Examining the Inter-temporal Dynamic Relationship between Inflation and Volatility of Inflation: Evidence from Sri Lanka

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Introduction

Knowledge about the linkage between inflation and inflation variability (uncertainty) plays an important role in decision making of economic agents. Inflation volatility/uncertainty distorts decisions regarding future saving and investment due to reduced predictability of the real value of future nominal payments; further, it 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). The welfare costs of inflation and inflation uncertainty are well documented in the literature. However, empirical evidence on the link between the two is sparse in the case of Asia and Sri Lanka in particular.

Inflation is defined as a persistent increase in the general price level, while inflation uncertainty refers to a situation in which future prices are unpredictable and the public does not know whether inflation will increase or decrease in the future. The existence of a positive association between the level and variability of inflation has been widely accepted in the literature (Okun, 1971; Logue and Willet, 1976; Foster, 1978; Taylor,1981). The link between inflation rate and inflation uncertainty attracted more attention by theoretical and empirical macroeconomists following the Nobel lecture of Friedman (1977). Friedman's (1977) and Ball's (1992) hypothesis say that higher inflation invokes more inflation uncertainty. In contrast, Cukierman and Metltzer's (1986) hypothesis is that higher inflation uncertainty leads to more inflation.

Friedman (1977) says that 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. He argued that increased variability of inflation distorts relative prices and adds an additional risk to long term contracting. However, the issue of liaison between inflation and inflation uncertainty is still debatable. Cukierman and Meltzer (1986) showed that increased uncertainty about money supply and inflation raises the optimal inflation rate set by policymakers. Holland (1993) thinks that inflation uncertainty arises due to the unknown size of the change in price level because of a certain change in money supply. Nevertheless, studies are scarce about the relationship between inflation and inflation uncertainty in developing countries including Sri Lanka. Therefore, this study attempts to examine the whether there exists any significant relationship between inflation & inflation uncertainty in Sri Lanka. The findings of the study can have a number of policy implications for trade, monetary policy.

Objectives

The main objective of the study is to examine the relationship between inflation and inflation uncertainty in Sri Lanka in-depth. The specific objectives are to verify Friedman–Ball hypothesis and to verify Cukierman-Meltzer inflation uncertainty hypothesis.

Methodology

This study uses the Consumer Price Index (CPI) to estimate inflation and its volatility. Data span January 2003 to December 2017 from the Department of Census and Statistics (DCS), Sri Lanka. Price inflation and volatility of inflation is derived from the overall CPI. Inflation is defined as log differenced of CPI ($\pi_t = [\ln(CPI_t) - \ln(CPI_{t-1})] * 100$). Absolute Inflation, Squared Inflation, and conditional variance of inflation generated by the FIGARCH model are used as proxies for volatility of inflation. Stationarity properties of the series are examined using standard unit root tests. This study uses two approaches to examine the linkages; viz. graphical method and inferential method. First, we employ scatter plot with confidence ellipse with Kernel regression to visually inspect the association between inflation and its volatility. The second is Granger causality test.

Results and Discussion

In Figure 1, the scatter plot with confidence ellipse shows the underlying dynamic inter-relationship between inflation and inflation volatility dynamics over time. The overall shape of the confidence ellipse indicates that these variables are positively correlated. The kernel fit (non-parametric regression) indicates that the dynamic relationships are nonlinear and positive.

