The Intertemporal Dynamic Relationship between the Level and Variability of Food Price Inflation: Evidence from Sri Lankan Economy

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Abstract - This study examines the intertemporal dynamic linkages between food price inflation and its volatility. FIGARCH model is employed to estimate conditional volatlity of food price inflation. The empirical evidence derived from the monthly data for the period from 2003M1 to 2016M12 for Sri Lanka. Granger causality tests show that food inflation seems to exert positive impact on inflation uncertainty. Hence, the findings of the study supports the Friedman hypothesis. This implies that past information on food inflation can help improve the one-step-ahead prediction of food inflation uncertainty but not vice versa. In addition, our study show that volatility of CFPI inflation also Granger causes the volatility of WFPI inflation. Our results have some important policy implications for the design of monetary policy, thereby promoting macroeconomic stability. In particular, the results indicate the importance of inflation stablization programmes.

Keywords - food inflation, inflation uncertainty, FIGARCH, causality

I. INTRODUCTION

The knowledge about the linkage between the level of inflation and its associated uncertainty is important for making decision about the priority of either targeting the level of inflation or stabilizing monetary policy in an economy. Following Nobel lecture of Friedman (1977), the relationship between inflation rate and inflation uncertainty has attracted more attention by theoretical and empirical macroeconomists. According to Friedman (1977) , high inflation will create political pressure to reduce it, but policy makers may fear recessionary effects and be reluctant to lower inflation, resulting in future inflation uncertainty. Friedman (1977) argued that increased variability of inflation distort relative prices and adds an additional risk to long term contracting. In addition, he asserted that high levels of inflation are costly since they raise inflation variability. Hence, it leads to inefficient decisions and decreases in economic growth. In contrast, Cukierman and Meltzer (1986) suggest that inflation uncertainty could lead to inflation and also lower long run economic growth.

Food is an important element of cost of living index represented by Colombo Consumer Price Index (CPI) in Sri Lanka. Food prices affect an economy in several ways, such as cost of living, investment, and trade balance. As 80 percent of the households in Sri Lanka spend more than 40 percent of their income on food (HIES, 2012/13). Food price dynamics play important role in the economy. As food expenditure accounts for larger proportion of consumer price index in Sri Lanka, food price dynamics play important role in general price in the economy. The impact of food price inflation on general (CPI) inflation is substantially larger in Sri Lanka. It is also noted that Sri Lanka falls in the higher inflation risk area (IMF and Nomura Global Economics, 2015)

Food price volatility is one of the major concerns for policy makers and development practitioners worldwide. Inflation volatility/uncertainty is not only distort the decisions regarding future saving and investment due to less predictability of real value of future nominal payments , but also extends the adverse effects of these distortions on the efficiency of resource allocation and the level of real activity (Fischer 1981, Golob 1993, Holland 1993). Volatility of inflation, volatility of food price inflation has negative impacts on different financial, economic variables and political stability hence eventually deteriorate the economic growth and welfare. Volatility of inflation distorts the decision making regarding future saving and investment, the efficiency of resource allocation and the level of real output (Fischer 1981, Golob 1993, Holland 1993).

Understanding the dynamics of food price, its volatility and inflation help in planning policy design and policy responses. The high and volatile food dynamics pose significant challenges for developing countries including Sri Lanka where households spend a larger share of their income on food.

The contribution of this study is threefold. Firstly, this study focus on food inflation and its volatility. Secondly, FIGARCH model which can capture long memory property is employed to derive volatility measures. Thirdly, causality is assessed using bivariate Granger causality method. Thus, the findings of this study can have a number of important

policy implications for food production, trade, and monetary policy makers.

Despite the considerable number of empirical research on the relationship between inflation and inflation variability, the empirical literature to date has supplied contradictory evidence on the direction of causal relationship. In addition, the past literature, to our knowledge, shows that there remain scarce in-depth studies focusing on this issue in the context of food price inflation. Most of the studies focused on the relationship between general inflation and inflation uncertainty. Therefore, this study intends to fill the gap in the literature. This study would contribute significantly to the existing knowledge. This study attempts to answer the following questions: i) are food price inflation stationary series, ii. Does the variance of food price inflation change over time? ii) do food price inflation and food price volatility have causal relationship ?.

