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Risk of Exchange Rate Pass-through and Adaptive Strategies of Land-intensive Products in China

----Taking Import Products from U.S. as an Example

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Abstract

Based on the review of literatures of exchange rate pass-through, the paper established an empirical model to analyze the degree of exchange rate pass-through of the price of the land-intensive products imported from U.S. and found that U.S. exporters not only passed the RMB appreciation to their export price in RMB in the Chinese market, but overreact to export these products to China in a much lower price. Based on the conclusion, the paper puts forward the policy suggestions such as increasing the support to land-intensive products in the framework of WTO and establishing exchange rate linked support measures for the land-intensive products.

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Key words: exchange rate; pass-through; risk; RMB appreciation; land intensive products

1. INTRODUCTION

The risk of exchange rate pass-through of RMB appreciation means that, after RMB appreciates, the RMB price of import goods will decrease due to the passing-through effect of exchange rate, thereby the competitiveness of import goods will enhance and shock the domestic commodity markets sensitive to exchange rate; while the price of export goods denominated in currency of target countries will increase, the export goods will be less competitive, which will lead to exports decrease, then domestic employment and national income decrease.

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After WTO accession, the situation of a series of domestic land-intensive products of China went bad. One of the worst-affected products is soybean whose import quantity have increased dramatically, domestic price decreased, planting area substantially reduced and output sharply declined. It become more and more difficult to sell soybean for the farmers in the main producing areas, and the livelihoods of the soybean producing farmers were affected severely. Moreover, 70% of soybean processing enterprises of China were controlled by transnational corporations. China had lost the pricing right of soybean. Provided China government has no effective measures to intervene, other exchange-rate-sensitive agricultural products such as cotton, sugar crops, will follow the soybean's track.

The general viewpoint on the price falling of Land-intensive products of china is that China is densely populated, land-intensive agricultural products are short of competition advantage, so after the domestic market was opened, it was shocked by import agricultural products which are cheaper. Of course, the opening of the domestic market was one of the reasons which caused the shock to the markets of agricultural products, but another important reason of RMB appreciation was often neglected. The commodities of one country are priced in the national currency, but competing in the international market, they must be measured in the same currency, which involves the price relations of currencies, namely the exchange rate. However the exchange rate is not stationary, therefore, at a certain exchange rate level, the competitiveness of one good in two countries are equivalent, while the exchange rate changes, the competitiveness of the commodities in these two countries will also shift. Generally speaking, in the case of domestic currency appreciation, the price of import commodities will decrease, strengthening the competitive power of foreign commodities. Because the lower price of import goods will force the domestic producers cutting prices, which will damage the interests of them. As a result, the producers will reduce planting area of these products. This could jeopardize a country's food security.

Table 1 Comparative Advantage Change Affected by Exchange Rate

Year	2003		2009	
Exchange rate(RMB/USD)	8.27 RMB/USD		6.82 RMB/USD	
	U.S.	China	U.S.	China
Soybean producer's price(USD)	270	365	270	
Soybean producer's price(RMB)	2233	3017	1841	3017

Note: Soybean producer's price is from www.fao.org

For an example, the exchange rate of RMB to USD was 8.27 in July 20, 2005, and has been remained floating within a narrow range around 6.82 since August, 2008. RMB has appreciated 17.5% against USD. According to the statistics of FAO, the producer's average price of China's soybean in 2003 was 365 USD per ton, conversed to 3017 RMB according to the exchange rate of 8.27of that year, while the soybean producer's price in the U.S. was 270 dollars per ton, conversed to 2233 RMB per ton. Supposing that the soybean's production conditions of the two countries has no change until 2009, and the change of exchange rate was fully passed through the domestic market, then the producer's prices of the soybean in China in 2009 remains at 3,017 RMB per ton, but due to RMB

appreciation (from 8.27 to 6.82), the price of U.S. decreased to 1,841 RMB from the 2233 RMB per ton. Assuming that due to the impacts of freight, tax and other reasons, the competitive advantage of soybean in U.S. is not obvious in 2003, but in 2009, as the appreciation of the RMB to USD, the competitive advantage of U.S. added 17.5% (see table 1). Not only soybean, but the other land-intensive agricultural products of China such as sugar cane, cotton, peanut, rapeseed, corn, wheat, etc., are also facing this problem.

Of course, the exchange rate is a macroeconomic variable, its change affects all the national economic sectors, why give land-intensive agricultural products special treatment? Because these land-intensive products relate to national food security which dooms that the Government must take effective measures to support them. RMB Appreciation is one of the important reasons that make these products less competitive, so taking support measures associated with the exchange rate to the land-intensive agricultural products should be most effective.

