

## **Food Price Dynamics in Sri Lanka and its Statistical Properties**

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### **Introduction**

Food price movements have significant impacts on the world's political and economic stability as well as the welfare of the people in every country (Wodon and Zaman, 2010). The increase in food prices has the most nefarious consequences (Joseph and Wodon, 2008). It reduces purchasing power and food security and increases hunger, poverty and malnutrition. Further, higher food inflation challenges macroeconomic stability and growth of an economy.

Food prices are one of the most significant sources of inflation in Sri Lanka. Food and non-alcoholic beverages account for 47 percent of total household expenditure (Department of Census and Statistics, 2012). The issue of food price dynamics has gained increasing attention in the economics literature (Aye, 2012; Baek and Koo, 2009; Durl et al., 2010; and Ularo, 2010) in recent years. Ratnasiri (2009) has examined the main determinants of inflation in Sri Lanka but has not included food prices in his analysis. Cooray (2008), Karunathilaka (1974) and Sivarajasingham (2012, 2013) have studied food price transmission and its transitory nature in Sri Lanka. However, the above studies did not focus on food price dynamics and its statistical properties in Sri Lanka. On the other hand, the characteristics of inflation induced by the food prices have been extensively analyzed in developed countries, but not given much attention in developing economics, including in Sri Lanka. This gap is addressed in this paper.

## **Objectives**

The objectives of this paper are to empirically investigate food price inflation dynamics in Sri Lanka and its statistical properties.

## **Methodology**

The study focuses the long run relationship and the causal relationships among the variables: Consumer Price Index for all items (CPI), Consumer Price Index for Food and beverages (CPIF), Wholesale Price Index for all items (WPI), Wholesale Price Index for Food (WPIF) and Global Food Price Index (GFPI). The formulas used to calculate Inflations are given in Annexure A. The study period covered by this study is from January 2003 to December 2012. The Data on above variables are collected from the annual reports of Department of Census and Statistics of Sri Lanka, Central Bank of Sri Lanka and Database of Food and Agriculture Organization (FAO). The above data are observed at monthly frequency and the data on all the variables are converted to logarithms. The natural logarithm of variables for time period  $t$  is defined as  $LCPI_t$ ,  $LCPIF_t$ ,  $LWPIF_t$  and  $LGFPI_t$ .

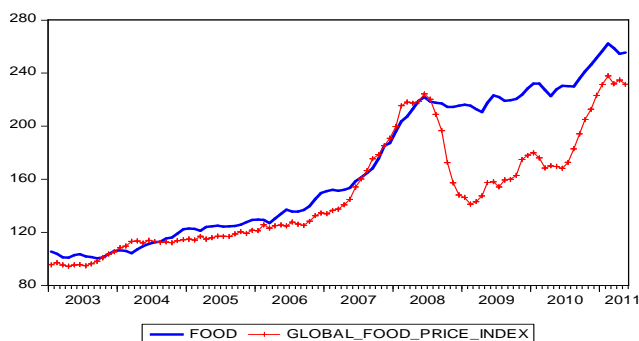
Graphical analysis was first used to identify the basic features and trends of the variables and to identify the relationships between selected variables. ADF and KPSS tests were used to test stationarity of time series variables. The study also employed the Engle-Granger Co-integration technique to examine the long run relationship and Error Correction Model (ECM) is used to examine the short run relationship between variables and long run equilibrium. Granger causality test is used to find out the direction of causality between variables. Generalized autoregressive conditional heteroscedasticity model is used to identify the dynamic behavior of conditional heteroscedasticity in the food inflation. GARCH (1,1) model.

(Balakrishnan, 1994) is used to capture ARCH and GARCH effects in inflation series.

## Results and Discussion

The food price in Sri Lanka is both increasing and relatively volatile. As shown in Figure 1, food prices locally and globally move in an upward trend.

Figure 1: Trend in CPIF and GFPI



The ADF unit root test confirmed that all variables are first differenced stationary which implies that all variables are integrated in order one. The Engle-Granger cointegration analysis indicates that FI has statistically significant effect on HI. It implies that FI and HI are positively cointegrated in long run. The Granger causality test confirms that food inflation Granger-causes headline inflation.

The results of ECM analysis show that the error correction coefficients of CPI, CPIF and WPIF are statistically significant [See Equations (1) – (4) in Annexure A] which implies that above mentioned variables moves downward towards equilibrium. There is positive relationship between FI and HI. The estimated error correction coefficients had negative values which indicate downward adjustment of headline inflation in the direction of equilibrium. The significance of error

correction term coefficients implies that there is a causal relationship between HI and FI in the long run.

**The Estimation Results of the ECM is below**

$$\Delta LCPI_t = 0.0067 + 0.1096\Delta LGFPI_t - 0.0293\hat{U}_{t-1} \dots\dots\dots(1)$$

(4.645)                      (-4.104)

$$\Delta LCPIF_t = 0.0071 + 0.1945\Delta LGFPI_t - 0.0366\hat{U}_{t-1} \dots\dots\dots(2)$$

(4.182)                      (3.099)

$$\Delta LCPI_t = 0.0039 + 0.4217\Delta LCPIF_t - 0.0201\hat{U}_{t-1} \dots\dots\dots(3)$$

(13.7368)                      (-2.1029)

$$\Delta WPIF_t = 0.0052 + 0.4323\Delta LGFPI_t - 0.0357\hat{U}_{t-1} \dots\dots\dots(4)$$

(4.8774)                      (2.4267)

Note: 't' values are given in parenthesis

The analysis on statistical properties of the price series showed that there are various stylized facts. ADF test results show that the level of CPIF and WPIF have random walks (I(1)) and stochastic trend for the variables CPI, CPIF, WPI, WPIF, GFPI. The external shocks of GFPI have a permanent effect on the other variables. The autocorrelation coefficient starts at a very high value (0.977) close to 1 and which declines very slowly toward zero as the lag length increases. Autocorrelations for the first 36 lags range between approximately 0.973 and 0.02, providing strong evidence on presence of serial correlation which indicate that CPIF series has a very long memory and is largely persistent with lagged coefficients that are clearly statistically significant.

## **Conclusions and Policy Implications**

This study uses monthly data for the period of 2003 to 2012. The study established the statistical properties of food price series in Sri Lanka. Further, the study found that the Consumer Price for all items (CPI) and the Consumer Price for Food and beverages (CPIF) are non-stationary series with stochastic trend. Food inflation and headline inflation are co-integrated. The consumer food price moves strongly with headline inflation rate. The empirical results of this study have important implications for policy makers with respect to policies for food, trade, agriculture and monetary sectors. The study suggests that policy makers should give more attention to headline inflation induced by global food prices rather than inflation induced by other imports for policy purposes.

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## Annexure A

### The formulae used to calculate Inflations:

(i) Headline Inflation (HI)  $= \pi_{tc} = (LCPI_t - LCPI_{t-1}) * 100$

(ii) Consumer Food Price Inflation (CFPI)  $= \pi_{t,cf} = (CPIF_t - LCPIF_{t-1}) * 100$

(iii) Wholesale Food Price Inflation (WFPI)  $= \pi_{t,wf} = (LWPIF_t - LWPIF_{t-1}) * 100$

(iv) Global Food Price Inflation (GFPI)  $= \pi_{t,gf} = (LGFPI_t - LGFPI_{t-1}) * 100$