Analysis of Exchange Rate and the Elasticity of Trade Balance in China

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Abstract: The exchange rate is the price comparison between the two countries' currencies. The change of the exchange rate level of a country will play a regulatory role in the changed trade and ultimately have an important impact on the internal and external balance of the national economy. Therefore, the impact of exchange rate changes on foreign trade has been an important topic worthy of study. Based on the analysis of China's exchange rate level and the basic situation of import and export trade, this paper makes a normative Empirical Study on the impact of exchange rate changes on China's export trade volume according to the actual data and samples from 2006 to 2018 by Using Marshall Lerner condition theory. It is found that the effect of short-term RMB exchange rate changes on China's export trade volume is not significant.

1. Introduction and Organization of the Text

The exchange rate is the most important adjustment lever in international trade. The rise and fall of a foreign exchange market will play an important role in import and export trade, economic structure, production layout, etc., and ultimately can have an effect on the internal and external balance of the national economy. Under the background of the integration of global economy and finance, exchange rate, as an important tool to balance the domestic and foreign economy, plays an increasingly important role in promoting a country's economic growth and financial development security.

Even with the development of international finance, international capital flow has become an important component of balance of payments. Balance of trade is still an irreplaceable part of balance of payments. In order to develop foreign trade, meet the needs of economic system reform and promote the development of national economy, China has adjusted its exchange rate policy many times according to the actual economic development needs. The "8.11 Exchange Rate Reform", China's market-oriented reform and the gradual progress of trade liberalization have jointly deepened the link between the RMB exchange rate and China's trade development.

This paper consists of five parts. The first and second parts mainly introduce the background and literature review of the paper. The third part briefly introduces the trend of RMB value and the import and export of goods and services in China since 2006. The fourth part makes empirical analysis on the corresponding data and finds that China's export volume will not be significantly affected by the fluctuation of RMB in the short term The fifth part gives the summary and suggestions.

2. Literature References

With the development of China's Reform and Opening-up, the relationship between RMB exchange rate change and import and export trade is increasingly close. In the past research, the role of exchange rate in import and export trade has been paid more and more attention. Empirical research has proved that the relationship between them has appeared and deepened gradually. Dai Zuxiang (1997) thought that the devaluation of exchange rate in China is conducive to the growth of exports, foreign exchange policy can be used as a means to manage import and export trade, and the RMB foreign exchange market in China is stable[2]. Zhang Haotian (2018) calculated based on Pearson's coefficient method that the exchange rate between the total import and export trade

between China and the United States and the currencies of the two countries is - 0.94, which is a negative number, that is to say, the decline of RMB value promotes the export, while the opposite is the restriction. At the same time, the rise of RMB unit value in the import and export trade structure can promote the import of processed products, but the unprocessed products are The opposite effect results [5].

In addition, the research on the influence of RMB exchange rate change on the structure of import and export trade is still insufficient. An Dongfeng (2006) focuses on the analysis of the impact mechanism of RMB exchange rate adjustment on China's foreign trade structure, and makes a trend analysis [1]. Fang Xianming, Peiping, Xiong Peng (2007) found that the response direction and degree of the difference between the real exchange rate of RMB and the difference between the import and export of different types of trade products were inconsistent; when the RMB appreciated, the total import and export volume would further increase [3]. Lin Wenfeng, Wang Meiying (2011) made an empirical analysis of the quantity and structure and concluded that although the RMB exchange rate began to play a role in the major deficit items, it did not have a significant impact on the three categories that caused China's huge surplus [4].

This paper mainly combines the current situation of China's exchange rate and the level and structure of the actual foreign trade market, based on the actual data and samples from 2006 to 2018, carries out relevant research and Analysis on the impact of export trade volume. The conclusion and suggestion are given.

3. Exchange Rate of RMB and Changes in Foreign Trade

Since the reform of exchange rate system in 2005, although the flexibility of RMB exchange rate has the trend of expansion, it is still the exchange rate system pegged to the US dollar. After the "8.11 Exchange Rate Reform" in 2015, the RMB / USD exchange rate mechanism was further marketized, which more truly reflected the supply and demand of the current foreign exchange market, and at the same time meant that the elasticity of China's currency exchange rate would further increase.