2. LITERATURE REVIEW

Theory of exchange-rate pass through is formed by developing the traditional theory of international trade balance. The traditional theory of elasticity deals with the impact of elasticity of demand and supply on the trade balance, and the price was known to change the same ratio as the change of exchange rate, so the change of exchange rate was fully passed through the price denominated in the currency of the import country. In this context, researchers studied the changes of import and export quantities caused by the change of exchange rate. However, Full exchange rate pass-through was proved to be uncertain. The relative literature shows that the export enterprises Price To Market. When facing with external shocks such as the change of exchange rate, the enterprises don't change the price measured in the currency of import country proportionally, they also consider other factors such as the share of market, product difference and the variability of the marginal cost [1]. The studies on the exchange rate pass-through can be summarized in the following three aspects:

Firstly, there are some studies on the degree of the exchange rate pass-through of the import and export prices. By analyzing 1980-1983 data of U.S. imports, Krugman [2] found about 35-40% appreciation of U.S. dollar is not reflected to the change of the import and export prices in machinery and transport sectors. Knetter [3] used data from the U.S. and German enterprises to make empirical studies and found that the exchange rate pass-through impact of American enterprises is larger than German enterprises. Knetter [4] showed that Japanese exporters offset 48% of exchange rate changes, while under the same case, the exporters of British and German only offset 36%. Luo [5] took Empirical analysis on the degree of exchange rate pass-through of import goods since Japan practiced floating exchange rate. Ju [6] analyzed the degree of exchange rate pass-through of export agricultural products in China and found it is low.

Secondly, some other studies were about the exchange rate pass-through to the domestic prices. When the price of import or export commodities changed due to the change of exchange rate, the domestic or foreign consumer

prices of similar products inevitably were affected. Feinberg [7] derived with a theoretical model that the higher the monopoly degree of import goods, the higher the degree of exchange rate pass-through to the domestic consumer price. Menon [8] found that, if the domestic and foreign goods can be completely substituted by each other, then the degree of exchange rate pass-through of the import and export prices is equivalent to that of the domestic consumer price. Bu [9] demonstrated that the change of exchange rate significantly affects the retail price and producer price by empirical analysis. Sun etc. [10] considered that the view of "china exports deflation" could not be established by an empirical analysis on the relation of exchange rates and deflation with macroeconomic variables. Feng [11] found that the exchange rate pass-through affect weakly on China's price level through empirical study. Chen and Liu [12] considered that the effects on China's import price and consumer price of the RMB effective exchange rate was although statistically significant, but is very low in reality.

Thirdly, some studies were about the factors which affect the degree of exchange rate pass-through of the import and export price, Dornbusch [1] pioneered theoretical discussion about the incomplete pass-through of exchange rate. He used models of different industrial organizations and showed that the exchange rate pass-through depends on the substitutability of goods, market share and foreign enterprises' competitiveness in domestic market. Bernhofen and Xu [13] considered that the incomplete pass-through of exchange rate was the result of the imperfect competition of foreign enterprises. Devereux. Etc. [14] found that the exchange rate pass-through was related to the relative stability of the monetary policy. Marston [15] and Yang [16] found that the exchange rate pass-through varied in different industries and different products.

Literatures of the exchange rate pass-through are abundant and in-depth, but most of them are about manufactured goods and developed countries, and of which studied agricultural products and developing countries are rare.

3. THE THEORETICAL INTERPRETATION OF THE EXCHANGE RATE PASS-THROUGH

Taking the influence on China's import products from U.S. of RMB appreciation as an example, this paper discusses the influence on China's land-intensive products of the risk of exchange rate pass-through,. Provided China is an importer and the United States is an exporter. Defining $P_\$$ as the export price measured in the USD, $P_¥$ as the price charged to the China importer in the RMB, $E_{¥/\$}$ as the nominal exchange rate quoted in units of RMB per unit of USD. According to the theory of purchasing power parity,

$$P_¥ / E_{¥/\$} = P_\$ \qquad\qquad 1$$

When RMB appreciates, $E_{¥/\$}$ decreased. $\varepsilon_\$$ is defined as the elasticity of export price with respect to the exchange rate. When RMB appreciates, the U.S. exporters will select one from the following pricing decisions:

(1) When $E_{¥/\$}$ decreases, keep $P_¥$ constant, $P_\$$ increases proportionally. Namely with RMB appreciation, if

kept the $P_¥$ in China's market unchanged, $P_\$$ increases proportionally with the RMB appreciation. Then, $\varepsilon_\$ = -1$, the exporters of U.S. completely price to market and absorb all of the RMB appreciation.

