

Research Article

The Impact of RMB Exchange Rate on Agricultural Food Prices in Emerging Market

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Abstract: With the development of economic globalization, the economic ties between countries in the world more and more closely, prices and the exchange rate are the core economic variables in an open economy. In this study, we make a statistical analysis of RMB real effective exchange rate and agricultural food prices data from the year of 1990 to 2014. From the empirical analysis, the result shows that RMB real effective exchange rate will effect on agricultural food prices. LnREER at lag 1 period increased one percentage can drive LnAFP growth by 0.015%; LnREER at lag 2 period increased one percentage can drive LnAFP growth by 0.187%, so the effect of RMB real effective exchange rate on agricultural food prices is obvious. Based on granger causality test, it shows that LnREER is the granger reason to LnAFP, which means RMB real effective exchange rate is the reason to agricultural food prices increase. On this basis, we have put forward relevant policy suggestions.

Keywords: Agricultural food prices, economic globalization, exchange rate, food processing industry

INTRODUCTION

With the development of economic globalization, the economic ties between countries in the world more and more closely, the exchange rate as price two national currencies nominal play a link role in the world economic exchanges (Juan and Reborado, 2014). With the collapse of Bretton Woods system, the international monetary system has entered an era of floating exchange rates, exchange rate volatility has become a normal feature in the foreign exchange market (Raphael and Ana, 2012; Jungo and Won, 2014). Therefore, we research on the fluctuation of exchange rate impact on food prices in emerging country as China, it will have important theoretical and practical significance whether for economists and for the government. Since the Chinese 2001 accession to the world trade organization (Hua, 1998), the pace of opening up the increasingly accelerated, all kinds of barriers Chinese commodity exports have been gradually eliminate (Li, 2011). With the domestic market and the world market integration to speed up the pace, the domestic price level has been inevitably affected by external shocks (Huang, 2008), such as the impact of the international market price fluctuations and exchange rate appreciation depreciation etc. Exchange rate movements exactly what will be the impact on the domestic price level and impact the implementation effect on domestic monetary policy, so it has become the common concern.

Prices and the exchange rate is the core of the economic variables in an open economy, as well as one of the two closely related economic variables, the

exchange rate theory and the continuous development of history, to explore the relationship between price and exchange rate between the two is always interwoven (Just, 1989). The real effective exchange rate shows the relationship between exchange rate and price has a breakthrough understanding is the purchasing power of the evaluation, this theory reveals the law of one price to make the exchange rate and the price of two variables, the real effective exchange rate is the most directly linked together (Dick and Josef, 2013). At a later stage, to explore the problems of the real exchange rate has become an important branch of exchange rate theory (Cody and Leonard, 1991), reason and trend of students and one of the many real exchange rate the results of the study is to reveal the changes in price structure of the country's. On the other hand, a large number of fixed exchange rate system state of existence also makes the research of the real exchange rate movements to a certain extent, the research on the domestic price movements in the country, because the nominal exchange rate remained basically unchanged for these countries, the real exchange rate of the country changed largely by changes in the domestic price performance out of the.

However, although the relationship between the exchange rate and prices so closely, but directly to the two relations as the object of study of the literature (Wang, 2011; Zhao and Geng, 2010). On the one hand, because of the relationship between exchange rate and price, what is the price determines the exchange rate, or the exchange rate determines the price, or both are determined by other variables, the causality there are still a lot of controversy between. On the other hand,

fundamentally, the exchange rate is a reflection of the value of a country's currency outside, so for a limited degree of open country, prices or mainly affected by the change of the domestic supply and demand and internal economic factors, just as a country's openness deepening, external factors, especially the will exchange rate factors of influence on prices gradually. Whether the exchange rate can have important significance of economic adjustment effect significantly affect domestic price level on the study of exchange rate (Milan and Christiaensen, 2008). Exchange rate pass through the international transmission and international policy cooperation on the volatility of the real exchange rate, macroeconomic impact of the welfare gains and other issues are very important. So the speed and degree of exchange rate pass through to domestic food price level is worthy of our in-depth analysis.