The main objective of the study is to analyze the relationship between food price inflation and food price inflation variability in Sri Lanka. Friedman's (1977) and Ball's (1992) hypotheses say that higher inflation invokes more inflation uncertainty. In contrast, Cukierman and Meltzer's (1986) hypothesis is that higher inflation uncertainty leads to more inflation. Both these hypotheses are examined using Granger causality tests. The specific objectives are i) to test the stationarity property of the variables, ii). To derive conditional variance series from food price inflation using FIGARCH model iii) to test Friedman-Ball and Cukierman-Meltzer inflation uncertainty hypothesis.

II. MATERIALS METHODS

Variables used in the study include are Colombo Consumer Price Index for Food and non-Alcoholic Beverages, (CFPI), Wholesale Food Price Index (WFPI), Two food price indices are used in the study. CFPI were collected from the department of census and Statistics, WFP is collected from Central Bank of Sri Lanka. The inflation series of CFPI, WFPI are denoted by INFCFPI, INFWFPI respectively. Data used in the study are monthly data spanning from 2003M1 to 2016M12. All the series are transformed into natural logarithms, inflation is defined as log difference of price series, where P is price index. Most food price series often admit a non-stationary component, but food price inflation (log difference) seems to be stationary.

The volatility (Uncertainty) of a food price inflation is measured by various measures, namely standard deviation/ variance of the series, absolute food price inflation, squared food price inflation, and conditional variance generated by the FIGARCH model. The absolute food inflation ($|\pi_t|$), squared food inflation (π_t^2) and conditional variance of food inflation generated by FIGARCH model are used as proxies for variability of food inflation.

Further, we analyse the relationship by decomposing the food inflation series as trend and cyclic components using Hodrick- Prescott filter (HP). The trend component obtained (HPtrend) by HP method is used as a proxy for mean food inflation and HP cyclic component used as a proxy for volatility series of food inflation.

This study uses two approaches to examine the relationship i) graphical method, ii) inferential method. First, we employ scatter plot with confidence ellipse and locally weighted scatter-plot Smoother (LOESS) regression curve line graph. The second method is Granger causality test.

III. RESULTS AND DISCUSSIONS

Descriptive Statistics, Correlation Analysis and Unit Root Tests Preliminary analysis shows how food inflation and food inflation volatility interrelated. For this purpose, descriptive statistics, unit root test, and correlation analysis are employed. Figure 1 shows the mean and variance dynamics of food price inflation in Sri Lanka. This figure reveals that mean and variance of food price inflation move together over time. The variance of food price inflation exeeds the mean of food price inflation most of the time periods.