(2) When $E_{¥/\$}$ decreases, $P_\$$ increases，but less than proportionally, so $P_¥$ decreases，but less than proportionally. Then $-1 < \varepsilon_\$ < 0$. This is partly exchange rate pass-through and American exporters only pass through a part of exchange rate change. Namely exporters price to market in some degree.

(3) When $E_{¥/\$}$ decreases, keeping $P_\$$ constant, $P_¥$ decrease proportionally. Then, $\varepsilon_\$ = 0$.Namely U.S. exporters keep price measured in USD unchanged and pass all of exchange rate change to the price measured in RMB.

(4) When $E_{¥/\$}$ decreases, $P_\$$ decreases, so $P_¥$ decreases more than proportionally. Then $\varepsilon_\$ > 0$, export price in USD changes in the same direction with the exchange rate. Namely U.S. exporters not only pass the RMB appreciation through the price measured in RMB but also overreact to cause the export price in USD to change in negative direction.

(5) When $E_{¥/\$}$ decreases, $P_¥$ increases，but more than proportionally. Namely with RMB appreciation, the export price of U.S. in RMB increases instead of decreases. Then $\varepsilon_\$ < -1$, U.S. exporters pass no change of exchange rate to the export price in RMB, overreact to price to market.

Among above five scenarios, the forth and fifth are more special. The 4th scenario will happen for the commodities that have high price elasticity of demand. However for the commodities that have lower price elasticity of demand, the fifth scenario will happen.

4. DATA AND EMPIRICAL MODEL

The paper aims to discuss the degree of exchange rate pass-through of the land-intensive agricultural products which U.S. exports to China. If the degree of exchange rate pass-through is high, the import from U.S. will shocked domestic markets with RMB appreciation. Then it is essential for the China government to make adaptive strategies.

For this purpose, the paper will construct a model to estimate $\varepsilon_\$$ to check the degree of the exchange rate pass-through of land-intensive agricultural products. Export price of U.S. is affected by the domestic producing cost and the exchange rate. Yang [16] constructed a model to study the relation of exchange rate and export price of manufacturing commodities, in which controlled industry producer's price index and multilateral trading weighted foreign producer's price index. Modifying this model, this paper constructs the following model:

$$Lnm_{i,t} = a_{0,i} + a_{1,i}lne_t + a_{2,i}lnp_{i,t} + \varepsilon_{i,t} \qquad\qquad 2$$

Where

$m_{i,t}$= import price measured in USD for land-intensive agricultural product i

e_t= nominal exchange rate quoted in units of RMB per unit of USD, is the estimation of above mentioned $\varepsilon_\$$

$p_{i,t}$= U.S. producer's price for land-intensive agricultural product i

$\varepsilon_{i,t}$= error term

Based on the quantity China imported from U.S., the paper chooses soybean, cotton, maize and wheat to study. The sample period is 1992-2007. The data of e_t are from *China Statistical Yearbooks*, the data of $p_{i,t}$ are from FAO statistics and $m_{i,t}$ is obtained by import amount dividing import quantity which are all from *China Customs Statistical Yearbooks* and measured in USD.

OLS regression requires that variables are stationary series. Firstly the paper tests the unit root of the variables. ADF test shows some variables have unit root. But if there is a long-run relationship between the dependent and independent variables so that they are cointegrated, the OLS regression can produce consistent estimates. Johansen tests for cointegration show that the three variables of every kind of product has at least one cointegration vector.

5. ESTIMATION RESULTS AND DISCUSSIONS

Table 2 demonstrates the estimation results. Except maize, the goodness of fit of the other three products' regressions is somewhat satisfied. The adjusted R^2 is very small for the regression equation of maize which demonstrates that the exchange rate change and domestic producer's price in U.S. almost can't explain the export price in China's market. In the all regression equations the sign of coefficients of $p_{i,t}$ is positive which is consistent with theoretical expectation. Namely export price of U.S. in China's market changes with domestic price U.S. in the same direction.

In the three equations whose Goodness of fit is somewhat satisfied, the exchange rate coefficients are all greater than 0, but except the coefficient of e_t of wheat is statistically significant at 5% level, the other two coefficients are not statistically significant. According to the above analysis, the positive coefficients of e_t means that with the RMB appreciation, the U.S. exporters dropped the dollar price of agricultural products, while the RMB price drops even more dramatically, dropping by more than the rate of RMB appreciation. The RMB appreciation not only fully passed to the export price measured in RMB, but the dollar price of exports also appeared in the opposite direction with the expected changes.

