XI'AN JIAOTONG UNIVERSITY

Symmetric and Asymmetric Impact of Economic Policy Uncertainty on Food Prices in China: A New Evidence

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INTRODUCTION

- In most countries, the vanguard policy agenda is always to ensure food security. The same is true for China as well. Because China is the world's most populous country, any food crisis has the potential to exacerbate the human catastrophe. The effects of such a turmoil might lead to many economic, social, and psychological implications.

- In China food accounts for approximately 35% to 41% of total consumer budgets in both rural and urban regions. Moreover, having such a high share of food expenditures, any major increase in the prices of these food products would certainly have consequences for the stability of national prices and the overall inflation level (Huang et al., 2010).

- Whenever the prices of major commodities in the international market start rising, it has important implications for China's food economy. The reason for this is because numerous food items may be traded freely over China's border. Therefore, domestic markets are highly co-integrated, and the effects of international food prices are quickly passed on to domestic food prices.

INTRODUCTION

- Another reason for rising food prices in China is that it is a big oil importer, and its oil import dependency is more than 73.4% (Chen et al., 2020). As a result, available empirical research suggest that rising oil costs are the primary source of rising food prices (Wang et al., 2014; Zhang & Qu, 2015; Salisu et al., 2017; Bala & Chin, 2018; Chen et al., 2020; Zakaria et al., 2021).

- There is no doubt that oil prices play an important role in determining food prices, but unfortunately, the existing literature has ignored the important factor of ‘uncertainty.’ China is an emerging economy and is instigating numerous reforms in economic policy regarding policy uncertainty shocks. Policy uncertainty shocks may have substantial consequences for the macro economy in China regarding business cycle frequency. Furthermore, the recurrence of trade tensions between China and the US has added to the uncertainty. This uncertainty reduces total import potential and raises trade costs, resulting in a rise in food prices (Li and Li, 2021).

INTRODUCTION

- Economic uncertainty has a far-reaching effect on the real economy. Therefore, Baker et al. (2016) worked on generating economic policy uncertainty (EPU) indicators for major economies by using newspaper articles in their seminal paper.

- Asymmetry arises if the impact of a shock is not equal on the sectors and on the economy of a country. Here, if the EPU shocks are symmetric in nature, then they will affect the whole sector and the economy of a country equally. If, on the other hand, the EPU shocks are asymmetric in nature, they will cause the economic sector or the entire economy to deviate from its normal cycle.

- Moreover, during symmetric analysis, a huge increase or decrease in a variable can cause changes, but a small change may simply go unnoticed. Therefore, EPU shocks can have symmetric or asymmetric effects on economic indicators. For China, such an index is meaningful because it is the world's second largest economy and also plays an important role in foreign trade. Similarly, due to having a big share of international trade, any uncertain event can affect the economy of China. Thus, it is important to critically check the impact of the EPU on food prices.

OBJECTIVES OF THE STUDY

- More specifically, this paper adds to the existing body of literature on the following critical grounds. First, the existing empirical studies have not checked the impact of the EPU on food prices in China. As a result, the goal of this research is to look at the impact of EPU on food prices.

- Secondly, most contemporary studies examine the relationship by employing the most commonly used time-series co-integration techniques. Although these approaches are useful for estimating the long-run association among the variables, as well as their short-run interactions. But these methods presume symmetric relationships and, therefore, are unable to fully capture the asymmetric effects.

OBJECTIVES OF THE STUDY

- To be more specific, this study uses the Non-linear Autoregressive Distributed Lag (NARDL) estimation technique to quantify the complicated link between EPU and food prices in order to give relevant and complete insights. It will help to check the impact of both positive and negative shocks of the EPU on food prices in the case of China.

- Finally, it is assumed that China can resolve the food crisis and food price volatility effectively. This study will provide empirical information regarding the economic policies implemented by China are effective or not.

Trend of Food Prices and Oil Prices in China

Fig. 1. Crude oil price and Food price (1998M1 – 2020M5).

