Assessing the Japanese "Sino-ASEAN" Offshore Balancing Strategy

—Based on Granger Causality Analysis

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Abstract—This research aims to explore whether Japan has intended to offshore balance its trade between China and ASEAN countries or not, as well as the effectiveness of this assumed strategy. By employing monthly trade data of the Chinese and ASEAN countries' proportion in the Japanese commodity trade during 2001 to 2020, we conducted short-run Granger causality analysis on the basis of vector error correction (VEC) models and found that: 1) Japan has not had clear short-run intentions to offshore balance China in commodity trade. An increase in the Chinese proportions will decrease the Japanese proportion of import (SE=-0.048, p=0.016) and export (SE=-0.092, p=0.015) from ASEAN countries; 2) the Japanese import from ASEAN has a marginally significant negative effect on the Chinese share in the Japanese export (SE=-0.195, p=0.066), implying that the hypothesized "offshore balancing strategy in trade" has been partially effective by means of restricting the Japanese export dependence to China. However, it does not mean that China can relax the vigilance. China should prepare to take countermeasures and actively respond.

Keywords-offshore trade balancing strategy; Japan; China; ASEAN; Granger causality

1 INTRODUCTION

China and Japan are the two important economies in East Asia, and the trade relationship between the two countries is considered to be a key link in promoting economic integration in East Asia. However, in recent years, they have been in constant conflicts over history and politics. With China developing rapidly and successfully accessing the WTO in 2001, the "China Threat Theory" has also been rampant [3-4], which has affected the economic and trade exchanges between China and Japan. Objectively speaking, Japan has the motivation to strengthen economic cooperation between other developing countries that are similar to China, and to form offshore balance against China. At the same time, ASEAN countries have developed rapidly in recent years. China and ASEAN countries are relatively similar in terms of industrial development levels and export structures, so there may exist trade substitution or competition. In this context, this research aims to explore whether Japan has intended to offshore balance its trade between China and ASEAN countries, as well as the effectiveness of this assumed strategy, which will strengthen our understanding of the trade relationship among China, Japan and

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ASEAN.

2 SAMPLE SELECTION AND DATA PROCESSING

This paper selects monthly data from 2001.01 to 2020.12 for analysis. The sample includes observations of 240 months in 20 years. The data comes from the DOTS (Direction of Trade Statistics) database of IMF, and the original data unit is nominal million U.S. dollars. Because all series used in further analysis are proportional values, using the original data of nominal dollar values will not have any impact on the validity of the conclusions. The objects of the empirical analysis are as follows:

$$m_{at} = M_{jat}/M_{jt} \quad (1)$$

It is the share of ASEAN in Japanese goods imports, reflecting its relative position in Japanese goods imports.

$$m_{ct} = M_{jct}/M_{jt} \quad (2)$$

It is the share of China in Japanese goods imports, reflecting its relative position in Japanese goods imports.

$$x_{at} = X_{jat}/X_{jt} \quad (3)$$

It is the share of ASEAN in Japanese exports of goods, reflecting its relative position in Japanese exports of goods.

$$x_{ct} = X_{jct}/X_{jt} \quad (4)$$

It is the share of ASEAN in Japanese exports of goods, reflecting its relative position in Japanese exports of goods.

Among them, M_{jat} represents Japanese goods import value to ASEAN in the t period, M_{jct} represents Japanese goods import value to China in the t period, and M_{jt} represents Japanese goods import value to the world in the t period. X_{jat} represents Japanese goods export value to ASEAN in the period t, X_{jct} represents Japanese goods export value to China in the period t, and X_{jt} represents Japanese goods export value to the world in the period t.

Because the above four series are monthly data, in order to avoid the influence of seasonal effects, first adopt the Census-12 method to make seasonal adjustments to m_{at}, m_{ct}, x_{at} and x_{ct} respectively.

