Analysis of the Impact of Japan's Positive List System on Chinese Mushrooms

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Abstract— *Since Japan implemented the positive list system in 2006, The amount and quantity of mushroom exported from China to Japan are decreasing. The export of mushroom in China has been hit hard. This article uses panel data for each quarter of China from 2005 to 2018.By constructing the corresponding virtual variable measurement model, the paper analyzes the impact of Japan's implementation of the positive list system on China's export of mushrooms to Japan. Empirical results show, China's GDP and the exchange rate of RMB against Japan have a positive correlation with the export value of shiitake mushrooms, but the impact is not significant. However, the market price and positive list system of shiitake mushrooms have a negative correlation with the export value of shiitake mushrooms. The higher the price of mushrooms, the smaller the export value, and the stricter the system will also reduce the export volume, and the impact of these two factors is more significant. Comprehensive research, from the aspects of enterprise management model, the role of industry associations and the coordination of management functions of the government, we propose relevant countermeasures to promote China's export of Japanese shiitake mushrooms under the affirmative list system.*

Keywords— *Positive tabulation, mushroom export, Virtual variable measurement model.*

I. INTRODUCTION

Shiitake mushroom has a special position in Japanese agricultural products. Japan is the largest main market of shiitake mushroom products in China, a large number of dried and fresh mushroom products are imported from China every year. Since Japan implemented the "positive list" system on May 29, 2006, Japan's inspection procedures for imported agricultural products and processed products are complicated and quality standards are improved, China's Japanese mushroom products have been detected 23 cases of violations exceeding the standard. And the stricter the green trade barriers in Japan, the less China's agricultural exports. It can be seen that China's mushroom export industry is a "hardest hit" and problem-prone area affected by Japan's "positive list system".Therefore, to find out the specific causes of the impact of China's mushroom exports on Japan's "positive list system", analyze its impact on China's mushroom exports, and propose that China's mushroom export strategy is urgently needed to be resolved.

II. LITERATURE REVIEW

The domestic research on the positive list system mainly proposes corresponding countermeasures for different types of agricultural products. Chen Di et al. (2014) [1]analyzed the tea export research in the positive list system. The study found that the most influential tea in Japanese tea exports is oolong tea. The main reason for the failure is the non-compliance with the pesticide residue standard in the positive list system. Liu Fangchi et al. (2016)[2] analyzed the Chinese carp export research and found that, Japan has a total of 112 inspection projects for catfish products after the implementation of the positive list system. However, it has not received the attention of Chinese carp culture producers, resulting in the shrinking of China's squid exports. From the perspective of research methods, domestic research on the impact of green barriers on international trade in agricultural products, It mainly analyzes the characteristics of green easy barriers. On this basis, the statistical data of import and export trade is compared with similar regions or countries to analyze the research problems intuitively. Zhang Zhiying et al. (2014) [3]analyzed the characteristics and internal factors of China's agricultural products encountering green barriers, and systematically summarized the experience of breaking through Japan's green trade barriers and its enlightenment to China. Gravity models are the most widely used in quantitative research. Mo Zhanhong (2012) [4]conducted a theoretical analysis of the impact of Japanese green barriers on China's agricultural exports. He used the gravity model to conduct empirical research, and the results proved that the pesticide residue standards set by Japan greatly affected China's exports.

III. CHINA'S TRADE STATUS OF EXPORTING MUSHROOMS TO JAPAN

1) China's exports of agricultural products to Japan

It can be seen from Table 1 that since the implementation of the positive list system in Japan, the agricultural products exported from China to Japan have shown a significant downward trend. In 2005, China exported 7.927 billion U.S. dollars of agricultural products to Japan, accounting for 29% of China's total agricultural exports. While China's exports of agricultural products to Japan increased to US$9.489 billion in 2018, its share of China's total agricultural exports fell to 13%.Moreover, with the increasing complexity of the standards of Japan's positive list system, the proportion of China's exports of agricultural products to Japan's total agricultural exports in the past few years has continued to decline.