DATA & METHODOLOGY

The study used monthly data from the period of 1998M1-2020M5. The data of the economic policy uncertainty (EPU) index is taken from Baker and Bloom. Whereas, the food price index (FPI) is taken from the Food and Agricultural Organization (FAO) database. The oil price (OP) is used as a control variable and the WTI oil price ($/b) is taken from the OPEC database.

Model of the study is as follows:

$$FPI_t = \alpha_0 + \alpha_1 EPU_t + \alpha_2 OP_t + \varepsilon_t \quad (1)$$

MODEL SPECIFICATION

The linear specification without asymmetric adjustment in the short run and long run is written as follows:

$$\Delta FPI_t = \beta_0 + \beta_1 FPI_{t-1} + \beta_2 EPU_{t-1} + \beta_3 OP_{t-1} + \sum_{i=1}^{n1} \delta_i \Delta FPI_{t-i} + \sum_{j=1}^{n2} \gamma_j \Delta EPU_{t-j} + \sum_{k=1}^{n3} \lambda_k \Delta OP_{t-k} + \varepsilon_t \quad (2)$$

The following equation is the short-run model with error correction term:

$$\Delta FPI_t = \omega ECT_{t-1} + \sum_{i=1}^{n1} \delta_i \Delta FPI_{t-i} + \sum_{j=1}^{n2} \gamma_j \Delta EPU_{t-j} + \sum_{k=1}^{n3} \lambda_k \Delta OP_{t-k} + \varepsilon_t \quad (3)$$

MODEL SPECIFICATION

Now Equation (1) can be further extended to an asymmetric equation Now Equation (1) can be further extended to an asymmetric equation as follows:

$$\boldsymbol{FPI_t} = \rho_0 + \rho_1 \boldsymbol{EPU_t^+} + \rho_2 \boldsymbol{EPU_t^-} + \rho_3 \boldsymbol{OP_t} + \boldsymbol{\mu_t} \tag{4}$$

Where.

EPU+ = Positive shocks in EPU.

EPU− = Negative shocks in EPU.

MODEL SPECIFICATION

By following Shin et al. (2014), Equation (4) can be further modified and transformed into a normal ARDL setting to capture both short run and long run impact as:

$$\Delta FPI_t = \eta_0 + \eta_1 FPI_{t-1} + \eta_2 EPU^{+}_{t-1} + \eta_3 EPU^{-}_{t-1} + \eta_4 OP_{t-1} + \sum_{i=1}^{n1} \theta_i \Delta FPI_{t-i} + \sum_{j=1}^{n2} \left(\pi_j \Delta EPU^{+}_{t-j} + \sigma_j \Delta EPU^{-}_{t-j} \right) + \sum_{k=1}^{n3} \vartheta_k \Delta OP_{t-k} + \mu_t \quad (5)$$

The following equation is the short-run model:

$$\Delta FPI_t = \phi\, ECT_{t-1} + \sum_{i=1}^{n1} \theta_i \Delta FPI_{t-i} + \sum_{j=1}^{n2} \left(\pi_j \Delta EPU^{+}_{t-j} + \sigma_j \Delta EPU^{-}_{t-j} \right) + \sum_{k=1}^{n3} \vartheta_k \Delta OP_{t-k} + + \mu_t \quad (6)$$

EMPIRICAL RESULTS

Table 1

Summary statistics.

Variables	Unit	Obs.	Mean	Median	Std. Dev	Min	Max	Skewness
FPI	Index	245	4.459	4.451	0.294	3.921	4.924	−0.351
EPU	Index	245	11.67	11.49	1.541	6.692	15.73	0.382
OP	Index	245	4.015	4.063	0.461	2.806	4.897	−0.325

EMPIRICAL RESULTS

Unit root Test Results

Table 2

Unit root test results.

Variables	Augmented Dickey-fuller Test (ADF Test)			Phillip-Perron Test (PP Test)		
	Level	1st Diff	Decision	Level	1st Diff	Decision
LFPI	−2.013	−5.517[a]	I(1)	−1.741	−4.468[a]	I(1)
LEPU	−4.126[a]	-	I(0)	−4.536[a]	-	I(0)
LOP	−1.809	−5.639[a]	I(1)	−1.646	−5.630[a]	I(1)

[a] Indicates significance at 5% level of significance.