3 ADF UNIT ROOT TESTS

The causality test is realized by vector auto-regression. Therefore, if the time series is not stationary, the problem of spurious regression will occur. In this paper, the measurement software Eviews10.0 is selected, and the augmented Dicky-Fuller (ADF) unit root test method is used to test the stationarity of the variables. The test results of the four series of m_{at}, m_{ct}, x_{at} and x_{ct} after seasonal adjustment are shown in the TABLE 1.:

TABLE 1. ADF UNIT ROOT TEST

Variable	Test form (C, T, k)	ADF statistics	Prob.
m_{ct}	*C,T,1*	-5.522	0.000
x_{ct}	*C,N,1*	-2.067	0.259
m_{at}	*C,N,1*	-3.364	0.013
x_{at}	*N,N,1*	-0.111	0.645
$\ln m_{ct}$	*C,T,1*	-5.666	0.000
$\ln x_{ct}$	*C,N,1*	-3.066	0.031
$\ln m_{at}$	*C,T,3*	-2.664	0.253
$\ln x_{at}$	*N,N,1*	-0.122	0.641

Variable	Test form (C, T, k)	ADF statistics	Prob.	conclusion
Δm_{ct}	*N,N,1*	-16.564	0.000	*I*(1)
Δx_{ct}	*N,N,0*	-21.258	0.000	*I*(1)
Δm_{at}	*N,N,2*	-13.367	0.000	*I*(1)
Δx_{at}	*N,N,0*	-24.106	0.000	*I*(1)
$\Delta \ln m_{ct}$	*N,N,1*	-16.870	0.000	*I(1)*
$\Delta \ln x_{ct}$	*C,N,0*	-22.577	0.000	*I(1)*
$\Delta \ln m_{at}$	*N,N,2*	-13.442	0.000	*I(1)*
$\Delta \ln x_{at}$	*N,N,0*	-24.250	0.000	*I(1)*

It can be seen from TABLE 1. that only m_{at}, m_{ct}, $\ln m_{ct}$ and $\ln x_{ct}$ in the above eight series rejects the unit root null hypothesis at the 5% significance level, and unit roots exist for other variables. However, after one order difference to these variables, the series after the difference is stable at the 5% significance level. Therefore, all variables satisfy I (1) process, that is, one order integration, so using OLS estimation may cause the problem of spurious regression. But because all variables are integrated of one order, the long-run equilibrium cointegration relationship between variables can be tested through the cointegration relationship.

4 JOHANSEN COINTEGRATION RELATION TEST

This paper uses the Johansen cointegration relationship test method to analyze whether m_{at}, m_{ct}, x_{at} and x_{ct} have cointegration relationships.

First, the optimal lag order needs to be determined. The VAR model requires to be established, and then determine the optimal lag order p of the VAR model according to the principles of FPE, AIC, SC, and HQ. Finally, obtain the optimal lag order p-1 of the Johansen cointegration relationship test. The test results show that the optimal lag interval of the sample is 1-1(TABLE 2.) [5-6].

TABLE 2. VAR OPTIMAL LAG PERIOD SELECTION

Lag intervals	Linear model assumption			
	FPE	***AIC***	***SC***	***HQ***
2			-28.830	-29.219
4	1.73E-18			
37		-29.862		

Lag intervals	Non-linear model assumptions			
	FPE	***AIC***	***SC***	***HQ***
2			-14.650	-15.039
4	2.58 E-12			
37		-15.725		

TABLE 3. COINTEGRATION RELATIONSHIP NUMBER SUMMARY

Cointegration equation:	**None**	**Intercept**	**Intercept**	**Linear trend**	**Linear trend**
VAR:	**None**	**None**	**Intercept**	**Intercept**	**Linear trend**
Trace	1	1	1	1	1
Max-Eig	1	1	1	1	1
DRC (dof adj.)	1.50E-18	1.45E-18	1.46E-18	1.42E-18*	1.44E-18
AIC	-29.576	-29.599	-29.586	-29.602*	-29.583
SC	-29.226	-29.234*	-29.178	-29.179	-29.116

*indicates the smallest value, which is the best cointegration test form.