MATERIALS AND METHODS

Basic exchange rate model: Based on purchasing power parity hypothesis is "the law of one price", that is, in a free market, without considering the transaction cost, trade barriers (including tariff and non-tariff barriers) and non trade goods and other conditions, the same kind of goods or assets in any country, if in the same currency and its price should be is the same (Zhang, 2010). Therefore, if the same goods in different countries the price level, it means that the market non balanced state, then investors arbitrage and speculative behavior will make the supply and demand change, finally makes the price tends to be consistent, thus restoring the balance:

$$P_i = S \cdot P_i^* \tag{1}$$

In this formula, S represents the nominal exchange rate for its currency, P_i commodity i domestic price level, P_i^* commodity i foreign price level. Based on this, the absolute purchasing power parity formula l can be expressed as:

$$S = \frac{P}{P^*} \tag{2}$$

The relative and absolute purchasing power parity hypothesis is the relative purchasing power parity hypothesis, that is, between the two countries is the nominal exchange rate should be equal to the ratio of relative price level between the two countries, or is the nominal exchange rate between two countries should be equal to the relative price level between the two countries change. The expressions can be expressed as:

$$\frac{dS}{S} = \frac{dP}{P} - \frac{dP^*}{P^*} \tag{3}$$

VAR model: Vector Auto Regression (VAR) is a statistical model used to capture the linear interdependencies among multiple time series. An estimated VAR model can be used for forecasting and the quality of the forecasts can be judged. VAR model is the simultaneous form of autoregressive model, A VAR (p) model of a time series $y(t)$ has the form:

$$A_0 y_{(t)} = A_1 y_{(t-1)} + \dots + A_p y_{(t-p)} + \varepsilon_{(t)} \tag{4}$$

Stability conditions: The stability of the VAR model means that when we put an impulse to the innovation of on formula in the VAR mode, the impact of the effect will gradually reduce. The basic condition of stability is that: all the eigenvalue of Π_1 should be located within the unit circle. According to the VAR formula, when $t = 1$, it should be:

$$Y_1 = c + \Pi_1 Y_0 + \mu_1 \tag{5}$$

And when $t = 2$, we calculate the formula with iterative method, as:

$$Y_2 = c + \Pi_1 Y_1 + \mu_2 = (1 + \Pi_1)c + \Pi_1^2 Y_0 + \Pi_1 \mu_1 + \mu_2 \tag{6}$$

So that, when $t = t$, it could be written as:

$$Y_t = (1 + \Pi_1 + \Pi_1^2 + \dots + \Pi_1^{t-1})c + \Pi_1^t Y_0 + \sum_{i=0}^{t-1} \Pi_1^i \mu_{t-i} \tag{7}$$

From the formula above, we can get that Y_t becomes a function to the vector μ , Y_0 and μ_t after the formula transformation. So we can analysis the impact result of these vectors to find out whether the VAR model is stable. If the VAR model is stable, it will satisfy the conditions as:

- If give one unit impulse to c at $t = 1$, when $t \rightarrow \infty$, the effect will have a Limit value as $(I - \Pi_1)^{-1}$.
- If give one unit impulse to Y_0 , the effect will be Π_1^t when $t = t$ and will be gradually disappeared with time has been increased.

From the analysis about VAR model, we can get that if the VAR model has the unit root, it will have the memory about impulse impact for a long time, so this VAR model is not stable. Also, the response of endogenous variables will not reduce with time increased in this case.

Data collection and evaluation index: In order to analyze how RMB exchange rate effect on agricultural food prices, we use STATA 12.0 software and make a statistical analysis of RMB Real Effective Exchange

Rate (REER) and Agricultural Food Prices (AFP) All data was collected from China statistic year book 2014 and Caixin database, period from 1990 to 2014. We also undertake log processing to data, noted as LnREER and LnAFP.