EMPIRICAL RESULTS

Bounds Test for Cointegration

Table 3

Bounds test for Co-integration.

	ARDL		NARDL	
F-statistic	4.21[a]		4.28[a]	
Critical values (at 5% level)	Upper Bound I(1)	Lower bound I(0)	Upper Bound I(1)	Lower bound I(0)
	3.87	3.1	4.02	3.23

[a] Indicates significance at 5% level of significance.

EMPIRICAL RESULTS

Short-run Analysis: ARDL & NARDL

Table 4
Short-run analysis.

	ARDL (linear) Results		NARDL (non-linear) Results	
Variable	Coefficient	Std. Error	Coefficient	Std. Error
C	0.431	0.576	1.565**	0.756
ΔLEPU	0.001*	0.0006	–	–
ΔLEPU+	–	–	−0.00036	0.0012
ΔLEPU-	–	–	0.0025**	0.0011
ΔLOP	0.189***	0.027	0.183***	0.028
ECT	−0.026***	0.007	−0.026***	0.0061
Wald Test (Asymmetry)			7.492 (0.00)	

Note: i. *, ** and *** indicates statistical significance at 10%, 5% and 1% significance level.
Ii. P-values reported in the parenthesis ( ).

EMPIRICAL RESULTS

Long run Analysis: ARDL & NARDL

Table 5

Long run Analysis.

	ARDL (linear) Results		NARDL (non-linear) Results	
Variable	Coefficient	Std. Error	Coefficient	Std. Error
LEPU	0.025**	0.011	–	–
LEPU+	–	–	0.044	0.033
LEPU-	–	–	−0.047	0.036
LOP	0.298	0.353	0.474*	0.295
Wald Test (Asymmetry)			2.074 (0.149)	

Note: * and ** indicates statistical significance at 10% and 5% significance level.

