

Research on the Impact of RMB Internationalization on China's Trade Competitiveness —An Empirical Analysis Based on the VAR Model

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ABSTRACT

With the continuous development of China's foreign trade level and the improvement of the RMB's international status, the use of RMB in international transactions and settlements has become more frequent, and the level of RMB internationalization has achieved a historic breakthrough. The Chinese government has taken many relevant measures to promote the development of the internationalization of the RMB, but at present, the degree of internationalization of the RMB cannot effectively meet the needs of China's international trade and rational capital flow. Based on the perspective of time series, this paper uses the VAR model to conduct empirical analysis on the relationship between RMB internationalization and trade competitiveness, draws relevant conclusions and proposes targeted recommendations, tries to add new impetus to China's trade competitiveness.

Keywords: *RMB internationalization, trade competitiveness, VAR model*

1. INTRODUCTION

At present, the internationalization of the RMB is progressing steadily, but the overall growth rate is relatively slow, facing some external challenges and internal deficiencies. From the perspective of external challenges, it is mainly reflected in intensified trade frictions and fierce international currency competition. In terms of trade frictions, the United States has frequently suppressed China, which has formed a major obstacle to the use of the RMB and the adjustment of RMB exchange rate. In August 2019, Sino-US trade frictions continued to escalate, and the United States regarded China as a currency manipulator. Market sentiment is extremely sensitive to Sino-US trade frictions. The exchange rate volatility in 2019 was 4.25%, higher than previous years. In terms of international currency competition, one is the slower growth of overseas RMB supply; the other is that mainstream currencies such as the U.S. dollar and the euro have formed a considerable squeeze on it, and have a certain path dependence. Especially in the turmoil of the international financial market, the monopoly power of the US dollar has become more apparent.

From an internal perspective, China's economic strength is continuously increasing and its international

status is constantly rising. The Chinese government is also constantly launching attempts to internationalize the RMB, and gradually promote the process of RMB internationalization. In 2009, the State Council decided to launch pilot projects for RMB cross-border trade settlement in Shanghai, Guangzhou and other regions; in 2016, the International Monetary Fund (IMF) officially included the RMB in the Special Drawing Rights Currency Basket (SDR); in 2017, there were already more than 60 countries included the RMB in their foreign exchange reserves, and 23 countries established RMB clearing arrangements; crude oil futures denominated in RMB were officially listed in March 2018. On February 18, 2019, the State Council issued the "Guangdong-Hong Kong-Macao Greater Bay Area Development Plan Outline" to study the establishment of a RMB-denominated securities market in Macau. On May 30, 2019, Portugal issued RMB 2 billion bonds (panda bonds) for the first time in China's inter-bank bond market. This is also the first panda bond issuance in China by a Eurozone country. Although the RMB already has a certain degree of international influence, as of the end of 2019, the RMB internationalization index (RII) was 3.03, and the dollar's internationalization index was 50.85 during the same period. In addition, the RMB international

circulation path has not been smooth, and there is still a certain gap between the RMB and the real internationalization, and a long effort is needed. This article uses a time series analysis model, using comprehensive and representative indicators of RMB internationalization to empirically examine the impact of RMB internationalization on trade competitiveness. This has strong theoretical and practical significance for promoting the internationalization of the RMB, giving play to the RMB's international currency functions, optimizing China's trade structure, and promoting China's trade competitiveness.

