Impact of RMB Exchange Rate on Sino-Japanese Trade

Xue Yu[1], Du Yulan[2],*

[1]*Nanjing University of Science and Technology, China*
[2]*Nanjing University of Science and Technology, China*
*Corresponding author. Email: 872928192@qq.com

ABSTRACT

With the development of economic globalization and regional economic integration, the economic development of China and Japan has an important impact on Asia and the world. It is of profound significance to study the development of Sino-Japanese trade.This article introduces the development and characteristics of China-Japan bilateral trade, and the impact of exchange rate changes on Sino-japanese trade, and collects relevant data for empirical analysis. Based on the empirical analysis, it proposes policy recommendations to improve the Sino-japanese trade deficit.

Keywords: exchange rate, Sino-Japanese trade, impact, trade deficit

1. DEVELOPMENT AND STATUS OF CHINA-JAPAN BILATERAL TRADE

1.1. Sino-Japanese Trade Development

For more than 40 years since the reform and opening up, China ' s economy has developed rapidly. China ' s GDP has increased from the original 367.87 billion yuan to 990865 billion yuan in 2019, making it the second largest economy in the world.Especially after joining the World Trade Organization, China's foreign trade has developed rapidly, and its economic growth has continued to accelerate.Japan's economy achieved rapid growth after World War II, and even achieved double-digit annual growth rates in the 1970s. However, after the 1980s, due to a combination of factors, Japan's economic bubble eventually collapsed and entered a long-term depression.It wasn't until 2012 that Abe came to power and started printing money machines that the Japanese economy improved. There are many similarities in the course of economic development between China and Japan, and the trade between the two countries is also very close.

Today, China has become Japan's largest source of imports and the second largest export market for Japan, and even surpassed the United States in 2018 as Japan's largest export market.In 2019, the total foreign trade between China and Japan was US $ 324.74854 million. This article counts the annual data of China-Japan bilateral trade from 2005 to 2019.

As can be seen from Figure 1, the import and export trade between China and Japan experienced a significant decline in 2008 and 2015. This is mainly due to the global economic crisis in 2008. The economic crisis has severely damaged the economies of countries around the world. Successive reductions in foreign trade volume have affected the development of China-Japan foreign trade.In 2015, China carried out exchange rate reforms, which led to a significant decline in the import and export trade between China and Japan. After the exchange reform in 2005 and 2015, China-Japan trade volume showed a substantial upward trend, and bilateral trade developed rapidly. This shows that the exchange rate can affect import and export trade.
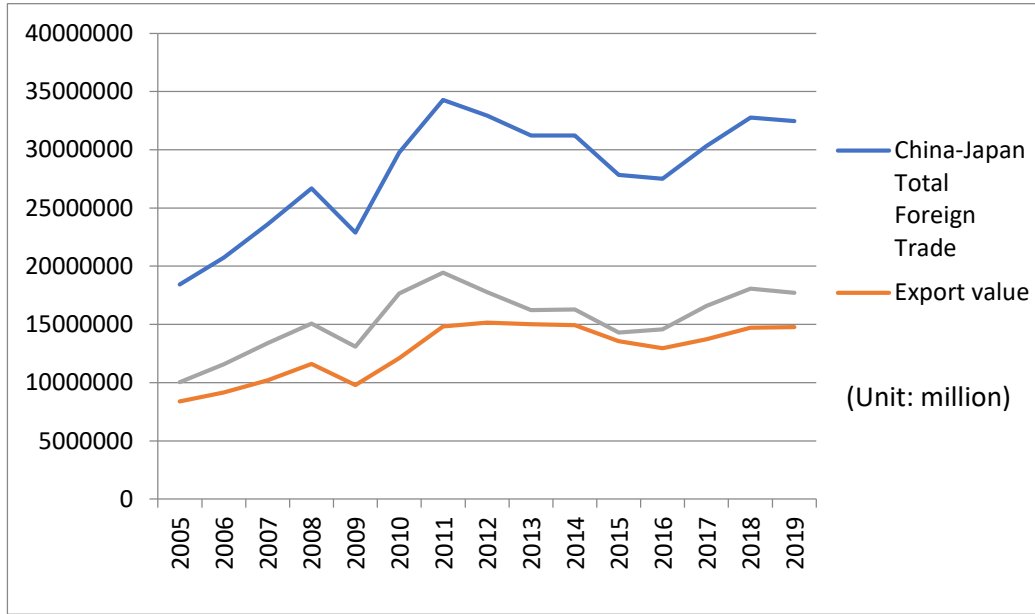
Figure 1 China-Japan Bilateral Trade Statistics 2010-2019