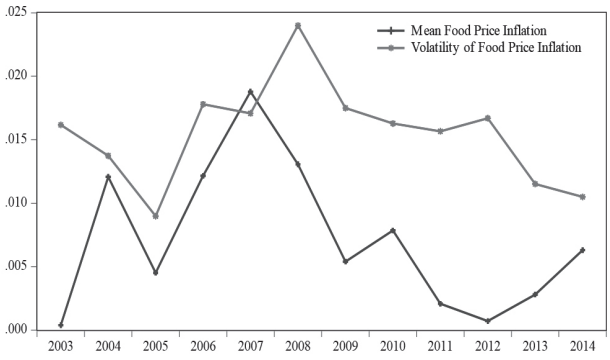
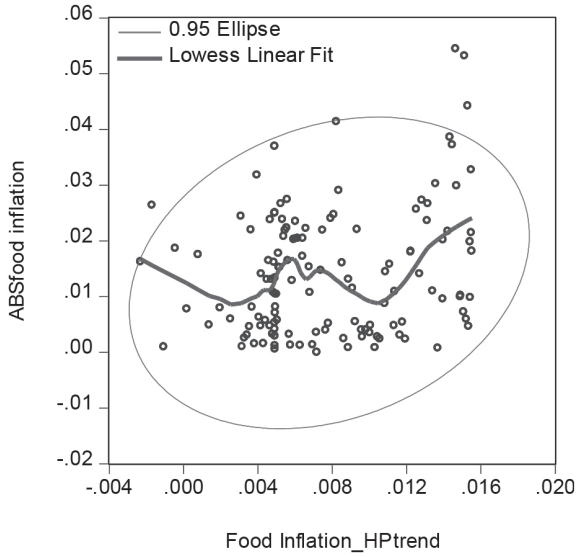
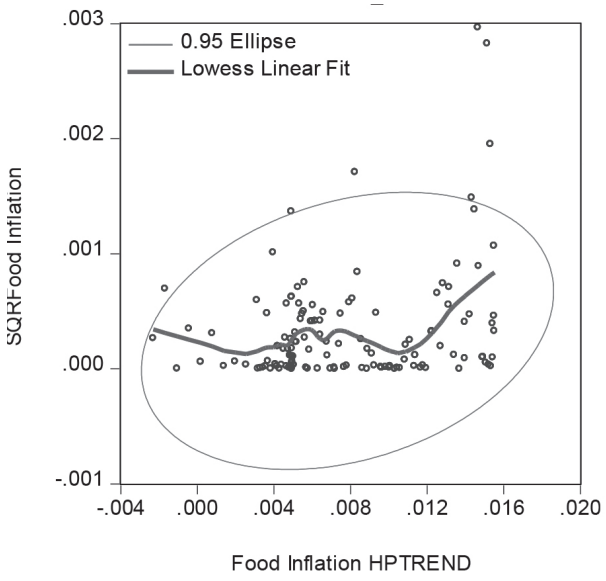


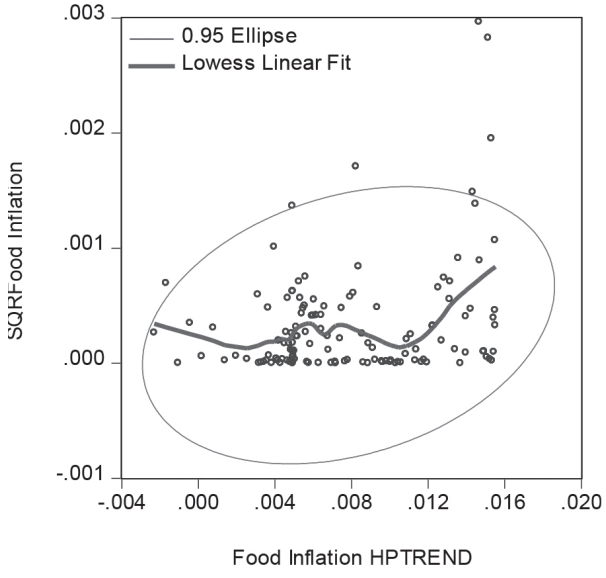
Figure - 1

3.1 Mean Food Price Inflation and Volatility of Food Price Inflation, 2003M1-2014M12

The scatter plot with confidence ellipse shows the positive relationship between food price inflation and variability of the inflation.