RESULTS AND DISCUSSION

ADF unit root test: Data stable is the premise of establishing VAR model, an Augmented Dickey Fuller test (ADF) is a test for a unit root in a time series sample. We use ADF unit root test to inspect LnREER and LnAFP, the result as is shown in Table 1. Through the test results we can see that LnREER and LnAFP are non-stationary and then we test on d.LnREER and d.LnAFP and demonstrate that they are stable, so we can build the VAR model and use granger test and co-integration test.

Result: In this study, we use AIC, SC criterion to identify the lag length. From the result, we can get that the minimum AIC is in lag 2, so I choose lag 2 as the lag length. Then, we build the VAR model of LnREER and LnAFP as:

$$LnAFP = 1.425 + 0.015LnREER_{t-1} + 0.187LnREER_{t-2} + 0.942LnAFP_{t-1} - 0.457LnAFP_{t-2} \quad (8)$$

$$LnREER = -1.248 + 0.013LnAFP_{t-1} + 0.004LnAFP_{t-2} + 0.456LnREER_{t-1} + 0.572LnREER_{t-2} \quad (9)$$

According to the formula (16), it can be seen that RMB real effective exchange rate will effect on agricultural food prices. LnREER at lag 1 period increased one percentage can drive LnAFP growth by 0.015%; LnREER at lag 2 period increased one percentage can drive LnAFP growth by 0.187%, so the effect of RMB real effective exchange rate on agricultural food prices is obvious. RMB real effective exchange rate will promote the agricultural food prices in short time, but RMB real effective exchange rate will has obvious effect on agricultural food prices in the long time. According to the formula (9), it can be seen that the agricultural food prices can also promote RMB real effective exchange rate and LnAFP at lag 1 period and the 2 period increased 1% will drive the LnREER increased by 0.013 and 0.004% respectively. Therefore, RMB real effective exchange rate and agricultural food prices have direct mutual promotion effect.

In order to analyze the relations between RMB real effective exchange rate and agricultural food prices, we use granger causality test to analyze this VAR model, the result is shown in Table 2. From Table 2, we can get that LnREER is the reason to LnAFP, which means

Table 1: Augmented Dickey-Fuller test (ADF)

Variable	Test statistic	1% critical value	5% critical value	10% critical value	Result
LnREER	-1.569	-3.709	-2.983	-2.623	Unstable
LnAFP	0.872	-3.709	-2.983	-2.623	Unstable
D.LnREER	-3.643	-3.709	-2.983	-2.623	Stable
D.LnAFP	-3.215	-3.709	-2.983	-2.623	Stable

Table 2: Granger causality test

Equation	Excluded	chi ²	df	Prob.>chi ²
LnREER	LnAFP	15.024	2	0.000
LnAFP	LnREER	28.714	2	0.000

Table 3: Johnson co-integration test

Rank	Parms	LL	Characteristic value	Statistic	5% sig. level
0	6	65.9620		20.8342	15.41
1	9	73.6523	0.56201	1.4519*	3.76

RMB real effective exchange rate is the reason to agricultural food prices increase. At the same time, LnAFP is not the reason to LnREER, so that agricultural food prices are also the reason to RMB real effective exchange rate; this is also same to the conclusion above (Table 3).

According to the results, there exist at least one direct co-integration relationship between RMB Real Effective Exchange Rate (REER) and Agricultural Food Prices (AFP), which means that there exist a long-term equilibrium relationship between RMB real effective exchange rate and agricultural food prices.

Impulse-response analysis: According to the results above, we can get that there exist a long-term equilibrium relationship between RMB real effective exchange rate and agricultural food prices and RMB real effective exchange rate is the reason to agricultural food prices, also the VAR model is stable. In order to analyze the VAR model, I use Impulse-response function and cholesky variance decomposition, the results is shown in Fig. 1 and 2.