Figure 1 shows the change of RMB / USD exchange rate from 2006 to September 2019 in China. From 2005 to 2013, the RMB gradually appreciated slightly, and since 2015, the RMB began to depreciate. After the reform of China's parliament in 2005, the formation mechanism of RMB exchange rate is more flexible, and it is no longer only pegged to the US dollar, the value of RMB goes all the way up. During 2008-2011, China's interest rate has always been higher than that of the United States. Because of the sub-loan crisis, the United States adjusted the benchmark interest rate and carried out a series of matching measures in order to revitalize the American economy and improve the employment rate, which made the American interest rate at a very low level. In addition, the European Union and Japan started quantitative easing in 2012. That is to say, before the world economy recovers, the interest rate level of developed countries continues to be lower than that of China. Moreover, since 2005, China's current account surplus has continued to expand to the peak in 2008, and the proportion of China's current account surplus to GDP in 2006-2008 is far greater than the standard proportion in the international external equilibrium. Finally, a large part of the pressure of RMB appreciation comes from the United States and other western developed countries. Since 2003, different interest groups in the United States have used public opinion, trade sanctions and other hard and soft means to exert appreciation pressure on the RMB, so as to eliminate the trade deficit of the United States, improve employment rate, reduce the debt service burden of the United States government and crack down on and restrict the Chinese system Development of manufacturing industry.

As the U.S. economy recovers, the Federal Open Market Committee announced in January 2014 that it would begin to reduce bond purchases by $10 billion a month. At this point, the U.S. withdrew from QE and returned to the U.S. dollar. As a result, the currencies of emerging economies around the world, including China, depreciated to varying degrees. Moreover, due to the decline of global economic growth rate and European sovereign debt crisis, European economic growth slowed down. In order to cope with the negative economic growth and the high unemployment rate, Europe chose

to issue more banknotes to promote economic growth, which brought about the problem of the world's trust in the euro. Therefore, the rising value of the US dollar, when the RMB is actually pegged to the US dollar, will indirectly cause the RMB to depreciate against the US dollar. Moreover, China's economy is slowing down gradually. Since the sub-loan crisis, in order to promote economic growth, China mainly relies on the issuance of additional RMB to invest in local economy, which will inevitably lead to the devaluation of the RMB. On the other hand, private enterprises broke out the crisis of capital chain rupture, trust fund crisis of real estate, coal, mining and other enterprises, and local governments may have debt default crisis and bank crisis. To solve these crises, the Chinese government had to print more RMB. The result of excessive issuance of RMB is further devaluation of RMB. All of these reasons led to the devaluation of RMB in 2015. In addition, due to the emergence and upgrading of trade friction between China and the United States, the RMB has further depreciated since 2018.
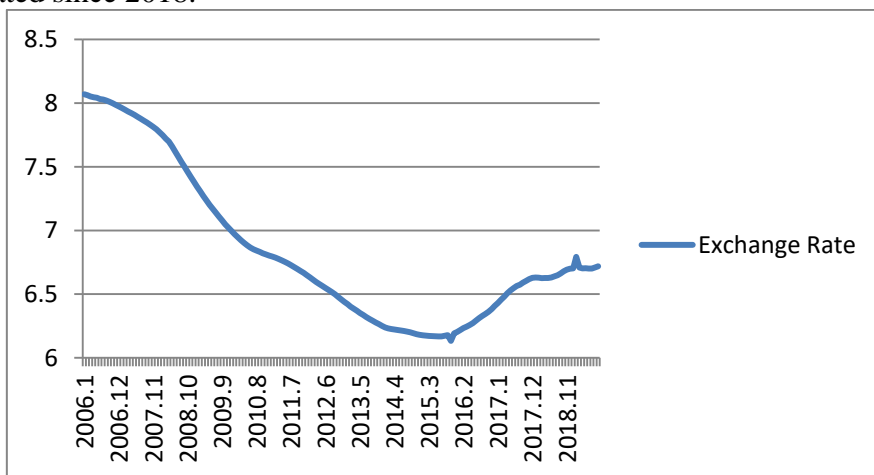