1.2. Development of Sino-Japanese Trade Deficit and Its Characteristics

After entering the 21st century, China has maintained a trade deficit with Japan as a whole. However, with the economic development of the two countries, this deficit has gradually become larger. , As shown in Figure 2.

From Figure 2, we can clearly see that China-Japan trade shows a continuous deficit.Beginning in 2005, the trade balance between the two countries began to expand, increasing year by year. Around 2010, with the decline in imports, China's quarterly trade deficit with Japan expanded to 55.646 billion US dollars, and then showed a downward trend.Although the trade deficit in 2011 decreased slightly from the previous year, it can be seen that the overall trade deficit in 2005-2011 has clearly increased. The trend is mainly due to the rapid economic development of our country, the improvement of people's living standards. Moreover, after China's accession to the WTO, tariffs have been significantly reduced, thereby facilitating the entry of Japanese products into our market.
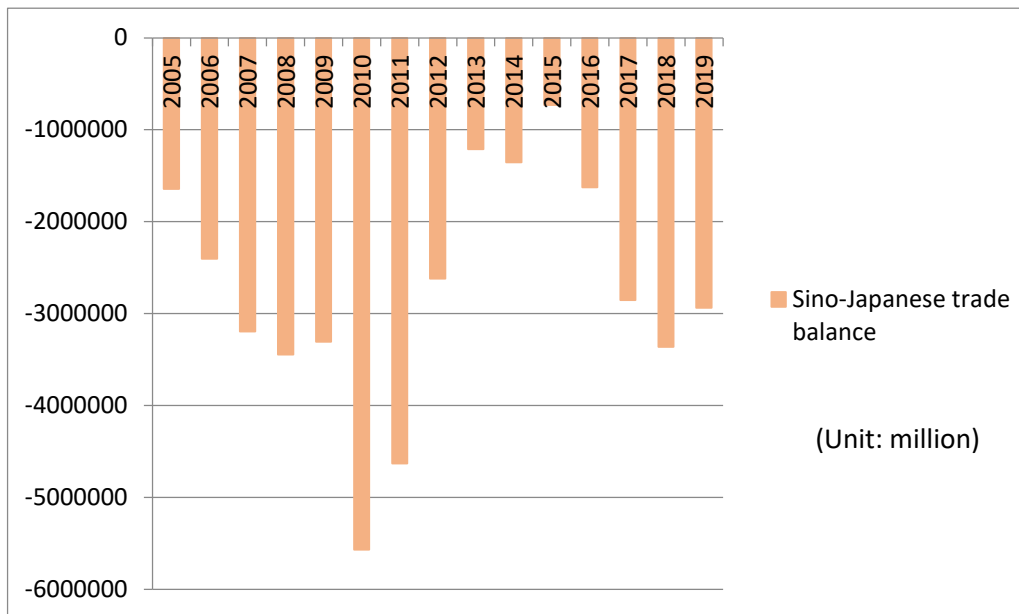

Figure 2 2005-2019 Sino-Japanese Trade Balance

At the same time, we can see that the trade balance has decreased significantly after 2012. This is because China's foreign trade has developed rapidly and trade with other countries and regions has developed rapidly. Although China-Japan trade has expanded, the growth rate is obviously too slow This has weakened Sino-Japanese trade.On the other hand, due to some historical reasons, China and Japan have always had a great problem of political mutual trust. Citizens of the two countries have always been more alert and resistant to each other. The disputes between these countries take a long time to resolve, and it is precisely these various frictions that have negatively affected the bilateral trade between the two countries.