Next, we need to determine the optimal test form. According to two statistics: Trace and Max-Eigenvalue, the cointegration relation number corresponding to each possible test form is shown in TABLE 3.

The results in the upper part of TABLE 3. show that at the 0.05 significance level, the results of both Trace and Max-Eigenvalue confirm that there is a long-run cointegration relationship between the four variables in the model [7-9]. The last two rows of Table 3 give the AIC and SC statistics for the five model forms of the VEC model. The optimal test form is selected according to the minimum information criterion, but the recognition results of the two statistics are inconsistent, so use "determinant residual covariance (degree of freedom adjusted)" (DRC (dof adj.)) according to the least information criterion for final identification. The results show that the optimal form of the cointegration and error correction model is "the cointegration equation has intercept and linear trend, and the VAR space has intercept without trend".

The estimated cointegration equation is as follows:

$$\hat{e}_{\tau-1} = m_{a,t-1} - 0.622m_{c,t-1} - 0.370x_{a,t-1} + 0.198x_{c,t-1} + 0.000\,@trend - 0.007 \quad (5)$$

The vector error correction model (VECM) estimation result is as follows:

$$\begin{bmatrix}\Delta m_{at}\\ \Delta m_{ct}\\ \Delta x_{at}\\ \Delta x_{ct}\end{bmatrix} = \begin{bmatrix}-0.095\\ 0.593\\ 0.066\\ -0.008\end{bmatrix}\cdot \hat{e}_{t-1} + \begin{bmatrix}-0.439\\ -0.162\\ -0.018\\ -0.195\end{bmatrix}\cdot \Delta m_{a,t-1} + \begin{bmatrix}-0.048\\ -0.140\\ 0.020\\ +0.111\end{bmatrix}\cdot \Delta m_{c,t-1} + \begin{bmatrix}0.051\\ 0.157\\ -0.422\\ -0.034\end{bmatrix}\cdot \Delta x_{a,t-1} + \begin{bmatrix}-0.092\\ 0.813\\ -0.029\\ -0.220\end{bmatrix}\cdot \Delta x_{c,t-1} + \begin{bmatrix}0.000\\ 9.067e-05\\ 1.929e-05\\ 0.001\end{bmatrix} \quad (6)$$

5 GRANGER CAUSALITY TEST

Through the ADF unit root test and the Johansen cointegration relationship test, it can be concluded that the four variables m_{at}, m_{ct}, x_{at} and x_{ct} in this paper all obey one order integration, and there is a long-run cointegration relationship. Therefore, the short-run Granger causality test can be carried out on the basis of VECM to study the short-run effects of variables.

5.1 Identification and Effectiveness Evaluation of Japanese "Sino-ASEAN" offshore balancing strategy

On the basis of testing the direction and signs of short-run effects, there are two core issues that need to be resolved: how to judge whether Japan has the intention of implementing the offshore balancing strategy and how to evaluate its implementation effect.

Regarding the first question, if Japan intends to implement "Sino-ASEAN" offshore balancing strategy, Japan will strive to develop trade with ASEAN to promote the relative position of ASEAN in Japanese trade (x_{at} and m_{at}) to improve when the relative proportions of China in Japanese trade (x_{ct} and m_{ct}) increase. That is, the necessary but insufficient conditions for existing the intention of trade checks and balances strategy is that "x_{ct} Granger causes x_{at} or m_{at} and the effect is positive" or "m_{ct} Granger causes x_{at} or m_{at} and the effect is positive", of which the most important is that "x_{ct} Granger causes x_{at} and the effect is positive" and "m_{ct} Granger causes m_{at} and the effect is positive".