Fig. 1 Change of RMB Exchange Rate in 2006-2018

Figure 2 shows China's total imports and exports of trade and services in the third quarter of 2006-2019. China's foreign trade in goods and services is growing at an overall level. However, in 2009, 2015 and 2016, the import and export business of goods decreased significantly. The sub-loan crisis broke out in 2008, and the real economy was negatively affected in 2009. The tightening of the western money market, the lack of market confidence and the loss of credit support for the manufacturing industry have a negative impact on its production and operation. The economic development is stagnant, the market consumption capacity is reduced, and the production power is weakened again from the supply-demand relationship. In the first quarter of 2009, the GDP of the United States and major countries in the world continued to shrink, and the unemployment rate continued to rise, so the demand for imports and exports decreased. China's foreign trade corresponding to the contraction of foreign markets, resulting in a decline in sales and exports. On the other hand, imported products are not urgently needed in China. As China's economy is also in a difficult period in 2009, the demand for imports is not high, so the number of imports will also decline. In 2014, the export volume of China's processing trade reached US $797.8 billion, down nearly 10% year on year. However, the proportion of processing trade exports to total foreign trade exports has been very high, accounting for 35% in 2015. In 2015, the export of capital intensive products basically did not decline, but the traditional labor-intensive products such as light industrial products and textile products declined, so the decline of processing trade import and export volume will promote the decline of total trade. In addition, among the various components of service trade, only the import of travel shows an obvious upward trend, and the import and export of the rest is relatively stable.

In fact, the continuous appreciation of RMB in 2006-2013 is conducive to domestic consumers' purchase of imported goods and services, thus increasing import demand, which is consistent with the overall trend of foreign trade in 2006-2013. The appreciation of RMB has stimulated the growth of import services, especially the service industry which plays an important role in the outbound tourism industry. On the export level, the continuous appreciation of RMB against US dollar makes

China's economic situation optimistic. Because the appreciation of RMB is a long-term and slow process, people may not be so sensitive to the change of price level, especially those markets with low demand elasticity. On the other hand, due to the improvement of productivity, the price of commodities will be further reduced, making Chinese products still have a comparative advantage over other countries. At the same time, even though the RMB appreciated in 2006-2015, there is still room for appreciation. According to the law of one price, it is still profitable to import from China. Therefore, even if the value of RMB continues to increase, China's total exports are still increasing compared with the previous years.
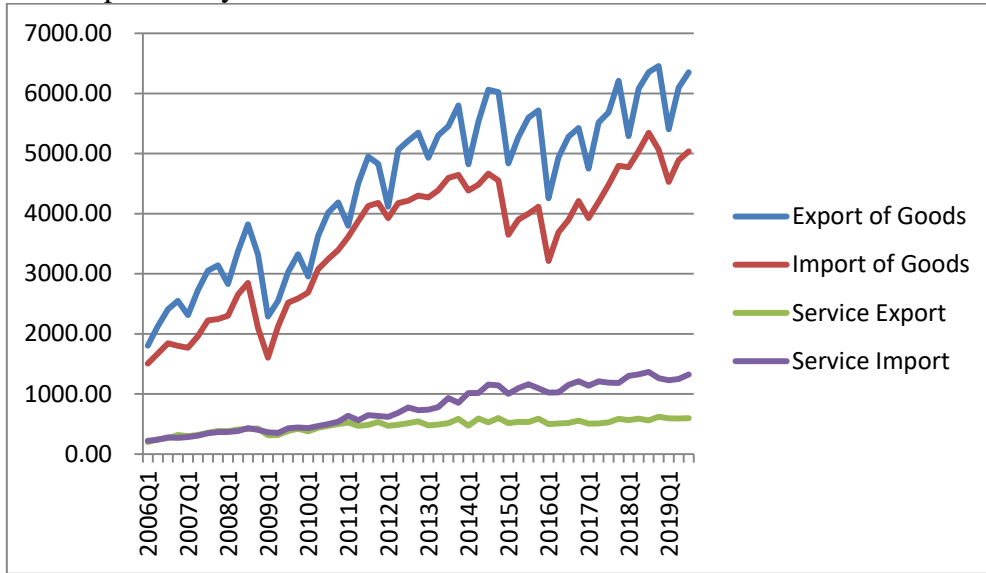

Fig. 2 China's import and export of goods and services in 2006-2018

Unit: US $100 million

In addition, since 2006, the export proportion of China's primary products and industrial manufactured products has been relatively stable, while the proportion of primary products in imported goods has shown a small upward trend.