From Fig. 1, we can get that when LnREER received one unit impact, it will lead LnAFP increase currently, LnAFP will reach the max at t = 4 period and begin to be stable then. It illustrates there is long-term effect between RMB real effective exchange rate and agricultural food prices. At the same time, when LnREER received one unit impact, it will lead LnAFP decrease currently and return to the basic situation at t = 4 period. According to the impulse analysis results, we can get that RMB real effective exchange rate will significant influence agricultural food prices, so that it is important to enhance the innovation of RMB real effective exchange rate. The cholesky variance decomposition also shows the same result, the contribution degree of LnREER to LnAFP is gradually increased. From Fig. 2, we find the contribution degree of LnREER to LnAFP at t = 1 period is 0 and then increased gradually from step 2, finally increased to

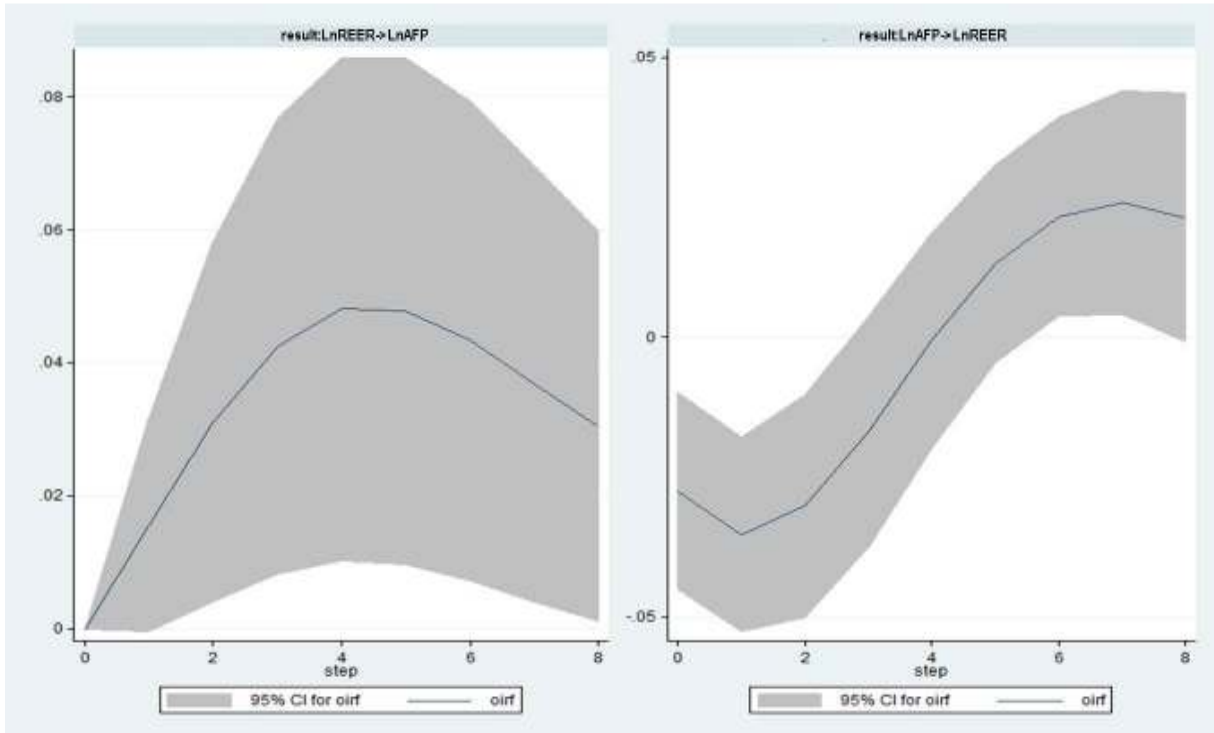


Fig. 1: Impulse-response analysis

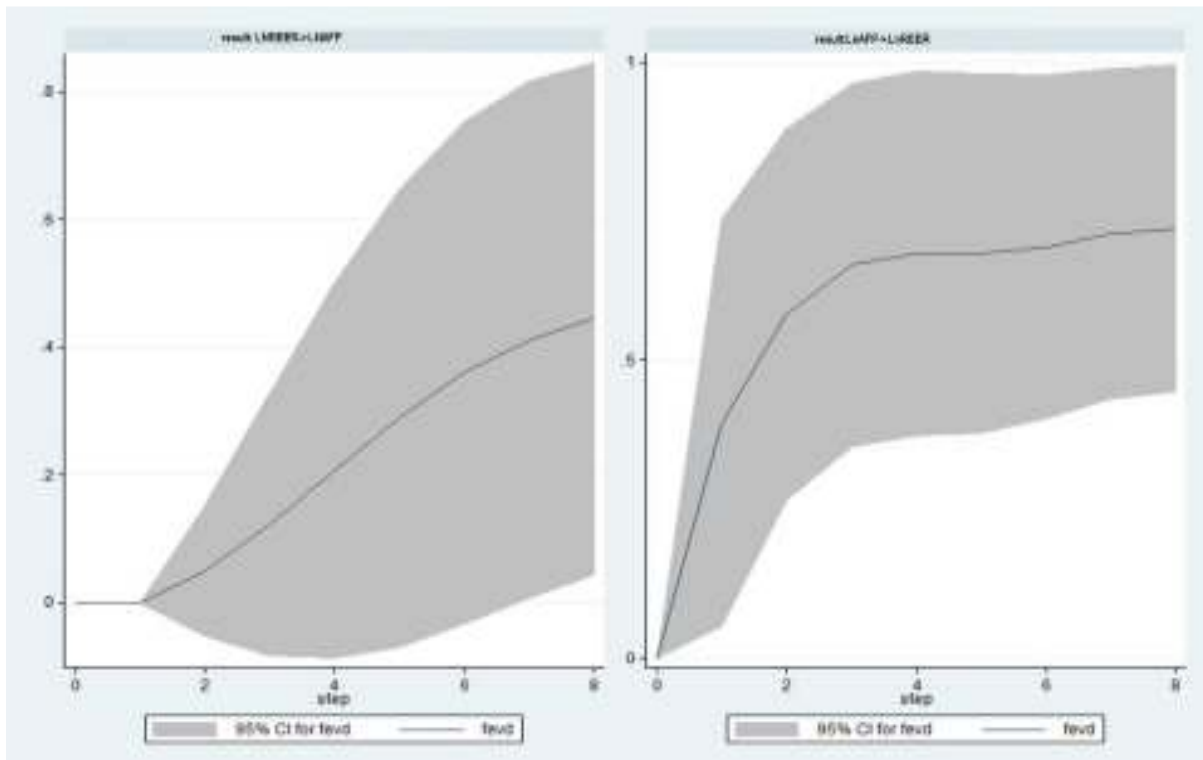


Fig. 2: Cholesky variance decomposition

44.2% at $t = 8$ period. At the same time, the contribution degree of LnAFP to LnREER is 39.52% at $t = 1$ period, then increased and become stable from

step 2, the contribution degree in $t = 8$ period is 72.13%. This means that RMB real effective exchange rate has a important contribution degree to agricultural

food prices and can be used to explain the rising of agricultural food prices.

CONCLUSION

Above all, there are long-term interaction effects between China's RMB real effective exchange rate and agricultural food prices. RMB real effective exchange rate can promote agricultural food prices to grow continuously and the agricultural food prices can also affect RMB real effective exchange rate. Also, RMB real effective exchange rate and agricultural food prices have long-term stability of mutual promotion relationship. According to the data of 1990 to 2014, it shows that RMB real effective exchange rate has a certain lag effect to agricultural food prices. Considering the importance of RMB real effective exchange rate, it is necessary to pay more attention to the development of the exchange rate mechanism and optimize capital configuration. Government also needs to pay attention to the degree of RMB real effective exchange rate should be suitable for the local economic development and avoid excessive RMB real effective exchange rate at the same time.