1.3. China-Japan Bilateral Trade Product Structure

The characteristics of the country's import and export trade commodity structure are jointly determined by the characteristics of comparative advantage and the characteristics of industrial structure. Although China has developed rapidly in science and technology in recent years, compared with Japan as a developed country, China is still at the bottom of the international division of labor, and low-value-added industries such as labor-intensive and resource-intensive industries still occupy a major position.Among them, the most basic performance is reflected in the commodity structure of China's exports to Japan. This article selects the structure table of China-Japan import and export commodities in 2018.

Table 1 2018 Sino-Japanese Trade Commodity Structure Table

Composition of Chinese imports to Japan			Composition of Chinese exports to Japan		
Category	**Amount**	**Proportion**	**Category**	**Amount**	**Proportion**
electronics	56,197	43.10%	**electronics**	78,900	45.50%
Chemical Products	13,941	11.50%	**Textiles and raw materials**	21,882	12.60%
Transportation Equipment	12,457	9.70%	**Furniture,toys, miscellaneous products**	10,748	6.20%
Base metals and products	12,071	8.60%	**Chemical Products**	10,146	5.90%
Optics,clocks,medical equipment	12,093	8.40%	**Base metals and products**	10,010	5.80%
Plastic, rubber	9,136	6.50%	**Plastic, rubber**	5,904	3.40%
Textiles and raw materials	2,379	1.70%	**Optics, clocks, medical equipment**	5,829	3.40%
Furniture,toys,miscellaneou s products	1,889	1.30%	**Food, beverage, tobacco**	5,061	2.90%
Ceramics, glass	1,746	1.20%	**Transportation Equipment**	4,678	2.70%
Mineral products	1,289	1.20%	**Shoes,umbrellas and other light industrial products**	3,548	2.10%

From Table 1, we can see that among the products imported from China by Japan, mechanical and electrical products, chemical products, transportation equipment, base metals and products account for a large proportion, exceeding 50% of the total import and export volume.In addition, China's imports of optical, clocks, medical equipment and other products from Japan also account for a high proportion.Among China's exports to Japan, textiles and raw materials, furniture, toys, miscellaneous products, food, beverages, tobacco and footwear, umbrellas and other light industrial products have a larger export volume.And although mechanical and electrical products account for 40.6% of China's exports, the technical content of this type of mechanical and electrical products is relatively low and belongs to low-end mechanical and electrical products.Therefore, we can see that most of Japan's exports to China are capital technology-intensive products, while China's exports to Japan are mainly labor-intensive products.

2. IMPACT OF EXCHANGE RATE ON SINO-JAPANESE TRADE

2.1. RMB internationalization process

In 1978, China implemented a reform and opening up policy. In order to open the market and adapt to the international trade market, the RMB began to implement a "dual-track" foreign exchange policy. Then, with China's entry into the "WTO", China's economy has developed rapidly, and its foreign trade surplus has increased. Other

countries have demanded the appreciation of the renminbi. At the same time, China's economic development needs the RMB to usher in exchange rate reform in 2005.After this "foreign exchange reform", China began to implement a managed floating exchange rate system based on market supply and demand with reference to a basket of currencies.

After the 2008 financial crisis, the US dollar and the euro were hit hard, and the yen and the pound continued to slump, so this provided an opportunity for the renminbi to internationalize. On April 8, 2009, China launched a pilot RMB settlement for cross-border trade. This is a key step towards RMB internationalization, and the process of RMB internationalization has developed rapidly. On August 11, 2015, the central bank announced that the renminbi-dollar exchange rate quotation mechanism has become "the market reference to the closing exchange rate of the interbank foreign exchange market of the previous day." This time the adjustment has further accelerated the marketization and internationalization of the RMB's intermediate quotation mechanism, making the RMB value more realistically reflecting the market supply and demand relationship. On October 1, 2016, the RMB was officially included in the Special Drawing Rights (SDR) currency basket. This has greatly increased the right to speak of the renminbi. In recent years, with the development and development of the "Belt and Road" strategy, it has brought more and more opportunities for RMB internationalization, expanded the scope of RMB application, created new investment and financing opportunities.the process of RMB internationalization is gradually accelerating.

