) = 0.9302$ (0.6280)

Engle's ARCH LM $Chi^2(1) = 2.3793$ (0.1230)

White's Test $Chi^2(1) = 27.15$ (0.2055)

Ramsey RESET Test Stat = 0.7624 (0.3826)

***, ** are used to represent significance of ADF test statistics at 1% and 5% level of significance.

Table 2 shows the estimation results and diagnostic tests performed to ensure normality of residuals, no serial correlation and no heteroscedasticity, stability of parameters, and collective significance of coefficients. Initially we have introduced 12 lags in the model because data is monthly. By applying General to Specific Methodology, insignificant variables have been excluded from the model.

The results show that all explanatory variables including *DUMFFINF* have correct sign and most of them are statistically significant. The summation of the coefficients of $FFINF_{t-i}$ and *DUMFFINF* is positive which leads to the conclusion that when international food price inflation is negative the impact on the domestic food prices continue to increase which means presence of asymmetric effect of world food inflation on domestic food inflation in Pakistan.

Although, adjusted R^2 is low but highly significant. F-Statistic shows that variables on the right side collectively affect the dependent variable. Jarque-Bera Test shows that residuals are normally distributed thus fulfilling one of the key assumptions of applying OLS. Similarly, Breusch-Godfrey LM test, Engle's ARCH LM test and White's tests show that residuals are uncorrelated and homoscedastic. Finally, Ramsey RESET test confirms stability of parameters.

Series: Residuals	
Sample 1994M08 2012M02	
Observations 211	
Mean	2.14e-19
Median	-0.000410
Maximum	0.040238
Minimum	-0.039131
Std. Dev.	0.012451
Skewness	-0.037280
Kurtosis	3.669650
Jarque-Bera	3.991337
Probability	0.135923
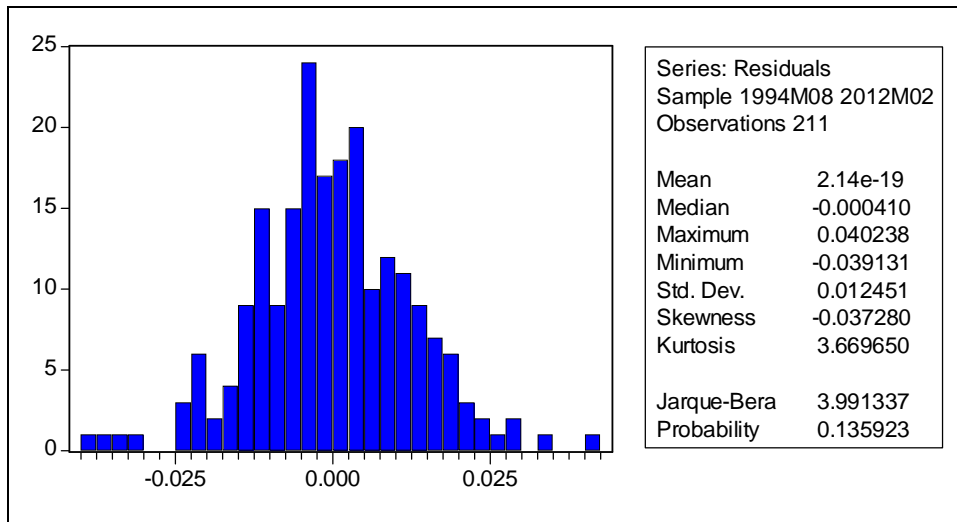
V. CONCLUSION AND POLICY IMPLICATIONS

This study has investigated the nature of passthrough of global food inflation to domestic food inflation by raising an important question: whether

passthrough of global food inflation is symmetric or asymmetric? In presence of all stationary variables in the model, we have applied OLS technique to estimate model by using monthly data from 1993M2 to 2012M2. Based on methodology by Shawarby and Selim (2012), we have found empirical evidence of asymmetric passthrough of global food inflation to domestic food inflation in Pakistan, *i.e.* at the time of decline in global food inflation we do not observe decline in domestic food inflation.

Since poor or low income households spend major share of their income on food, therefore, asymmetric passthrough of global food inflation makes them deprived of the benefit when global inflation declines. Thus asymmetric passthrough has important policy implications to control poverty and inequality.

Developing countries like Pakistan cannot ensure food security even when abundant food is available if the consumers find it difficult to purchase in presence of high prices. Thus empirical evidence of asymmetric passthrough of global food inflation in Pakistan suggests concrete measures to ensure food security through food price rationalization.

REFERENCES

Ahsan, H., Z. Iftikhar and M. Ali Kemal (2011), The determinants of food prices: A case study of Pakistan. PIDE *Working Paper* # 76.

Ali, Syed Atif, M. Ramzan, A. Razi and A. G. Bhatti (2012), Impact of oil prices on food inflation in Pakistan. *Interdisciplinary Journal of Contemporary Research in Business*, Volume 3(11), pp. 123.

Al-Shawarby, S. and H. Selim (2012), Are international food price spikes the source of Egypt's high inflation? *ERF Working Paper* # 714.

Cunado, J. and F. Perez de Gracia (2005), Oil prices, economic activity and inflation: Evidence for some Asian countries. *The Quarterly Review of Economics and Finance*, Volume 45, Issue 1, pp. 65-83. http://dx.doi.org/10.1016/j.qref.2004.02.003

Gelos, G. and Y. Ustyugova (2012), Inflation responses to commodity price shocks – How and why do countries differ? *IMF Working Paper* # 12/225.

Ianchovichina, E., J. Loening and C. Wood (2012), How vulnerable are Arab countries to global food price shocks? *Policy Research Working Paper* # 6018.

Jaffri, Atif Ali, R. Asjed and S. Bashir (2013), Passthrough of global inflation to domestic inflation: An empirical evidence for Pakistan. *Journal of Managerial Sciences*, Volume 7, No. 1, pp. 105-111.

Khan, M. Arshad and A. Ahmed (2014), Revisiting the macroeconomic effects of global oil and food price shocks to the Pakistan economy: A structural vector autoregressive (SVAR) model. *OPEC Energy Review*, Volume 28, Issue 2, pp. 184-215. http://dx.doi.org/10.1111/opec.12020

Peeters, M. and R. Albers (2013), Food and energy prices, government subsidies and fiscal balances in South Mediterranean countries. *Development Policy Review*, Volume 31, Issue 3, pp. 273-290. http://dx.doi.org/10.1111/dpr.12007

Zoli, E. (2009), Commodity price volatility, cyclical fluctuations, and convergence: What is ahead for inflation in emerging Europe? *IMF Working Paper* 09/41.