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Research on Relationship between CPTPP Participation and Japan Agricultural Product Import

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Abstract: As the leader of "Comprehensive and Progressive Agreement for Trans-Pacific Partnership" (CPTPP), which cuts off majority of tariff for participating countries, action of Japan has been followed with interest, especially in its traditional protecting industries, agricultural business. This paper estimates the relationship between the cyclical component of monthly total import value on agricultural product during 2011-2021 and the participation of CPTPP. It shows that there exist significant before and since distinction, which could be explained in 4 perspectives: inaccurate fitting method, existence of omitted bias, existence of multiple collinearities, and the step-by-step elimination on tariffs.

Keywords: CPTPP, Elimination of Tariff, Agricultural Product, Japan Agricultural Product Import

1. Introduction

In 2005, Brunei, Chile, Singapore, and New Zealand signed the "Trans-Pacific Strategic Economic Partnership Agreement" (TSEPA), which is the predecessor of Trans-Pacific Partnership Agreement (TPP), enforced in 2006 [1]. With the announcement that the U.S., Peru, Vietnam, and Australia would like to take part in as well, it has appeared an expansion of participation in Asia-Pacific region. Japan declared to join the negotiation on June 23rd, 2013, which was ended successfully in Oct. 15th, 2015, and the original agreement was approved by the Diet of Japan in Nov. 10th, 2016. Following with the withdrawal of U.S. in 2017, the remaining 11 countries agreed to revise the agreement, in the name of "Comprehensive and Progressive Agreement for Trans-Pacific Partnership" (CPTPP). CPTPP is a retainment of TPP, despite ruling out 20 provisions insisted by the U.S., concentrating on investment, government procurement and intellectual property [2,3]. One of the main topics of CPTPP is cutting off tariffs. The agreement requires each countries' custom plenty of improvements, which is predicted to be most beneficial to small businesses. However, the cut-off is comprehensive. Some industries where government could hardly give up the protection were pushed to a competitive market, which is a controversial section of CPTPP as well. Due to signing into CPTPP, government of Japan had to lower even cancel the tariffs of agricultural imports. Therefore, in prediction there ought to exist some distinctions before and after Japan participated into CPTPP. It was observed that there remain some blanks in existing research, thus this paper would be mainly focusing if there are apparent differences on agricultural product import before and after Japan brought CPTPP into enforce, which is 2017.

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2. Literature Review

Influence on Japan's agricultural trade by TPP has been widely discussed. It is shown that the hinders preventing Japan's agricultural trade to a free market, which especially lies in five Japan's "sensitive agricultural categories consisting of rice, wheat and barley, beef and pork, sugar, and dairy products" [4], and are not Genetically Modified Organisms (GMOs). Through "partial equilibrium model" and "sensitivity tests" [5], the impact on liberalized trading under TPP in the five subsectors above was analyzed in two cases. Consequently, it is found out that the net total economic benefit for Japan would be positive. Though consumers would gain profit under the free trade environment, almost all producers would face losses without protection of government. Even if the author specially focuses on GMOs, which is out of our main purpose, the analysis on general trade environment is still typical. It is posed that because of lack of natural material and the limited size of land, farms of Japan are small, nevertheless the supply of agricultural goods are extremely concentrated. Japanese producers are evaluated as "the most highly protected among TPP countries" [5], derived from high tariff and tariff-rate quotas (TRQ). Reduction of protection procedure would lead to an absolute disadvantage for domestics' farmers, related to their foreign competitors. Therefore, the department of agriculture has to offer amounts of compensations [5].

TPP would have impact on Japan's agricultural import. It is suggested that TPP agreement would lead to more imports from other TPP participation countries, "dominating the total agricultural trade impact of such an agreement" [6], despite it would have little reduction on domestic production. Imports from TPP partners are substantial and most of them are relatively steady, though actual values have dropped due to the increasing imports from China and Thailand. With emergence of the comprehensive agreement, explosion on agricultural imports by reduction of tariffs would lower the price distinctly and vary the choice for consumers, though in this way it would compete with domestic productions in some sectors. Nonetheless it is pointed out that one of the limitations of import growth would be the "supply limitation" [6] from other countries in TPP [6].

Moreover, TPP would have great influence in other economic aspects. Influence on GDP and and agricultural trade by eliminating all agricultural tariffs that are claimed in TPP agreement in 2025 was assessed. Relative to the baseline, Japan's GDP is predicted to increase by percentage of 0.02%. Particularly on agricultural production, it is estimated that most agricultural production would decline, in which cereal production drops most. Nevertheless, the import is estimated to increase in all countries, US and Japan would share the largest proportion and that for Japan would be around 14% higher than the baseline [7].