2.2. Impact of exchange rate on China-Japan bilateral trade

From Figure 1, we can see that China-Japan trade volume fluctuates greatly. The main fluctuations after 2005 are accompanied by the rise of the RMB exchange rate reform in 2005. The China-Japan import and export volume has rapidly changed. However, in terms of the rate of increase, the increase of imports is faster than that of exports, leading to a further increase in the trade deficit.

Later, after the financial crisis in 2008, the total import and export volume between the two countries declined significantly. At the same time, the exchange rate of the renminbi began to decline, and Sino-Japanese trade began to increase. Therefore, with the economic recovery, China's import demand for Japan has shown a sharper rise, which has led to an increase in China's trade deficit.

After 2012, the trade volume between China and Japan started to rise. At this time, Abe came to power to implement quantitative easing and the exchange rate of the Japanese yen began to increase sharply. In foreign trade, the decline in China's imports from Japan was shown.Another important time point is the RMB exchange rate reform in 2015. With a slight depreciation, China's imports have increased and the deficit has increased. Until

2018, there has been a slight decline in 2019. It can be seen that the exchange rate has a certain impact on the bilateral trade between China and Japan. The corresponding empirical analysis is carried out in the third part of this article.

3. EMPIRICAL RESEARCH

3.1. Model construction

This paper uses Rose and Yelen's simplified trade balance model in 1989 to build the model. China imports function from Japan：

$$IM=f(Yc,BRER) \tag{1}$$

China-Japan Export Function

$$EX=f(Yj,BRER) \tag{2}$$

In order to eliminate the heteroscedastic interference of the time series, the logarithm of both sides of the above equation is:

$$Ln(IM)=\alpha+\beta Ln(Yc)+\gamma Ln(BEER)+\varepsilon \tag{3}$$

$$Ln(EX)=\alpha_1+\beta_1 Ln(Yj)+\gamma_1 Ln(BEER)+\varepsilon_1 \tag{4}$$

Among them, Yc is China's real GDP, which reflects the total domestic economic demand of China; Yj is Japan's real GDP, which reflects the total domestic economic demand of Japan. BEER is the real exchange rate of the Japanese yen to the Renminbi, reflecting the relative price competitiveness of the goods of the two countries after the exchange rate adjustment.

3.2. Adoption and source of data

The data used in this article are monthly data, and the data from January 2010 to December 2019 are selected. Import and export data comes from the General Administration of Customs and the National Bureau of Statistics. The real exchange rate of RMB is calculated from the nominal exchange rate and the monthly CPI indices of China and Japan. The direct quotation method is used.China's monthly CPI data comes from the China Statistics Bureau database, Japan CPI monthly data comes from the Japan Statistics Bureau, and monthly nominal exchange rates come from the People's Bank of China website. China's GDP data comes from the national database, and Japan's GDP data comes from the Japanese Bureau of Statistics. All data are in RMB and converted to January 2010 as the base period.

3.3. Empirical process

3.3.1. Unit root test for stationarity.

In this paper, the extended Dickey-Fuller method (ADF) is used to test the unit root of the sequence, and it is operated with Eviews8.0 software. Here are the test results for each variable:

Table 2. the test results for each variable

variable	ADF test value	5% threshold		conclusion	DW value
Ln(BEER)	-1.024151	5% level	-3.449716	Unstable	2.066823
ΔLn(BEER)	-7.282604	5% level	-3.449716	stable	2.054152
Ln(GDPj)	-1.36829	5% level	-3.449716	Unstable	2.067428
ΔLn(GDPj)	-6.884088	5% level	-3.449716	stable	2.047137
Ln(GDP c)	-2.904237	5% level	-3.453179	Unstable	2.078657
ΔLn(GDPc)	-2.924594	5% level	-2.889200	stable	2.099991
Ln(IM)	-2.318971	5% level	-3.449716	Unstable	1.942397
ΔLn(IM)	-3.593896	5% level	-3.452764	stable	1.961012
Ln(EX)	-2.877415	5% level	-3.450073	Unstable	2.040216
ΔLn(EX)	-3.305106	5% level	-2.888932	stable	2.136217

From the above results, it can be seen that the first-order difference sequence of each variable sequence is stationary, that is, these variables are all first-order single integers, and the next co-integration analysis can be performed.