4. Data analysis

Based on the Marshall Lerner condition, this paper explains whether the exchange rate fluctuation will be conducive to the terms of trade. Even though China has gradually expanded its import in recent years, the import is still largely affected by national policies, so this paper focuses on the elasticity of export demand. Formula (1) shows that the export demand is a function of the relative export price and the real income level of foreign countries [2].

$$Q_t^* = a_0 \left(\frac{P_{X_t}^*}{P_t^*}\right)^{a_1} \left(\frac{Y_t^*}{P_t^*}\right)^{a_2} \tag{1}$$

At the same time, since the export demand is unobservable, it is assumed that the change of export demand follows the stock adjustment hypothesis, that is

$$\frac{Q_t}{Q_{t-1}} = \left(\frac{Q_t^*}{Q_{t-1}}\right)^k \tag{2}$$

By introducing formula (1) into formula (2), the estimation equation for regression can be obtained, that is

$$\ln Q_t = \beta_0 + \beta_1 \ln\left(\frac{P_{X_t}^*}{P_t^*}\right) + \beta_2 \ln\left(\frac{Y_t^*}{P_t^*}\right) + \beta_3 \ln(Q_{t-1}) + \varepsilon \tag{3}$$

Where Q is the export quantity, P_X^* is the export price in foreign currency, Y^* is the foreign income level. In this paper, the per capita GNI of the United States is used, P^* is the foreign consumption price, and the subscript is the time. $\beta_0 = a_0 \times k$, $\beta_1 = a_1 \times k$, $\beta_2 = a_2 \times k$, $\beta_3 = 1-k$,

all of which are coefficients to be estimated. β_1, β_2 represent the short-term relative price elasticity of export demand and the short-term real income elasticity, respectively. Because international trade is affected by the dependence of the original import channels, the export volume lagging behind one period will also be one of the explanatory variables

In this paper, based on the 2006 as the base period of the relevant statistical data in the form of index regression. Among them, the export volume index is converted into the total export volume of goods and services according to the customs statistics; the export price index is finally converted into the index form according to China's CPI $\times$ exchange rate; the export volume index is q = export volume /(P_X/P^*); the foreign price index and foreign income index are mainly based on the relevant indexes of the United States. Substituting the data in the table into equation (3), the following regression results are obtained:

$$\ln Q_t = 3.5919 + 0.3306 \ln\left(\frac{P_{X_t}^*}{P_t^*}\right) + 4.0471 \ln(\frac{Y_t^*}{P_t^*}) + 0.2541 \ln(Q_{t-1})$$

$$\qquad\qquad 1.0788 \qquad\qquad 0.2699 \qquad\qquad 1.5414 \qquad\qquad 0.2277$$

$$\text{P-value=} \quad (0.0104) \qquad (0.2555) \qquad\qquad (0.0304) \qquad\qquad (0.2969)$$

$$R^2 = 0.7877 \quad Adjusted\ R^2 = 0.7080$$

The statistical analysis results show that the short-term price elasticity of China's export product demand from 2006 to 2018 is 0.3306, but it is not significant. Because the price level of export commodity is mainly affected by the change of exchange rate in the short term, that is to say, the relative price of export product is mainly affected by the change of exchange rate, the depreciation of RMB in the short term cannot effectively expand exports. The short-term income elasticity is 4.0471, which is significantly different from zero. According to the corresponding regression analysis of goods and services, the same result is obtained, that is, the change of China's short-term export volume is mainly affected by the actual income level of foreign countries, which explains the reason why the export of goods and services is still rising while the appreciation of RMB.

5. Conclusion

Based on the data of RMB exchange rate and China's import and export trade, this paper finds that the RMB has been appreciating from 2006 to 2014, and began to depreciate in 2015, and China's import and export of goods and services have been on the rise from 2006 to 2018. At the same time, based on the theory of Marshall Lerner condition, this paper analyzes the influence of the change of RMB exchange rate on the export trade volume in the short term, and finds that the change of RMB exchange rate will not significantly affect China's export of goods and services in the short term, and China's export situation is mainly positively related to the actual income level of foreign countries.

Although the change in the value of RMB will not significantly affect China's exports of goods and services in the short term, in the context of financial globalization, in the process of continuously promoting RMB marketization, enterprises should remain vigilant against the fluctuation of RMB. Export enterprises should increase the proportion of manufactured products in export commodities, pay attention to technology introduction and product research and development, improve product added value and create brand effect. Therefore, the impact of RMB exchange rate fluctuations on China's import and export structure will become the next research goal.

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