Passthrough of Global Inflation to Domestic Inflation: An Empirical Evidence for Pakistan

Atif Ali Jaffri[*]*, Rooma Asjed*[**] *& Samra Bashir* [***]

Abstract

This study has estimated passthrough of global food and energy inflation to CPI inflation in Pakistan for the period 1993M2 to 2012M2. The study has applied Augmented Dickey Fuller (ADF) test to check stationarity of data before applying Ordinary Least Square (OLS) technique. The estimation results showed that global inflation in food, industrial inputs and energy price indices positively and significantly affect inflation in Pakistan in the long run. The empirical estimates of long run passthrough of foreign food and energy inflation to domestic inflation are consistent with recent studies for developing countries. On the basis of estimation results, the study recommends prudent use of monetary policy in coordination with fiscal policy to control pssthrough of foreign inflation to domestic inflation in Pakistan.

Keywords: Inflation, Food Inflation, Energy Inflation

Introduction

Pakistan experienced double digit inflation in past several years due to both domestic and foreign factors. Among domestic factors fiscal and monetary shocks coupled with disruptions in supply chains resulted output gaps leading to rise in prices. On external front, frequent exchange rate depreciations, foreign food and energy price shocks and global events like crisis in 2008 have affected price stability in Pakistan. In this scenario, along with Pakistan other regional countries like India, Bangladesh, and Sri Lanka also observed impact of global food and energy inflation in their CPI inflation (Economic Survey 2011-12).

Recent literature on inflation shows how inflation in small economies like Pakistan is more affected by shocks in global food and energy prices as compared to advanced economies. Gelos and Ustyugova

[*] Dr. Atif Ali Jaffri, Head, Department of Economics, University of Gujrat, Gujrat. Email: atif.ali@uog.edu.pk

[**] Ms. Rooma Asjed, Research Officer, Department of Economics, University of Gujrat, Gujrat

[***] Ms. Samra Bashir, MPhil Economics students, Department of Economics, University of Gujrat

(2012) provided recent evidence of high passthrough of food and energy inflation to developing and emerging economies as compared to advanced economies. The latter having independent central banks and higher governance have more chances to control passthrough of external shocks. Further, study found that economies having larger share of food items in CPI and high existing inflation also caused higher passthrough.[2]

From several past years double digit inflation observed in Pakistan has worsened poverty related targets of Millennium Development Goals.[3] In case of Pakistan, a large body of literature on determinants of inflation is available [Khan and Ahmed, 2007; Ahsan et al., 2011; Zaman et al., 2011] however, only a few studies have focused on impact of external price shocks on domestic inflation in Pakistan. [4]

Jaffri (2010) has estimated exchange rate passthrough for Pakistan economy for 1995M1 to 2009M3 by considering existing real exchange rate misalignment, and foreign inflation as control variables. The results showed significant and high impact of foreign inflation on domestic inflation. However, the study did not consider foreign food and energy price indices to estimate their passthrough as done in this study.

Oil prices are one of the most important determinants influencing domestic prices. Ali et al. (2012) examined the impact of Oil prices on food sector prices in Pakistan by using 10 years data 2001 to 2010. Results indicated that oil prices are having highly positive and significant impact on food inflation in Pakistan. Ahmed and Donoghue (2010) have proved the relationship between increase in import prices of petroleum and industrial raw material on output prices in Pakistan by using Computable General Equilibrium Model (CGE). Similarly, Javid and Munir (2011) also proved the existence of positive relationship between oil price shocks and inflationary pressure on domestic economy of Pakistan.

Khan and Ahmed (2011) studied the impact of globally external shocks specifically global oil and food price shocks on the domestic

[2] Pakistan has 40.3 percent weight of food items in CPI index with base year 2000-01. Weight of food items in CPI with new base 2007-08 has been revised to 34.08 percent. However, long time series data on CPI with new base is not available.

[3] According to recent research conducted in 2012 by Asian Development Bank (ADB) titled " Food Price Escalation in South Asian: A Serious Growing Concern", poor in South Asia are 6.2% more vulnerable than other regions in the developing Asia.

[4] For other developing countries, recent empirical studies are available for China, Taiwan, Bolivia, Romania, Nigeria, and Oman etc.(see, Chou and Tseng, 2011; Tang et al.,2010; Mendieta and Palmero, 2008; Caraiani , 2008; Akpan, 2008; Heckro and Omezzine, 2010)

prices by applying generalized impulse response function and variance decompositions. Results showed that oil price shocks affect the domestic prices along with the depreciation of the exchange rate which significantly generates inflationary pressure on Pakistan economy.