3.3.2. Co-integration inspection.

The regression analysis was performed by the least squares (OLS) estimation method, and then the residuals were used as a new series to test the stationarity. The inspection process is as follows:

For the imported function, we estimate the following regression equation by OLS method:

$$Ln(IM)=1.789482+0.332108Ln(Yc)-0.186931Ln(BEER)+\varepsilon \tag{5}$$

The stationarity test is performed on the residual sequence of the regression equation, and the test results are as follows:

Table 3. the test results for Residual

variable	AEG test value	Critical value	conclusion	DW value
Residual	-2.171744	5% level-1.943824	stable	1.979106

From the test results: the test value of the residual sequence is -2.171744, which is less than the critical value of 5% significance level-1.943824, that is, within the 95% confidence interval, the null hypothesis that the unit sequence has a unit root is rejected. The stationarity test was performed. The residual sequence is therefore a stationary time series. This shows that changes in the real exchange rate of the RMB and China's national income have a long-term impact on China's imports to Japan.

From the perspective of the factors that affect imports, China's domestic income elasticity against imports is 0.332108, which means that for every 1% increase in domestic income, the import value to Japan will increase by 0.332108%; the exchange rate elasticity of imports is -0.186931, which means the real RMB exchange rate For every 1% decrease (1% appreciation of the RMB), the import value to Japan will increase by 0.186931%.

China's domestic income and the real exchange rate of the RMB have a certain impact on Japanese imports, but the impact is not significant.

For the exit function, we estimate the following regression equation by OLS method:

$$Ln(EX)=-13.46383+1.955945Ln(Yj)$$

$$+0.284229Ln(BEER) + \varepsilon 1 \tag{6}$$

The stationarity test is performed on the residual sequence of the regression equation, and the test results are as follows:

Table 4. the test results for Residual

variable	AEG test value	Critical value	conclusion	DW value
Residual	-2.356524	5% level-1.943824	stable	2.004650

From the test results: the test value of the residual sequence is -2.356524, which is less than the critical value of the significance level of 5%-1.943824, that is, within the 95% confidence interval, the null hypothesis that the unit sequence has a unit root is rejected The stability test is performed, so the residual sequence is a stable time series, which shows that changes in the real exchange rate of the renminbi and Japan's national income have a long-term impact on China's exports to Japan.

From the perspective of the factors that affect imports, Japan's domestic income elasticity on exports is 1.955945, which means that for every 1% increase in Japanese domestic income, exports to Japan will increase by 1.9559455%; the exchange rate flexibility of exports is 0.284229, which means the real exchange rate of RMB For every 1% decrease (1% appreciation of the RMB), the import value to Japan will decrease by 0.284229%.

3.4. Conclusion

The national income of both countries has a significant impact on import and export trade. From the empirical results above, it can be seen that the elasticity of Japanese national income to exports is 1.955945, while the elasticity of Chinese national income to imports is 0.332108. National income has a certain impact on the import and export trade of the two countries, but Japan's national income will have a greater impact on China's exports.In combination with the sluggish economic trends of the Japanese countries in recent years, it is a good explanation why China's exports to Japan have been weak and its trade deficit with Japan has gradually expanded.The reason for Japan's national income elasticity can be explained from the Japanese residents' consumption structure. Personal consumption accounts for nearly 60% of the total economic volume, and most of China's exports to Japan are personal consumer goods. China's exports are closely related.

The actual bilateral exchange rate has a greater impact on China-Japan trade. The bilateral real exchange rate has a significant positive impact on China's imports from Japan,The impact of bilateral real exchange rates on China's exports is greater than that of imports.This is related to China's trade structure with Japan, because labor-intensive products are more sensitive to changes in exchange rates than technology-capital-intensive products. The elasticity coefficient of the exchange rate of exports is greater than the elasticity coefficient of imports, which reflects that China's exports to Japan are dominated by labor-intensive products and imports are dominated by technology-capital-intensive products.Therefore, it can also be seen that too fast and too large appreciation will seriously affect China's exports, and the exchange rate changes must take a steady pace. Among the factors analyzed, the real exchange rate elasticity is significantly smaller than the income elasticity, which indicates that

price is not the dominant factor in terms of total demand (supply) in Sino-Japanese trade.