TABLE 1. China's Agricultural Exports to Japan
(Unit: 100 million US dollars)

Year	Export Amount	Export Amount to Japan	Proportion
2005	271.8	79.27	0.29
2006	310.3	82.12	0.26
2007	366.2	83.49	0.23
2008	402.2	77	0.19
2009	392.1	76.87	0.2
2010	488.8	91.48	0.19
2011	601.3	109.94	0.18
2012	625	119.82	0.19
2013	671	112.36	0.17
2014	713.4	111.26	0.16
2015	706.8	101.98	0.14
2016	729.9	100.39	0.14
2017	755.3	98.19	0.13
2018	797.1	94.89	0.13

Data Source: Ministry of Commerce of the People`s Republic of China

2) China exports mushrooms to Japan

As can be seen from Table 2, after the implementation of the positive list system in Japan in 2006, In 2007, the amount of mushrooms exported to Japan fell from 111.610 million US dollars to 92.184 million US dollars, a decrease of 17.4%, and the number also dropped by 28.6%. China's mushroom exports have been hit hard. It was not improved until 2009, but the number of mushrooms exported to Japan afterwards continued to decrease. Although the export amount has increased, the increase is not obvious. Comparing the export of shiitake mushrooms to Japan and exporting around the world, it can be seen that the Japanese positive list system has an important impact on the export of shiitake mushrooms in China.

TABLE 2. China's Mushroom Exports

Year	Mushroom exports to Japan		Year-on-year growth（%）		Total exports of mushrooms		Year-on-year growth（%）	
	Quantity（Ton）	Amount Currency (10k dollar)	Quantity	Amount currency	Quantity（Ton）	Amount Currency (10k dollar)	Quantity	Amount currency
2005	29,247.60	9,849.50			40,191.2	21,345.9		
2006	24,215.70	11,160.10	-17.2	13.3	40,191.2	21,345.9	-20.7	-7.8
2007	17,286.90	9,218.40	-28.6	-17.4	40,606.2	20,319.1	1.0	-4.8
2008	10,157.10	6,711.60	-41.2	-27.2	24,947.0	16,156.3	-38.6	-20.5
2009	10,310.00	8,238.30	1.5	22.7	35,981.7	31,859.8	44.2	97.2
2010	11,705.30	11,292.30	13.5	37.1	64,038.7	75,000.0	78.0	134.3
2011	11,243.60	11,720.80	-3.9	3.8	91,881.0	120,000.0	43.5	60.4
2012	9,725.60	9,073.60	-13.5	-22.6	57,005.0	59,269.0	-38.0	-50.5
2013	6,863.80	6,820.90	-29.4	-24.8	97,121.2	128,000.0	70.4	115.7
2014	7,624.10	10,434.60	11.1	53	89,437.8	125,874.4	-7.9	-1.5
2015	7,825.40	11,024.60	2.6	5.7	97,443.3	144,908.2	9.0	15.1
2016	7,989.80	10,816.40	2.1	-1.9	109,482.4	155,062.8	12.4	7.0
2017	7,534.4	9,178.5	-5.7	-15.1	145,917.2	204,124.0	33.3	31.6
2018	7,326.1	9,407.0	-2.8	2.5	153,961.8	231,955.4	5.5	13.6