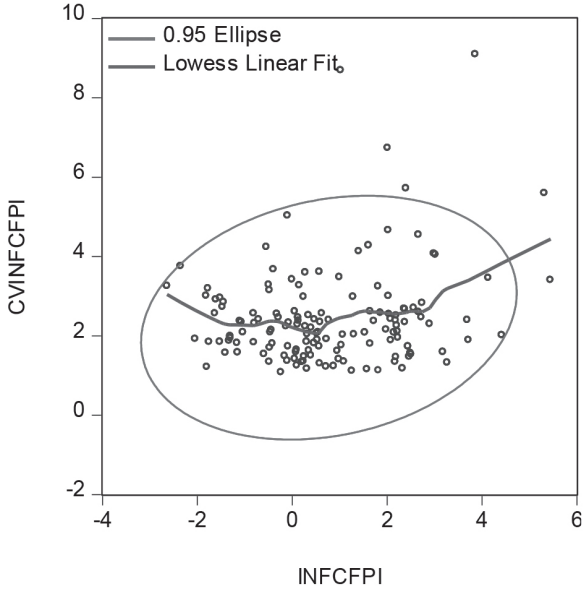


Figure 2 Food inflation vs Food inflation volatility

3.2 Causality Relationship between Food Price Inflation and Volatility of Food Price Inflation

Empirical results of bivariate Granger causality analysis are reported in Table 1. It shows the evidence of causality relationship between food price inflation and food price inflation uncertainty series. According to these results, both food inflation series (INFCFPI, INFWFPI) Granger causes its own volatility of inflation series (DCVINFCFPI, DCVINFWFPI) in the short run. The p-values of the F test statistics for the null hypothesis that inflation does not Granger cause uncertainty are given in the last column. It indicates that the Friedman null hypotheses are rejected at five percent level. This evidences support the Friedman-Ball research hypothesis.

3.2.1 Bivariate Granger causality Tests

Table 1

Bivariate Granger Causality Test between food Inflation and food Inflation Volatility

Null Hypothesis	**F Statistic**	**P-value**
INFCFPI does not Granger cause DCVINFCFPI	7.414*	0.0009
DCVINFCFPI does not Granger cause INFCFPI	1.083	0.3413
INFWFPI does not Granger cause DCVINFCFPI	8.349*	0.0004
DCVINFCFPIdoes not Granger cause INFWFPI	1.231	0.2951

INFCFPI does not Granger cause DCVINFWFPI	2.598	0.0781
DCVINFWFPI does not Granger cause INFCFPI	0.561	0.5714
INFWFPIdoes not Granger cause DCVINFWFPI	10.174*	8.E-05
DCVINFWFPI does not Granger cause INFWFPI	0.2072	0.8131
DCVINFWFPI does not Granger cause DCVINFCFPI	0.6223	0.5382
DCVINFCFPIdoes not Granger cause DCVINFWFPI	14.234*	2.E-06

Note: CV… refers for conditional variance of the food inflation variable, * indicates significance at 5 % level,
D refers first difference, INF refers inflation

However, Cukierman–Meltzer (1986) hypothesis; "inflation uncertainty affects inflation", is not supported by the bivariate Granger causality analysis. However, it is noted that volatility of food price inflation (INFCFPI) Granger cause the volatility of wholesale food price inflation (DCVINFWFPI).

In sum, the results are supportive to the Friedman-Ball hypothesis. In addition, there are some evidence for price inflation volatility of one food price affects the volatility of related other food price inflation and food price inflation level. Therefore, the Central Bank of Sri Lanka should try to stabilize the inflation rate in the face of inflationary shocks. The results of the study are consistent with the results of Gilbert and Morgan (2010) who say that price levels and price volatilities are likely to be positively associated.

IV. CONCLUSION

This paper looks at the relationship between food inflation and its volatility in Sri Lanka. Our results are in line with the Friedman-Ball causal link. Further, we found that volatility of CFPI inflation Granger causes the volatility of wholesale food price inflation. Economists find the relationship as a central importance for policy analysis. The findings may be useful to food policy makers to formulate the stabilization programs and inflation targeting policies. Support the view of adopting inflation targeting policy in Sri Lanka, to reduce the welfare cost of inflation and its related uncertainties.

Limitations of the Study

It is also worth to note some limitations of the study for future work. Nonlinearity and asymmetric aspects of food price dynamics are not considered in the study. Aggregate food price indices are used in the study for analysis. It would be more informative and useful to use individual food commodities prices. This would help policy planers.

ACKNOWLEDGEMENTS

First author wishes to express his gratitude to Prof.dr. Jan G. De Gooijer, University of Amsterdam, and The Netherlands and Emeritus Prof. Dr. R.O.Thattil, University of Peradeniya.

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