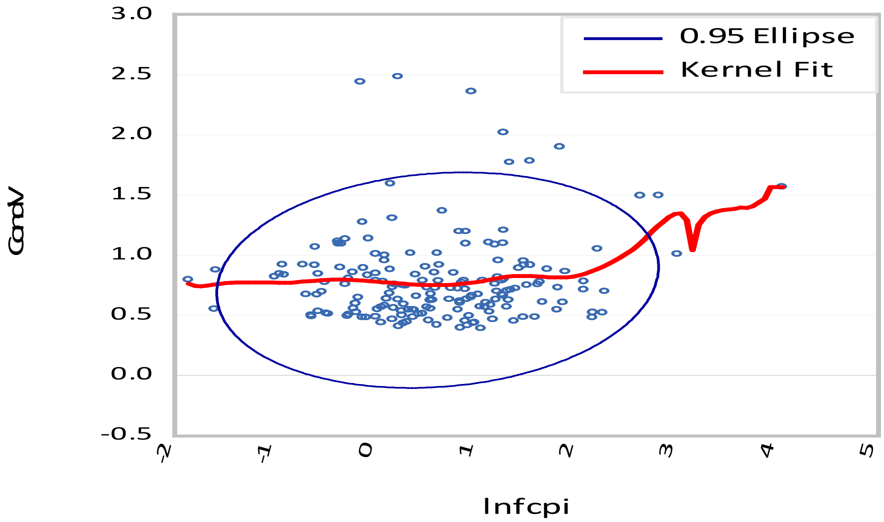

Figure 1: Association between inflation and inflation uncertainty

Table 1: Unit-root test results

Variable	Level with intercept Test statistic ADF	PP	Order
Inflation	-9.321 (0.000)	-9.325 (0.000)	I(0)
Absolute inflation	-10.066 (0.000)	-10.304 (0.000)	I(0)
Squared inflation	-11.345 (0.001)	-11.932 (0.000)	I(0)
CV-GARCH	-3.552 (0.007)	-3.552 (0.000)	I(0)
CV-FIGARCH	-3.510 (0.008)	-3.876 (0.003)	I(0)

Note: P value is given in Parenthesis“( )”. Variable* indicates stationary at 5% level of significance, Cv- Conditional Variance.

Simple statistical contemporaneous correlation analysis confirms that there is a weak positive correlation between inflation and inflation volatility (0.124). Unit-root test results (Table 1) indicate that both tests of ADF and PP reject the unit root null hypothesis. CPI series are stationary at their level. The p–value for the corresponding test statistic for each case is less than 0.05. These results suggest that variables are stationary series. Therefore, inflation series and the volatility series are stationary series. Empirical results of bivariate Granger causality analysis are reported in Table 2. The *p*-values of the *F* test statistics for the null hypothesis that inflation does not Granger cause uncertainty indicates that the null hypothesis is rejected at 5 percent significance level. Hence, inflation series Granger causes its own volatility of inflation series. Thus, the findings of the study support the Friedman-Ball hypothesis. However, Cukierman- Meltzer (1986) hypothesis, "Inflation uncertainty affects inflation", is not supported by the Granger causality analysis. In sum, the results are supportive to the Friedman- Ball hypothesis.

Table 2: Causality between variables

Null hypothesis	F statistics	P value	Decision
Inflation does not Granger cause ABSINF	4.463	0.036	Reject H_0
ABSINF does not Granger cause Inflation	0.016	0.870	Accept H_0
INF does not Granger Cause CV-GARCH	2.497	0.044	Reject H_0
CV-GARCH does not Granger Cause INF	0.473	0.755	Accept H_0
INF does not Granger Cause Squared inflation	3.275	0.040	Reject H_0
Squared inflation does not Granger Cause inflation	1.145	0.320	Accept H_0
LNFCPI does not Granger Cause CONDV	65.651	6.E-21	Reject H_0
CONDV does not Granger Cause LNFCPI	1.012	0.365	Accept H_0

Conclusion

This paper examines the relationship between inflation and its volatility using monthly data of CPI in Sri Lanka. In sum, the results support the Friedman-Ball hypothesis. The results of the study could help policy makers to formulate policies to control inflation so that inflation uncertainty can be minimized. 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.

References

Ball, L. (1992). Why does high inflation raise inflation uncertainty?. *Journal of Monetary Economics.* 29(3), 371–388.

Cukierman A, Meltzer, A. (1986). A theory of ambiguity, credibility, and inflation under discretion and asymmetric information. *Econometrica.* 54(5), 1099–1128.

Friedman, M. (1977). Nobel Lecture: Inflation and Unemployment. *Journal of Political Economy*. 85(3), 451–472.

Payne, J. (2007). Inflation and inflation uncertainty: Evidence from the Caribbean Region, *Journal of Economic Studies*,35.