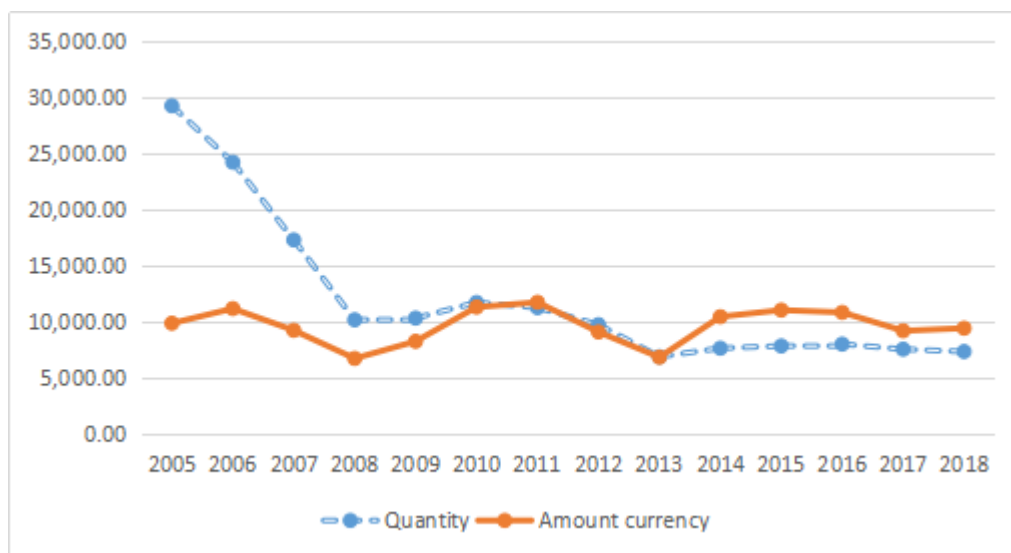Data Source: Ministry of Commerce of the People`s Republic of China

Fig. 1. Chinese Mushroom Exports to Japan

IV. AN EMPIRICAL ANALYSIS OF JAPAN'S POSITIVE LIST SYSTEM FOR CHINA'S MUSHROOM EXPORT

1) Virtual variable measurement model

In modern economic analysis, the use of econometric models for regression analysis has a wide range of applications in the analysis of relevant economic issues. When analyzing economic issues such as export trade, the general variables are quantitative and data-oriented. For example, there are many factors affecting the export of shiitake mushrooms, such as the consumption level of residents, export tax rebates, exchange rates, prices, etc., all have specific data. The main focus of this paper is the impact of the Japanese positive list system on the export of Chinese mushrooms to

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Japan. The implementation of the Japanese positive list system is a dummy variable. In general, simulated regression cannot be lack of sample data. But in practice, it is not enough for the export trade model to consider only quantitative variables, because export trade is not only affected by some quantitative factors, but also by some qualitative factors. For example, the implementation of the Japanese positive list system will have an impact on China's mushroom exports. Based on this consideration, this paper introduces the virtual variable of coping policy in the regression model and constructs a virtual variable measurement model.

2) Model construction

There are many factors affecting the export of shiitake mushrooms, such as the consumption level of residents, domestic production, exchange rate, price, geographical distance and so on. Through research, it is found that variables such as population, cultural differences and consumption habits have little effect on the research of this problem. Geographic distance is basically quantitative. Therefore, the influencing factors mainly use China's GDP, China's mushroom market price against Japan, the exchange rate of RMB against Japan, and the implementation of policies.

This article uses the relevant data for each quarter from 2005 to 2018. The data comes from the China Statistical Yearbook, Ministry of Commerce of the People`s Republic of China and the Foreign Exchange Administration.

Starting from the relevant knowledge of econometrics, we can establish the following model of Chinese mushroom export to Japan:

$$Q_i = \partial_0 + \partial_1 GDP_i + \partial_2 X_i + \partial_3 P_i + \partial_4 T_i + \xi_i$$

Q_i indicates the number of Chinese mushrooms exported to Japan, GDP_i Shows China`s gross national product, X_i Indicates the exchange rate of RMB against Japan, P_i represents the price of Chinese mushrooms on the Japanese market, T_i indicates whether the Japanese positive list system is implemented or not, which is a virtual policy variable. Its settings are as follows:

$$T_i = \begin{cases} 1 & \text{Positive list system implementation} \\ 0 & \text{Positive list system not implemented} \end{cases}$$

In order to eliminate the heteroscedasticity problem, we delog the time series variables and establish an error correction model as follows:

$$INQ_i = \partial_0 + \partial_1 INGDP_i + \partial_2 INX_i + \partial_3 INP_i + \partial_4 T_i + \xi_i$$

Where T_i is a dummy variable and no logarithmic processing is required.