It is suggested that the Joint Declaration means to "avoid the use of currency devaluations as a means to alter market access commitments agreed to under TPP" [8]. However, it is argued that effect of this request would not be sustainable as "currency misalignment" has not be defined explicitly which leaves gaps and some member countries have "exchange rate regimes" [8]. Following with CPTPP, leaders of the remaining countries prefer to leave a blank in this topic. However, Japan has been pressured to keep its currency at a low exchange rate by the US government, within Japan-US trades. Thus, exchange would have various possible impacts, therefore it is a situation with diverse consequences [8].

There are also research comparing on the policy rules between TPP and CPTPP.Policies on agricultural trade of TPP and CPTPP was combed and analyzed. It is concluded that CPTPP has inherited most content of TPP, and on this basis CPTPP lower the level of free trade agreement (FTA) and condition bringing the agreement into force. Similarly, CPTPP requires to cancel most of the tariff on agricultural goods, part of which could be applied gradually. Both TPP and CPTPP claim to improve and fasten the process of customs, which would lower the logistics cost of trade. It also infers those two agreements both protect worker's legal rights, including minimal wages, working hours.

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Participating countries is prohibited to encourage trade and investment by lower the legal safeguard procedure, which would increase the production costs. This observation brings employment factors into account when evaluating impact of CPTPP [9].

The previous studies provide backgrounds of this research. Basically, most cases pay attention to possible impact on TPP, and there exist blanks of that on CPTPP. Empirical evidence about amount of featured goods was examined, however, other relative economic factors are dismissed, as mentioned: "we do not take into account the potential impact of Japan's income and population growth on the annual welfare gains from trade liberalization" [5]. These aspects are correlated to the agricultural trade situation. As papers above shown, the participation into TPP would have impact on these factors, such as GDP, unemployment rate, and exchange rate [6-8]. Thus, it is reasonable to take these into account of the influence factors of agricultural import. In addition, the study creates a bridge gathering TPP and CPTPP as they almost hold the identical content [9]. Therefore, a quantitative evaluation could be set up on the impact on Japan's agricultural import of CPTPP, combined with relative economic factors.

3. Research method, Results and Discussion

This research uses ordinary least square (OLS) method setting up a linear regression model to estimate the relationship between the cyclical component of Japan's agricultural product import and period. Ordinary least square method is an estimation that minimizes the sum of squares between observed values and fitted values from the regression function [10]. Given 8 independent variables, x1, x2, x3, ..., x8, and dependent variable, y, the estimated regression would be:

$$\hat{y} = \widehat{\beta_0} + \widehat{\beta_1}x_1 + \widehat{\beta_2}x_2 + \ldots + \widehat{\beta_8}x_8 \quad (1)$$

Where β_0 and β_i are paremeters,given by

$$\widehat{\beta_0} = \frac{\sum(y-\bar{y})x_i}{\sum(x_i-\bar{x})x_i} \quad (2)$$

$$\widehat{\beta_1} = \frac{\sum(y-\bar{y})(x_i-\bar{x})}{\sum(x_i-\bar{x})^2} \quad (3)$$

It would be focused on how a certain year is relative to the year that Japan took part in CPTPP, i.e., 2017. If the year is before 2017, a dummy variable with value 0 would be generated, or it would be assigned by 1. In addition, unemployment rate, consumer price index (CPI) of all items (Index in 2015 =100), Japanese Yen to US dollar exchange rate, employment on agriculture (all persons for Japan), and leading indicators OCED: Reference series: Gross Domestic Product (Normalised) are brought into consideration as explanatory variables as well. Furthermore, CPI and employment on agriculture are taken natural log to create two other independent variables

To figure out Japan's total import on agricultural products, we check the data from the Statistics of Japan. Going through the tariff sheet of Japan's custom, products in chapter 2, 3, 4, 7, 8, 9, 10, 11, 12, 15, 17, 18, 19, 20, 21, 22, 23 and 24 would be brought into consideration. Due to the time efficiency of data, it is preferred to pay attention to the monthly import quantities from 2011 to 2021, which implies that 5 years are generated as dummy variable value 0, and 6 years are in value of 1. Summing up the import values from various sectors within 11 years, the total value of agricultural products import by Japan would come out, as shown in figure1. Owing to time-series data, detrending

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method ought to be applied. Given the scatter graph of total import, polynomial curves fitting with degree of 5 are preferred, expressing as

$$y = 0.1738x^5 - 52.981x^4 + 5786.6x^3 - 289168x^2 + 8 \times 10^6 x + 5 \times 10^8 \quad (4)$$

in which fitted value could be calculated:

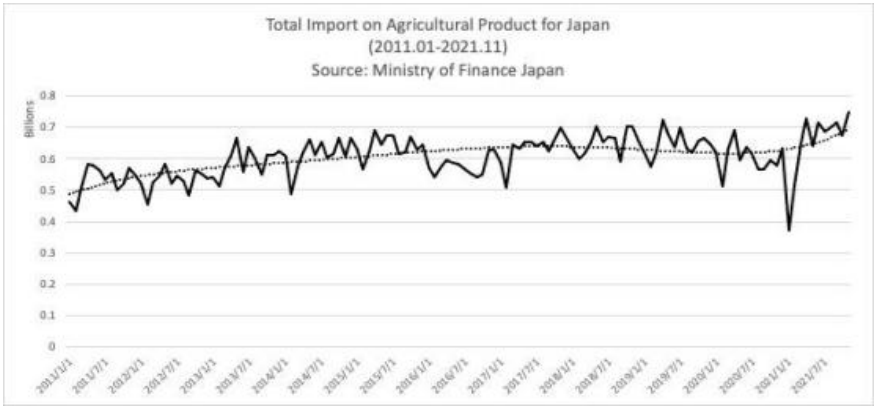

Figure1： Total Import on Agricultural Product for Japan [11,12].

The percentage change of difference between observed data and trend values, which equals to differences divides the fitted trend values, captures the cyclical component of total import value, generating the dependent variable in our regression, and figure 2 shows as follow:

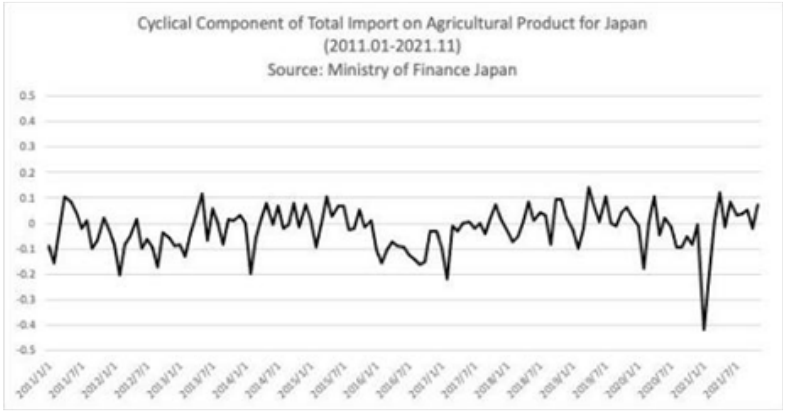

Figure2： Cyclical Component of Total Import on Agricultural Product for Japan [11,12].

Plug data into Stata, it is estimated by the regression between cyclical component of total import value and the dummy variable determining whether Japan had been in CPTPP. Table 1 shows the result. The expression of regression would be:

$$\widehat{\text{importcyclical}} = 138.1894 + 0.0606\text{dummy} + 0.0965\text{unemploy} + 0.9278\text{cpi} + 0.0038\text{usd} - 5.98 \times 10 - 6\,\text{agriempl}\,0.00499\text{leadingindicator} 89.679\text{lncpi} + 13.2786\text{lnagri} \quad (5)$$

where: importcyclical: cyclical component of total import on agricultural products
dummy: the dummy variable generating whether the year is before or after 2017
unemploy: unemployment rate of Japan

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cpi: Consumer Price Index
usd: Japanese Yen to US dollar exchange rate
agriemply: employment on agriculture
leadingindicator: leading indicators
OCED: Reference
series: Gross Domestic Product (Normalized)
lncpi: ln(cpi)
lnagri : ln(agri)
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unemployment, CPI, exchange rate to US dollar, agriculture employment, leading indicator, log (CPI), and log (agriculture employment). Then a t-test would be done on the estimated parameter of dummy variable to test whether it is statistically significant at 1%, 5%, 10% level of confidence. The null hypothesis would be the estimated parameter equals to zero, thus alternative hypothesis would be the estimated parameter does not equal to zero. The test formula is given by:

$$t - statistic = (\beta dummy - 0)se(\beta dummy) = 1.82 \quad (6)$$

according to the result from Stata, and the p-value is calculated to be 0.072, which is greater than 0.01, 0.05, but smaller than 0. 1. Therefore it can be concluded that the estimated parameter is statistically insignificant at 5% and 1% level of confidence, but statistically significant in 10% level of confidence. As a conclusion, it would say that it does have impact on amount of agricultural product import whether Japan participated in CPTPP, though it is not so apparent.

It seems not so convinced to get such conclusion. CPTPP cuts off plenty of tariffs for participating countries, within Japan's tariffs on agricultural products, though the government is unwilling to do so. From Zhu et al. (2016)'s study, in a competitive market, domestic agricultural producers would have disadvantage comparing with their foreign competitors. Before entering CPTPP there ought to be little amount of import by the protection of government, after then the amount would be explosive. Statistically the result should have been quite distinct, even if the effect is significant at 10% confidence level. Five possible reasons are about to be discussed here:

First, the linear fitting method may not be accurate. Due to detrending method, a fitted curve for observed total import values would be generated, which infers that there may exist errors between observed data and fitted values. In this way another fitting method for the regression is possible to result in a better conclusion, as the R-sqaured for the original regression is merely 0. 1846. Besides, at the first time taking natural logarithm to CPI and agricultural employment hadn't been brought into consideration, nonetheless they do improve fitting level of this regression, therefore it is reasonable to believe that simple linear regression may not be the best fitting method and using a more advanced method would get a better result.