A wide range of literature provides evidence of positive relationship between inflation and output gap. Output gap is simply the difference between actual and potential output. If the output gap is positive which means actual output is greater than potential, then inflation will begin to rise and vice versa. Satti et al. (2007), based on time series data of Pakistan from 1976-2006 indicated that output gap is positively associated with domestic inflation.

Model and Data

To estimate short run and long run passthrough of global food and energy prices on CPI inflation in Pakistan, we have augmented model given by Gelos and Ustyugova (2012) by adding growth in nominal effective exchange rate and foreign industrial input price changes as additional external factors affecting inflation:

$$\Delta LCPIt = \gamma_0 + \gamma_{1i}\sum_{i=1}^{12} LCPI_{t-i} + \gamma_{2i}\sum_{i=0}^{12} YGAP_{t-i} + \gamma_{3i}\sum_{i=0}^{12} \Delta LNEER_{t-i} + \gamma_{4i}\sum_{i=0}^{12} \Delta LFFCPI_{t-i} + \gamma_{5i}\sum_{i=0}^{12} \Delta LFINDCPI_{t-i} + \gamma_{6i}\sum_{i=0}^{12} \Delta LFECPI_{t-i} + \varepsilon_t$$

Long-run Pass through

$$LRPT_{FOOD} = \frac{\sum_{i=0}^{m1} \gamma 4i}{1 - \sum_{i=1}^{Q} \gamma 1i}$$

$$LRPT_{ENERGY} = \frac{\sum_{i=0}^{m1} \gamma 6i}{1 - \sum_{i=1}^{Q} \gamma 1i} \qquad (2)$$

Where,

ΔLCPI: difference of natural log of domestic consumer price index (month on month inflation)

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

ΔLNEER: difference of natural log of nominal effective exchange rate

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

ΔLFINDCPI: difference of natural log of foreign consumer price index for industrial materials

ΔLFECPI: difference of natural log of foreign consumer price index for energy

All the explanatory variables are expected to affect inflation positively except ΔLNEER which reflects appreciation in nominal effective

exchange rate having negative possible effect on inflation. 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). 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%).

Estimation Results

The study has applied Augmented Dickey Fuller (ADF) test to check stationarity of data before applying suitable estimation technique. The results of ADF test in Table 1 showed that all variables except YGAP are I(1), whereas, YGAP is I(0). Thus all variables in the proposed model (ΔLCPI, YGAP, ΔLNEER, ΔLFFCPI, ΔLFINDCPI, ΔLFECPI) are stationary (i.e., I (0)) fulfilling the prerequisite of applying Ordinary Least Square (OLS) technique. Equation 1 is estimated by Ordinary Least Square (OLS) method, as it provides unbiased estimate of parameters in presence of stationary variables in the model (see, Enders, 2004).[5]

Table. 1: Results of Augmented Dickey Fuller(ADF) Test

At Level			At First Difference		
Series	With intercept	With intercept and trend	Series	With intercept	With intercept and trend
LCPI	0.713(3)	-0.639(3)	LCPI	5.780(2)***	-5.839(2)***
YGAP	-4.75(12)***	-4.77(12)***			
LNEER	-0.226(1)	-2.977(1)	LNEER	-11.746(0)***	-11.726(0)***
LFFCPI	-0.728(1)	-1.656(1)	LFFCPI	-10.146(0)***	-10.183(0)***
LFINDCPI	-0.636(1)	-1.777(1)	LINDCPI	-10.568(0)***	-10.578(0)***
LFECPI	-0.823(1)	-3.612(2)**	LFECPI	-9.34(0)***	-9.430(0)***

****,**,* are use to represent significance of ADF test statistics at 1%, 5%, and 10% level of significance. Optimal lags to control serial correlation selected by SIC are given in parenthesis.*

[5] Use of OLS technique in similar models has been advocated by Edwards (2006).

Estimation results presented in Table 2 show that lags of inflation, output gap, growth in nominal effective exchange rate, foreign food inflation, foreign industrial input inflation and foreign energy inflation affected significantly month on month CPI inflation in Pakistan. As the data is monthly, therefore, 12 lags of variables were initially incorporated to calculate long run passthrough(LRPT) of foreign food and energy inflation to domestic inflation by using formula in equation (2).[6] The results showed that $LRPT_{FOOD} = 0.287$ and $LRPT_{ENERGY} = 0.114$. These estimates are consistent with estimates for developing and emerging economies as estimated by Gelos and Ustyugova (2012).

