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Food Prices and Money Supply: A Causality Analysis for the Indian Economy

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Abstract: The nonstop increase in the prices of food has been the burning issue in these days. This research attempts to investigate the direction of causality between the food prices and money supply in India, using ARDL causality test. Empirical results show bidirectional causality between money supply and food prices in the long and unidirectional causality in the short run from money supply to food prices. Hence the '*money supply is not neutral in determining food prices in the long run and short run*'. Therefore it is suggested that in India monetary policy instrument could be used to control food inflation.

Key words: Food Prices · Money Supply · ARDL
Jelclassification: E_3 · E_{51}

INTRODUCTION

Literature on agricultural economics suggested that monetary factors cause to the agricultural prices. Monetary shocks lead the agricultural product prices that were stated by Tweeten [1], David A. Bessler [2]. After that Devadoss and Meyers [3] investigated the money supply and relative prices relation by employing the vector autoregressive approach in the case of USA. They concluded that money supply has faster effect on farm product prices than compare to manufacturing product prices. An agricultural sector gets benefit from positive shock of money supply in the short run that suggested by Dorfman *et al.*[4].

Xuehua peng *et al.* [5] empirically investigated the link between the money supply, interest rate and food prices in the case of china by using the vector error correction model. They suggested cointegration association between monetary policy variables and food prices and causality runs from money supply to food prices. Hye *et al.* [6] used recent cointegration technique of autoregressive distributed lag model in the case of Pakistan in order to determine the directional of causality between the money supply and food prices. They found causality from money supply to food prices. Same results found in the case of Bangladesh by Hye *et al.* [7].

The purpose of this empirical research is to investigate the link among money supply and food prices in India by applying the time series data from1971-2007. For estimation evidence the Autoregressive Distributed Lag (ARDL) based causality test is used to determine the long run causality. The plan of the remaining paper as follows. Section II discusses data and methodology. Section III presents the result and the final section (IV) concludes this study.

Data and Econometric Methodology: The data of food prices index which is based on 2000 prices and money supply in millions of current $ are taken from the Key indicators of developing Asian and pacific countries. The data span from 1971 to 2007. Both variables are used in natural logarithm from for econometric evidence.

Methodology: This study adopts three steps to determine the direction of causal relationship between the food prices and money supply.

In first step we determine the order of integration by applying the Phillips and Perron [8] unit root test.

Second step is very important in which we determine the long run relationship and take decision of the direction of Causality between the money supply (MS) and food prices. For this purpose we used newly developed bound testing approach to cointegration that proposed by Pesaran *et al.* [9][1]. The bound testing model

[1]This method has certain econometric advantages in comparison to other Cointegration producers. Firstly, it is apply irrespective the variables included in the model are purely I(0), I(1) or mutually. Secondly, all variables are assumed to be endogenous. Thirdly, the long run and short run parameters of the model are estimated simultaneously.

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$$\Delta Ln(IFP)_t = \lambda_0 + \sum_{i=0}^{n} \lambda_i \Delta Ln(IFP)_{t-i} + \sum_{i=0}^{n} \lambda_i \Delta Ln(IMS)_{t-i} + \alpha_1 Ln(IFP)_{t-1} + \alpha_2 Ln(IMS)_{t-1} + v_{1t} \quad (1)$$

$$\Delta Ln(IMS)_t = \gamma_0 + \sum_{i=0}^{n} \lambda_i \Delta Ln(IMS)_{t-i} + \sum_{i=0}^{n} \gamma_i \Delta Ln(IFP)_{t-i} + \beta_1 Ln(IMS)_{t-1} + \beta_2 Ln(IFP)_{t-1} + v_{2t} \quad (2)$$

The long term relationship is determined by using overall F-test. Pesaran *et al.* [9] have calculated two sets of critical values at 1%, 5% and 10% level of significance. In which one set supposed all variables are integrated by order zero and other set assumes all integrated by order one.

If the calculated F-statistic above upper critical bounds value, then the H_0 is rejected. The results inconclusive if F-statistic falls into the bounds. Lastly, if the F statistic is below the lower critical bounds value, it implies no Cointegration[2]. In the third step we employ modify Granger causality test. This test is formulated like vector error correction model (VECM). We can write as follows:

$$\begin{bmatrix} \Delta Ln(IFP)_t \\ \Delta Ln(IMS)_t \end{bmatrix} = \begin{bmatrix} \Gamma_1 \\ \Gamma_2 \end{bmatrix} + \sum_{i=1}^{\rho} \begin{bmatrix} n_{11i} & n_{12i} \\ n_{21i} & n_{22i} \end{bmatrix} \begin{bmatrix} \Delta Ln(IFP)_{t-i} \\ \Delta Ln(IMS)_{t-i} \end{bmatrix} + \begin{bmatrix} \Omega_1 \\ \Omega_2 \end{bmatrix} [EC_{t-1}] + \begin{bmatrix} \psi_1 \\ \psi_2 \end{bmatrix} \quad (3)$$

Where:

EC_{t-1} is the error correction term, if it is negative and statistically significance that confirms the long run relationship. The short run causality is investigated by checking statistical significance of the lagged differences of the variables for each vector.

RESULTS AND DISCUSSION

Table 1 shows the unit test results. The results confirms that both money supply and food prices are integrated order one or I (1).

Table 1: Phillip Perron Unit root test

Variable	PP Unit Root
IFP	1.96
IMS	-2.51
ΔIFP	-6.59***
ΔIMS	-4.57***

***: 1% level of significance.

Table 2: F-Statistic for the existence of a long run relationship

Dependent Variable	F-Statistic
IFP	4.83*
IMS	6.12**

**:*: 5 and 10 % Level of significance

Table 3: Granger Causality Test

Dependent Variable	Wald Statistic	ECT	T-statistic of ECT	$\bar{R}^2$
D(IFP)	3.55**	-0.14	-2.01**	0.67
D(IMS)	0.02	-0.02	-2.11*	0.16

**:5% level of significance.

In next step we apply the bound testing method. Before the implementation of this test it is important to determine the optimal numbers of lags of first difference variables. For this purpose we used Schwarz Bayesian criterion (SBC).

Table 2 represents the bound testing results. The results confirm the long run association between the money supply and food prices and also conclude bidirectional causality between money supply and food prices in the long run. This results against the earlier findings: Hye *et al.* [7] stated unidirectional causal from money supply to food prices in case of Pakistan and Bangladesh.

In Table 3 the significance of Wald statistic value confirms the short run causality from money supply to food prices. The negatively and significance of error correction term provide evidence of long run causality. In both equations error correction term is significant with the expected sign that confirm long run bidirectional causality as we concluded through bound test.

CONCLUSION

The purpose of this investigation was to estimate the causal relationship between the money supply and food prices in India for the period 1971-2007. This empirical work uses the ARDL robust Cointegration technique. The long run bound testing results confirms that the long run

[2]In the F test the null hypothesis of equation (1) is $\langle H_0 = \alpha_1 = \alpha_2 = 0 \rangle$. This is denoted as $F_{FP} \langle IFP|IMS \rangle$. In equation (2), the null hypothesis is $\langle H_0 = \beta_1 = \beta_2 = 0 \rangle$ this is represented by $F_{MS} \langle IMS|IFP \rangle$

relationship exists between the variables, the direction of causality bidirectional. The Granger causality test shows that in the short run unidirectional causality from money supply to food prices and bidirectional causality in the long run.

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