Second, there exists omitted bias. In the regression above, there are merely eight explanatory variables, which is not a great amount, especially endogenous factors of agriculture haven't been applied much, which would have inescapable impression on import number of agricultural products. Effect of these factors are omitted into the existing explanatory variables. Plenty of external factors, such as policies, would have correlations with the dummy variable. Thus, omitted bias would affect quite a lot.

Third, there exists heteroskedasticity. A White test is applied, and table 2 shows the result. It is evident that p-value of the chi-test is 0.8408, which is much greater than 10%, 5%, and 1%, thus we can conclude that there is no heteroskedasticity, or heteroskedasticity is not an explanation for the

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result.

Table1: Regression Cyclical component of Total Import Value on Dummy Variable.

regress importcyclical dummy unemploy cpi usd agriempl leadingindicator lncpi lnagri							
Source	SS	df	MS		Number of obs	=	131
Model	0.170139235	8	0.021267404		F(8,122)	=	3.45
Residual	0.751326564	122	0.006158414		Prob>F	=	0.0013
Total	0.921465798	130	0.007088198		R-squared	=	0.1846
					Adj R-squared	=	0.1312
					Root MSE	=	0.07848
importcyclical	Coefficient	Std. err.	t	P>|t|	[95% conf. Interval]		
dummy	0.0606888	0.0334062	1.82	0.072	-0.0054422	0.1268197	
unemploy	0.0965465	0.0371158	2.60	0.010	0.023072	0.1700209	
cpi	0.9278865	0.6508831	1.43	0.157	-0.3606016	2.216375	
usd	0.003804	0.0012358	3.08	0.003	0.0013576	0.0062504	
agriempl	-5.98e-06	2.43e-06	-2.46	0.015	-0.0000108	-1.17e-06	
leadingindicator	0.0049974	0.0074362	0.67	0.503	-0.0097233	0.019718	
lncpi	-89.67966	64.32209	-1.39	0.166	-217.0117	37.65235	
lnagri	13.2786	5.16832	2.57	0.011	3.047397	23.50981	
-cons	138.1894	242.8831	0.57	0.570	-342.6219	619.0007	

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Table2: White Test Result.

estat imtest, white			
White's test			
H0: Homoskedasticity			
Ha: Unrestricted heteroskedasticity			
Chi2(39) = 30.26			
Prob > chi2 = 0.8408			
Cameron & Trivedi's decomposition of IM-test			
Source	chi2	df	p
Heteroskedasticity	30.26	39	0.8408
Skewness	8.34	8	0.4006
Kurtosis	1.17	1	0.2790
Total	39.78	48	0.7948

Fourth, there may exist multiple collinearities among independent variables. For unemployment rate and employment amount in agriculture, though it is not true that their sum equals to one, since unemployment rate = population unemployed / labour force ,employment rate = population employed / civilian adult population 16 years or older not in institutions, but there ought to be some correlations between these two factors since employment rate and unemployment rate are correlated, and as a proportion of employment rate, the employment rate in agriculture is also correlated with unemployment rate. In addition, considering the CPI and unemployment rate, Philips's curve points out the relation between inflation rate and unemployment rate, expressed as:

$$\pi = \pi e + a(u - u) + s \tag{7}$$

where π is the inflation rate, πe is the expected inflation rate, u is the actual unemployment rate, ū is natural unemployment rate, α and s are parameters. As a measurement of inflation rate, CPI could be correlated with unemployment rate as well. Overall, the relations among variables may affect the regression and significance level and resulting in such a conclusion. Fifth, according to the agreement, the tariffs would be eliminated gradually until 2025, particularly for agricultural goods. Therefore 2017 may be not such a significant point, which implies that import amount after 2017 would not blow up dramatically. Instead, it would grow in a relatively steady way until the year of 2025.

4. Conclusion

Data of the total import number of agricultural products for Japan is detrended, and regressed to eight explanatory variables, including CPI, unemployment rate, and employment on agriculture, etc. The effect of dummy variable that determining whether the data is before or after 2017 is statistically significant at 10% level but insignificant in 5% and 1% level, which may be led by four possible reasons: fitting method, omitted bias, multiple collinearities, and graduate elimination of tariffs. This research is a simple linear regression model, which may not fit the observed data very well. Moreover, there are plenty of shortages in this model as well, such as limited independent variables, which could be improved through following studies.

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