4. SUGGESTIONS ON SINO-JAPANESE TRADE

Now that the international economic situation is complicated,Both China and Japan have encountered new challenges and opportunities. China and Japan are important partners. How can we achieve a win-win situation in the future development process? This article makes suggestions on the analysis results and conclusions obtained before.

4.1. Accelerate the improvement of the exchange rate system

Since the launch of the RMB settlement pilot for cross-border trade in 2009, the internationalization of RMB has made great progress. From the empirical results of this article, we can see that although exchange rate changes are not the dominant factor affecting China-Japan bilateral trade, they still have a role that cannot be ignored. Therefore, continuing to promote the internationalization of the renminbi, improving the self-regulation mechanism of RMB, and accelerating RMB marketization and interest rate will still have a very important impact on improving China-Japan bilateral trade. The Chinese government must continue to advance the reform of the exchange rate system, moderately relax foreign exchange controls, promote the formation of the RMB exchange rate mechanism, and gradually achieve marketization.

4.2. Expand domestic market, reduce dependence on foreign trade

From the previous empirical results, we can see that China's export dependence on Japan is relatively large, and domestic demand is insufficient. And Japan's economic downturn will lead to a larger trade deficit between China and Japan, and the terms of trade will gradually deteriorate.Due to China's large population base, China itself has huge demand potential.Therefore, by correctly guiding the consumption patterns of residents, fully tapping and utilizing the internal market, and expanding domestic demand, we can gradually get rid of excessive dependence on foreign markets, and we can also narrow the gap in urban consumption and promote consumption for development.

4.3. Encourage innovation, promote industrial structure upgrade

Science and technology are the primary productive forces. Under the current world economic development trend, trade protectionism has risen and trade barriers have gradually increased. Only by technological innovation and improving scientific and technological productivity can we improve and maintain our own competitiveness. In the long run, only by increasing the technological content of export products and promoting the upgrading of China's industrial structure can China's exports fundamentally enhance the competitiveness of China's export products, thereby expanding exports.

4.4. Facing history, strengthening political dialogue and economic exchanges

The historical issue between China and Japan has always been a hurdle between the peoples of the two countries. And Japan has recently adopted a series of trade protection measures in order to protect its own economic development, which has also affected the trade between China and Japan.China and Japan, as the two major economies in the world, peacefully and amicably resolve their contradictions and promote the political and economic development of the two countries in a more positive way are in the common interest of the development of the two countries.Therefore, Japan needs to face history and look to the future.The two governments should promote the development of bilateral relations in a more friendly and mutually beneficial direction, strengthen economic exchanges between the two countries, and promote common development.In particular, the new COVID-19 epidemic has not been under control, and has had a huge negative impact on the economies of both countries. The two countries should work together to help each other and overcome the epidemic, opening up broad prospects for the economic development of both countries.

REFERENCES

[1] Dai Shihong. Empirical Research on RMB Exchange Rate and China-Japan Trade Revenue and Expenditure [J]. Financial Research, 2006 (06): 150-158.

[2] Huang Liexin. Empirical Analysis of the Impact of Changes in the RMB Exchange Rate on Sino-Japanese Trade since the Exchange Reform [J]. Knowledge Economy, 2014 (23): 69-70.

[3] Li Minghuan. Research on the impact of exchange rate on China-Japan import and export trade [D]. Jiangxi University of Finance and Economics, 2019.

[4] Yang Xiang. Analysis of China-Japan Trade Deficit since the 21st Century [D]. Jilin University, 2018.

[5] He Mingdong. Research on the Status and Prospects of Sino-Japanese Trade Relations [J]. Business Economy, 2014 (10): 83-84.

[6] Wen Shaobo. Research on the impact of China-Japan trade on China's economic growth [J]. Economic Forum, 2014 (04): 167-168.