Regarding the second question, if Japan intends to implement the offshore balancing strategy, the relative proportions of China in Japanese trade (x_{ct} and m_{ct}) will decline when the relative position of ASEAN in Japanese trade (x_{at} and m_{at}) increase. That is, the necessary but insufficient conditions for the effective realization of the Japanese "Sino-ASEAN" offshore balancing strategy is that "x_{at} Granger causes x_{ct} or m_{ct} and the effect is negative" or "m_{at} Granger causes x_{ct} or m_{ct} and the effect is negative", of which the most important is that "x_{at} Granger causes x_{ct} and the effect is negative" or " m_{at} Granger causes m_{ct} and the effect is negative".

5.2Granger Causality Test

It can be seen from TABLE 4. (In the bottom of P4) that during the sample period from 2001.01 to 2020.12, on the one hand, the proportion of China in Japanese exports and imports (x_{ct} and m_{ct}) Granger cause the proportion of ASEAN in Japanese imports (m_{at}) in the short run. Specifically, both m_{ct} and x_{ct} have significant short-run negative effects on m_{at} at the level of 0.05. On the other hand, the proportion of ASEAN in Japanese imports (m_{at}) Granger causes the proportion of China in Japanese exports (x_{ct}) in the short run. Specifically, m_{at} at the level of 0.1 has a significant short-run negative effect on x_{ct} [1-2].

TABLE 4. SHORT-TERM GRANGER CAUSALITY TEST

Dependent variable / Independent variable	Δm_{ct}		Δx_{ct}		Δm_{at}		Δx_{at}	
	x-stat	***SE***	***x-stat***	***SE***	***x-stat***	***SE***	***x-stat***	***SE***
$\Delta m_{c,t-L}$	——	——	10.125 (0.002)	0.111**	5.814 (0.016)	-0.048**	0.953 (0.329)	
$\Delta x_{c,t-L}$	53.843 (0.000)	0.813**	——	——	5.894 (0.015)	-0.092**	0.550 (0.458)	
$\Delta m_{a,t-L}$	0.840 (0.359)		3.379 (0.066)	-0.195*	——	——	0.087 (0.768)	
$\Delta x_{a,t-L}$	0.775 (0.379)		0.099 (0.753)		0.693 (0.405)		——	—

( ) in the table is the corresponding Prob; *indicates that the Granger causality is significant at the 0.1 level, and **indicates that the Granger causality is significant at the 0.05 level.

6 CONCLUSION

This study uses monthly trade data from January 2001 to December 2020 to conduct a time series analysis of the proportions of China and ASEAN in Japanese exports and imports. The main conclusions of this paper are as follows:

To begin with, in the short run, in terms of the intention of Japan to implement the offshore trade balancing strategy, the share of China in Japanese imports and exports, m_{ct} and x_{ct}, has a short-run negative effect on the share of ASEAN in Japanese imports, m_{at}. It shows that the increase of m_{ct} and x_{ct} will not improve m_{at}, but significantly reduce it. The intention to implement the "trade check and balance strategy" is unclear. The reason for this phenomenon may be that for Japanese companies, importing from China is a better choice because China is developing faster than ASEAN and its products are more competitive.

Besides, in the short term, in terms of the effects of Japanese offshore trade balancing strategy, the share of ASEAN in Japanese imports m_{at} has a significant short-run negative effect on the share of China in Japanese exports x_{ct}. Although the intention of Japan to implement the strategy is not clear, the increase of m_{at} will significantly reduce x_{ct}, and to a certain extent, it restricts Chinese imports from Japan. However, it is not Chinese export ability to Japan, but Japanese export ability to China that is limited. It is not wise to implement the "trade check and balance strategy" in the short run.

Finally, in the short run, the intention of Japan to implement the offshore trade balancing strategy is not clear, but it has a certain effect in restricting Chinese imports from Japan. It may be because the main body of foreign trade is Japanese companies. In order to maximize their benefits, they will not easily abandon China, an important source of imports and export markets, and quickly turn to ASEAN countries. However, it does not mean that China can relax the vigilance and ignore the competitiveness of ASEAN countries in trade with Japan. China should look for other developed countries that are competitive or substitute in trade with Japan, prepare to take countermeasures and actively respond.

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