Regression analysis using EVIEWS measurement software. First, we will make a line chart of the amount of Chinese mushroom exports to Japan and the time. It is observed through the line chart that the export volume of Chinese agricultural products to Japan has a great relationship with the quarter, with quarterly fluctuations. Therefore, a double logarithmic regression analysis is performed with the following results as Table 3:

TABLE 3. Results of Regression Analysis

Dependent Variable:INQ
Method: Least Squares
Date:10/26/19Time:19:37
Sample:2005Q12016Q4
Included observations:48

Variable	Coefficient	Std.Error	t-Statistic	Prob.
INGDP	0.032001	0.182582	0.175272	0.0617
INP	-0.910079	0.178435	-5.100347	0
INX	0.07701	0.340646	0.22607	0.0222
T	-0.263773	0.158274	-1.666555	0.0129
C	9.612147	1.516008	6.340431	0

R-squared	0.755722	Mean dependent var		7.9484
Adjusted R-squared	0.732999	S.D.dependent var		0.55324
S.E.of regression	0.285872	Akaike info criterion		0.43179
Sum squared resid	3.514093	Schwarz criterion		0.62671
Log likelihood	-5.362977	Hannan-Quinn criter.		0.50545
F-statistic	33.25732	Durbin-Watsonstat		1.47428

From the results of the above linear regression, the corrected R square is 0.733, and each variable passes the test with a confidence of 0.1, So the model has a good fit. It can be concluded that the number of Chinese mushroom exports to Japan is:

$$INQ_i = 9.612147 + 0.032001 INGDP_i + 0.077010 INX_i$$
$$-0.910079 INP_i - 0.263773 T_i$$

From the model of China's agricultural exports to Japan, we can conclude that when T=1, Japan's positive list system has a negative correlation with China's total exports of mushrooms to Japan. That is to say, the implementation of the policy of the Japanese positive list system will reduce the export of Chinese mushrooms to Japan. In addition, the size of China's GDP and the exchange rate of RMB against Japan and China's total exports of mushrooms to Japan have a positive correlation. China's shiitake mushrooms have a negative correlation with the market price of Japan and the total export of Chinese shiitake mushrooms to Japan. At the same time, from the regression results, it can be seen that the positive list system and the market price of mushrooms have a significant impact on the total export value of Chinese mushrooms to Japan, while the GDP and the exchange rate of RMB against Japan have relatively little impact on the total export volume of Chinese mushrooms to Japan.

V. CONCLUSION AND RESPONSE MEASURES

Based on the comprehensive literature research, this paper analyzes the impact of the Japanese positive list system on the export of Chinese mushrooms to Japan. The analysis shows that Japan`s positive list system has had a large negative impact on China's exports of mushrooms to Japan. Through the above research, the following measures should be taken for the affirmative list system of Chinese mushrooms and even agricultural products to respond to Japan:

Enterprises should adjust the management mode and establish a strict monitoring system for pesticides and veterinary drugs. Enterprises should change the previous "enterprise-farmer-base" model and establish a new "enterprise-base-standardization" management model. Develop your own production base, making the enterprise and production circulation a subject. In this way, enterprises can conduct real-time communication and monitoring of production links, so as to strictly regulate the use of agricultural and veterinary drugs, control drugs from the source, and improve the specifications of agricultural products. Establish a strict monitoring system for pesticide and veterinary drug residues. The inspection and quarantine record management system for export agricultural products shall be fully implemented, and the management of the use of agricultural veterinary drugs and additives shall be strictly regulated.

Actively play the role of industry associations. Agricultural associations should enhance the awareness and concept of export enterprises, standardize the production processes of enterprises, formulate industry norms, implement enterprise appraisal systems, and eliminate enterprises that do not meet the requirements to jointly face the obstacles.

Give play to the government's coordinated management functions and safeguard the rights and interests of Chinese enterprises. The government must try to negotiate with Japan to safeguard the interests of China's export agricultural products enterprises. In addition, the government should actively understand the dynamics of the "positive list system" and provide enterprises with the latest news to guide enterprises to scientifically regulate the use of agricultural chemicals.

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