EMPIRICAL RESULTS

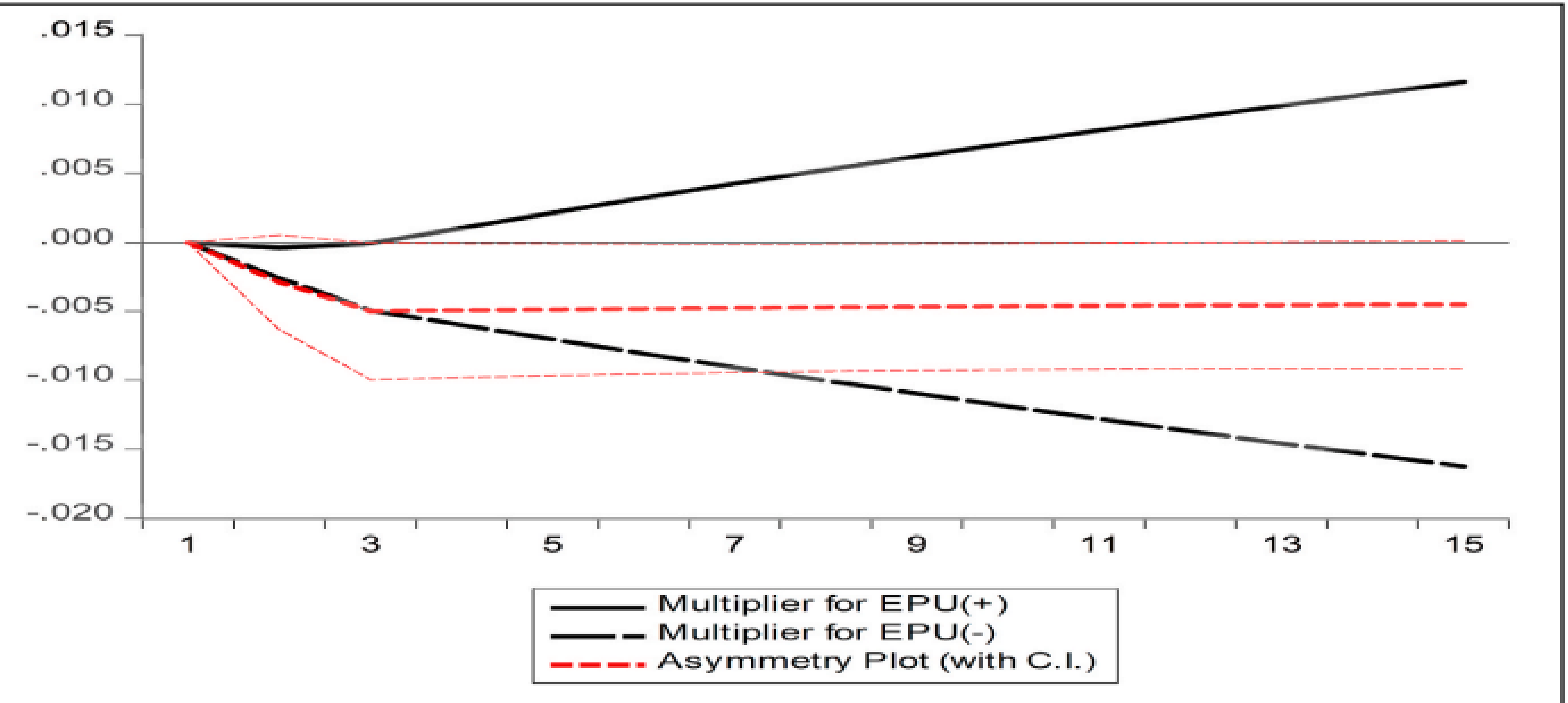
Diagnostic Overview

Table 6
Diagnostic overview.

Diagnostic Tests	P-value	Outcome
Breusch-Godfrey Serial Correlation LM Test	0.915	No serial correlation
Breusch-Pagan-Godfrey (Hetroscedasticity Test)	0.794	No evidence of hetroscedasticity
Jarque-Bera (Normality Test)	0.269	Residuals are normally distributed
Ramsey RESET Test (Stability Test)	0.137	Model is correctly specified
VIF (Multicollinearity Test)	1.006	No multicollinearity exists

EMPIRICAL RESULTS

Dynamic Multiplier Graph



CONCLUSION

- ✓ First, the ARDL model findings show that EPU has a significant impact on FPI in both the long run and the short run. Yet, the NARDL model results suggest that food prices respond to the short-term policy uncertainty shocks only. However, the same impact changes completely over the long run, indicating that the impact will gradually weaken over the long-run. The following three aspects of this study enrich the existing literature:

- ✓ First, it ties China's food prices to EPU. In existing literature, this is not one of the main highlights of the source of China's food price volatility. Second, it adds to the current literature on method selection by using the NARDL model to assess the asymmetric impact of EPU on food prices in China. This provides the separate impact of positive and negative shocks of EPU on food prices. Finally, this study indicates that EPU shocks would only have a significant short-term asymmetric effect on food prices. Further, it also validates that the EPU shocks are asymmetric in nature and disrupt the stability of food prices in China.

CONCLUSION

- ✓ Despite of having the world's largest population and unpredictable shocks, China has not experienced a food crisis in recent years. In this context, China's economic policies and their implications are of interest to other markets around the world. The fact that economic uncertainty affects the food prices in China, it is also found that China is generally able to solve its food problems and the government plays an important role in improving food security at the national and global level. Policy responses from China can have a significant and successful in preventing the transmission of international price shocks to domestic markets.

- ✓ The intervention of the Chinese government through effective economic policies can help to ensure the smooth food supply in the country and provide an appropriate as well as effective response in the time of a major crisis. A comprehensive knowledge of present policies and their implications for the sustainability of food production, supply, trade, and domestic food security is required to formulate appropriate policy measures and organizational frameworks to ensure food price stability.

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I Truly Appreciate Your Attention.

Thank You

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