Table. 2: Estimation Results of Model 2

Dependent Variable: ΔLCPI			
Variables	Coefficients	t-values	Probability
C	0.0018	2.40**	0.0171
ΔLCPI(-3)	0.2492	4.41***	0.0000
ΔLCPI(-8)	0.1699	2.93***	0.0037
ΔLCPI(-12)	0.2030	3.59***	0.0004
YGAP(-1)	0.0145	3.51***	0.0005
YGAP(-7)	0.0164	3.96***	0.0001
ΔLNEER	-0.0456	-1.85**	0.0656
ΔLNEER(-2)	-0.0452	-1.90**	0.0587
ΔLNEER(-8)	0.0415	1.69*	0.0912
ΔLFFCPI	-0.0464	-2.70***	0.0074
ΔLFFCPI(-1)	0.0665	3.88***	0.0001
ΔLFFCPI(-3)	0.0426	2.96***	0.0034
ΔLFFCPI(-8)	0.0438	2.88***	0.0043
ΔLFINDCPI	0.0315	2.11**	0.0354
ΔLFINDCPI(-	0.0083	-0.60	0.5433
ΔLFINDCPI(-	0.0197	1.55	0.1221
ΔLFINDCPI(-	0.0415	-2.83***	0.0050
ΔLFECPI	0.0127	1.78**	0.0755
ΔLFECPI(-6)	0.0117	1.89*	0.0594
ΔLFECPI(-10)	0.0186	2.63***	0.0090

[6] Although, Akaike Information Criterion (AIC) and Schwarz Information Criterion(SIC) applied on Vector Autoregressive(VAR) model were suggesting lesser number of lags but we decided to include 12 lags to get response of variables from at least one year.

R^2=0.43
Adj. R^2=0.37
F-Stat=8.13(0.0000)
Jarque –Bera $Chi^2(2)$ = 1.1457(0.5639)
Breusch-Godfrey LM $Chi^2(1)$ =0.437(0.5085)
Engle's ARCH LM $Chi^2(1)$ =0.0241 (0.8765)
White's Test $Chi^2(1)$=34.9145(0.6129)

Conclusion and Policy Implications

Passthrough of foreign inflation in food and energy commodities to domestic inflation in small open economies like Pakistan has posed serious difficulties for policy makers to maintain price stability. According to literature, size of pass-through in the long-run depends on several factors including share of food and energy items in CPI basket, central bank's independence, existing inflationary environment, trade openness, financial development, wage flexibility, and exchange rate regime. Pakistan has small open economy having large share of food and energy items in CPI basket, high inflationary environment and labor market rigidities which lead to high pass-through of foreign inflation to domestic inflation. This study has empirically found long-run pass-through of foreign food and energy inflation in Pakistan by using monthly data from 1993M02 to 2012M02. The results showed that $LRPT_{FOOD}$ = 0.287 and $LRPT_{ENERGY}$ = 0.114. These estimates are consistent with estimates for developing and emerging economies as estimated by Gelos and Ustyugova (2012). To limit volatility of inflation caused by passthrough of foreign shocks, we recommend prudent use of monetary policy in coordination of fiscal policy.

References

Ahmed V. and O' Donoghue C, (2010). 'Tariff Reduction in a Small Open Economy'. *Seoul Journal of Economics*. 23(2).

Ali Atif., Ramzan M., Razi, A. and Bhatti G. A, (2012). 'Impact of Oil Prices on Food Inflation in Pakistan'. *Interdisciplinary Journal of Contemporary Research in Business*. 3(9).

Clause I., Conway, P. and Scott A, (2000). 'The output gap: measurement, comparisons and assessment'. *Reserve bank of New Zealand*. (Research Paper No. 44)

Edwards, S., (2006). 'The Relationship between Exchange Rates and Inflation Targeting Revisited'. NBER Working Paper No. 12163.

Enders, W, (2004). *Applied Econometric Time Series*, Second Edition. UK: Wiley Series in Probability and Statistics.

Gelos, G. and Ustyugova, Y. (2012). 'Inflation Responses to Commodity Price Shocks-How and Why Do Countries Differ?' *IMF Working Paper.*

Jaffri, A. A. (2010). 'Exchange rate pass-through to consumer prices in Pakistan: Does misalignment matter?'. *The Pakistan Development Review*. 49(1), 19-35

Javid, M. and K. Munir, (2011). 'The Price Puzzle and Transmission Mechanism of Monetary Policy in Pakistan: Structural Vector Autoregressive Approach'. MPRA Paper No. 30670,

Khan A. M. and Ahmed A, (2011). 'Macro economics effects of global oil and food price shocks to the Pakistan economy: A structural vector auto regressive (SVAR) model'.

Rudd, J. and Whelan, K, (2001). 'New Test of New Keynesian Phillips Curve. Federal reserve board, division of research and statistics', *Journal of Monetary Economics*, 52.

Satti A, H., Wasim, S. M. and Ghulam S, (2007). 'New Keynesian Philips Curve for Pakistan'. *The Pakistan development review*, 46(4).