Because the exchange rate pass through effect is small and therefore to a stable exchange rate and domestic price stability as the fulcrum of the Chinese monetary policy can be focus on a stable domestic prices, need not worry about the impact of exchange rate fluctuations on the domestic price level, so as to achieve a more flexible exchange rate system, strengthening the independence of monetary policy, firmly implement the price stability goal. Provide a good economic environment and increase the volatility of the exchange rate elasticity and flexibility, expand the floating range of RMB exchange rate, reduce the direct intervention of the central bank in the foreign exchange market, the gradual relaxation of exchange rate floating range limits. In this way, a hand can strengthen the signal of the exchange rate, to guide the flow of resources, so that the exchange rate can reflect the change of relationship between supply and demand in the foreign exchange market; on the other hand, it can cultivate the main body of market risk awareness and improve the rational behavior of investors, to lay the foundation of the market further opening of financial industry. In addition to gradually improve the foreign exchange market, improve the formation mechanism of RMB exchange rate. To improve the degree of marketization of exchange rate formation mechanism, the further opening up of the foreign exchange market, the reform of compulsory foreign exchange settlement and sale system, excessive willingness to settlement system. This is not only conducive to better meet the needs of enterprises and individuals demand for foreign exchange, improve efficiency in the use of foreign exchange, but also

conducive to the central banks avoid holding too much foreign exchange facing the exchange rate risk, while the corresponding reduce foreign exchange reserves on money supply pressure, the RMB exchange rate based on the relative balance of supply and demand, so as to promote the RMB the exchange rate formation mechanism to further improve. The relaxation of the foreign exchange market access restrictions, increase market transaction subject, let more financial institutions and enterprises directly involved in foreign exchange trading, avoid large institutions centralized trading monopoly market price level. The increase of foreign exchange trading tools, increase in trading foreign currency, the development of forward contracts, swaps, repurchase transactions, foreign currency option transaction means, promote market-oriented, the RMB exchange rate formation mechanism of scientific. In addition to gradually promote the convertibility of RMB under capital account, RMB free implementation of the floating.

Conclusion the empirical study provides empirical support and technical support for the establishment of perfect food price monitoring and early warning mechanism and regulation of stabilizing mechanism. We have put forward relevant policy suggestions as follows: first, implementation of the establishment of long-term mechanism and improve the food supply of food circulation and market system construction, make no law of characteristic food price expectation management measures in response to food price volatility. Under the background of globalization, China will face uncertainty factors influence abroad more and random shocks. Therefore, the government departments to considering these effects of the shock velocity fluctuations with periods, path, intensity and produce, make full use of the reasonable and effective measures to stabilize the life of consumers expected to fluctuate frequently deal with food prices. Second, increase the agricultural investment, protect the quantity and quality of agriculture, constantly optimize the agricultural production structure, strengthen the agricultural production capacity, the lower part of the staple agricultural products import foreign degree of dependency, the positive impact of direct or indirect impact so as to reduce food price volatility by the international economic crisis and the external uncertain factors. Third, in addition to strengthening the construction of farmland water conservancy facilities, improve the basic facilities of agricultural production and to establish the mechanism of agricultural meteorological disasters defense dominated climatic disaster prevention system, it must establish a comprehensive and scientific food price forecasting system to the impact of natural disasters on the defense of domestic food price volatility. Due to the occurrence of natural disasters will directly affect the agricultural production system and stability of food prices, coupled

with the agricultural ecological system to the natural environment dependence is larger, strength and impact strength of natural disasters directly affect the agricultural production capacity, leading to food market price fluctuations and their choice of planting area of farm products them. Therefore, the government departments in the macro policy analysis framework to more into a dynamic stochastic general equilibrium analysis mechanism and the construction of a comprehensive scientific food price forecast system.

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