For example, RMB appreciates by 1%, the export price in USD of U.S. wheat is not increased by 1% to keep the price in RMB constant, even not maintained the same to make the export price in RMB decrease proportionally, but decrease the price of USD by 0.99%, so that the import wheat measured in RMB is much lower and more competitive in the Chinese market. The coefficient of e_t of soybean is 0.24, which means that, when RMB appreciates 1%, the import price of U.S. soybean in USD in Chinese market will reduce 0.24%. The coefficient of e_t

of cotton is 0.34, which means that when RMB appreciates 1%, the export price of U.S. cotton in USD in Chinese market will reduce 0.34%.

Table 2 Exchange Rate Pass-through Estimates for U.S. Export To China

Produts	Coef. Of e_t	Coef. Of $p_{i,t}$	Adjusted R^2	DW
Wheat	0.99	0.36	0.35	1.21
	(0.38)**	(0.20)*		
Maize	- 1.17	0.01	0.07	1.81
	(1.15)	(0.63)		
Soybean	0.24	0.62	0.58	1.61
	(0.21)	(0.13)**		
Cotton	0.34	0.51	0.32	2.06
	(0.32)	(0.17)**		

Notes：Values in brackets are standard deviation of estimates
** and * represent statistical significance at the 5- and 10-percent levels

According to Dornbusch's conclusion [6], the degree of exchange rate pass-through depends on the substitutability of goods, market share and foreign enterprises' forces in the domestic market. As the land-intensive products are more apt to replaceable, their price elasticity of demand is high. U.S. exporters not only exhaust the RMB appreciation advantage, but also decreased the export price in USD using the government's support policy to grab more market shares in the China.(see table 3)

Table 3 Farming Subsidies Of US   Unit：US Dollar

Year	Corn	Soybean	Wheat	Cotton
1995	2,723,846,939	241	587,079,488	29,744,234
1996	1,861,475,819	0	1,672,182,732	647,484,806
1997	2,694,553,005	0	1,411,333,311	595,074,058
1998	4,826,101,164	480,126,119	2,763,619,969	1,163,052,658
1999	7,238,282,386	2,490,877,291	3,695,893,750	1,721,488,862
2000	7,722,105,815	3,003,939,376	3,652,629,030	1,852,207,942
2001	5,483,720,758	4,307,339,757	2,483,578,458	3,070,700,379
2002	1,981,339,791	670,836,288	975,308,509	1,758,053,164
2003	2,812,727,118	1,141,506,239	1,372,937,961	2,334,354,522
2004	4,506,577,294	913,622,392	1,215,554,219	1,972,956,134
2005	9,399,338,468	588,606,840	1,120,760,803	3,488,937,049
2006	4,920,813,719	642,848,198	1,100,688,102	2,695,808,452
2007	2,048,116,614	574,640,511	1,092,800,323	586,187,836

Data source: Environmental Working Group's Farm Subsidy Database on www.ewg.org

6. CONCLUSION AND POLICY SUGGESTIONS

The estimation results shows that U.S. exporters not only passed the RMB appreciation to the export price in RMB in the Chinese market, but overreact to export land-intensive products to China in a lower price under the

support of government's subsidies. In view of this, Chinese government should pay attention to the adverse effects on land-intensive products of the RMB appreciation and take positive coping strategies.

6.1 INCREASING SUPPORT TO LAND-INTENSIVE PRODUCTS IN THE FRAMEWORK OF WTO

Developed countries have been taking measures to support their agriculture. The amount of domestic support in developed countries is still large despite of the commitment to reduce. Large subsidies distort the market and make the unfair competition. Due to the multi-functionality of agriculture, WTO permits moderate support to agriculture, only forbids the policies which impede agricultural products' free flowing and fair competition. Since the agricultural support in developed countries has hurt the interests of agricultural producers in China, the government should take some measures to support relative products.

6.2 Establishing exchange rate linked support measures for the land-intensive products

The land-intensive products are sensitive to exchange rate fluctuation. Price fluctuations will affect the farmer's incentive to produce, which may affect the country's food security. Therefore, for these land-intensive products, the Government should have a production plan, and based on the plan, make some support measures according to exchange rate changes. One of WTO Green Box Policies is "general agricultural income security benefits" which considered that: "In the circumstance of agricultural trade liberalization, market changes or other reasons are likely to severely reduce agricultural income of people, this is definitely not conducive agricultural production, for which the Government's proper subsidies is justified." Therefore we can design the exchange rate linked supporting measure as an policy insurance product in which establish a benchmark exchange rate according to the cost of land-intensive products. If the average exchange rate in the duration, for example 3 months or half a year, after harvesting is higher than the benchmark of the exchange rate, the insurant will not be compensated, in the contrast, if lower than the benchmark, the insurant will be compensated and the amount of compensation depends on the degree of RMB appreciation.

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