2. LITERATURE REVIEW

Foreign scholars have conducted many studies on the impact of currency internationalization on a country's trade competitiveness. The most classic theory is Triffin's Paradox (Triffin, 1978). [1] This theory proposes that the two goals of currency internationalization and currency stability cannot be achieved at the same time. The rising international status of the U.S. dollar has caused countries around the world to use the U.S. dollar as a reserve and settlement currency. A large number of U.S. dollars are stored overseas, which affects the stability of the U.S. dollar and hinders the internationalization of the U.S. dollar. Magee (1973) believes that the devaluation of the domestic currency has a "J curve" effect. That is, after the devaluation of the domestic currency, the current account balance will be worse than the initial situation, exports will decrease, imports will increase. It will take some time for the devaluation of the domestic currency to promote the growth of trade income. [2] Grassman (1973) and Krugman (1980) conducted research from the perspective of currency internationalization and international trade transaction costs, and proposed a series of theories such as Grassman's law and currency usage inertia, and found that currencies with a high degree of internationalization can significantly reduce the cost of transactions between countries that use the currency. [3][4] Since the 21st century, with economic regionalization, especially the establishment of the Eurozone, foreign scholars have shifted their research focus to the relationship between regional currency unions and international trade. Rose (2000) is based on the 1970-1990 two empirical analyses of the trade data of 186 countries in the past ten years found that the trade volume between countries using the same currency is three times the volume of trade between countries using different currencies. [5] Badinger (2014) conducted an empirical analysis based on data from 15 European countries and found that the euro-driven export growth was about 28%, and it had a greater impact on the Intensive marginal. [6] In recent years, many foreign scholars have also conducted certain studies on the internationalization of the RMB. Gagon (2014) investigated the internationalization of the

renminbi based on the perspective of the offshore renminbi market. He believes that as the level of renminbi internationalization increases, the offshore market renminbi (CNH) will appreciate relative to the onshore market renminbi (CNY). China Importers will increase settlement in the offshore market, resulting in an increase in the scale of RMB in the offshore market. [7] Fung (2017) conducted an empirical analysis on RMB internationalization and regional trade development through agglomeration geographic models based on the "One Belt and One Road Strategy" perspective, and found that the increase in the level of RMB internationalization can promote trade development in related regions while reducing the degree of dependence on the U.S. dollar, thereby reducing the chance of potential trade friction between China and the United States. [8] Harrison (2019) believes that the internationalization of the renminbi helps to enhance the status of SDR in the world, weaken the dominance of the US dollar in international society, and stabilize the global monetary system. [9] Chen's (2021) investigation found that the internationalization of the RMB will reduce the price spread between the onshore market and the offshore market, increase the degree of market integration, and reduce arbitrage opportunities, which will help promote the flow of RMB in the international market. [10] Li (2021) conducted an empirical investigation based on the short-term capital flow model and found that RMB internationalization helps reduce transaction costs and short-term capital inflows, and at the same time contributes to the expected appreciation of the RMB. However, in the context of RMB internationalization, it is necessary to reassess the relationship between exchange rate expectations and short-term capital flows. [11]

Domestic research mainly focuses on the relationship between RMB internationalization and China's trade competitiveness, and there are mainly two different viewpoints. One view is that the internationalization of the RMB has a positive role in promoting China's trade competitiveness; the other view is that the internationalization of the RMB has a negative hindrance to trade competitiveness. From the perspective of related research on positive effects, Hu Zongyi and Liu Yiwen (2009) found through scenario simulation that RMB internationalization can improve the terms of trade. [12] Li Daokui (2013) believes that the internationalization of the RMB will significantly reduce the cost of international trade transactions, but at the same time it will also lead to a series of problems such as the fluctuation of the RMB exchange rate and the instability of the economic environment. [13] Domestic scholars also have certain differences on whether the internationalization of the RMB will cause positive or negative effects. Sha Wenbing (2014) conducted an empirical analysis through the SVAR model and found that the degree of RMB

internationalization is conducive to the current and expected appreciation of the RMB. [14] Yang Jing (2015) conducted an empirical analysis through the trade gravity model and found that the larger the scale of RMB circulating abroad, the more conducive to the expansion of the scale of international trade. [15] Ma Guangming (2015) analyzed the supply effect of the US dollar and the buffer effect of the RMB overseas stock and found that they have a certain protective effect on my country's exports. [16] Zheng Yaling (2016) established a VAR model and found that RMB internationalization has a positive effect on my country's import and export trade. [17] Pu Yue (2016) conducted research based on the binary decomposition perspective of trade growth and found that RMB internationalization can promote the growth of export trade by affecting the intensive margin. [18] Wang Fang (2017) studied the impact of RMB internationalization on trade based on the perspective of regional currency cooperation, and found that the relationship between the proportion of the most frequently used currency in the region and the level of intraregional trade integration presents a "U" shape. [19] Ma Guangming (2020) conducted an empirical investigation based on the stock of overseas RMB and the proportion of RMB settlement, and found that the stock of overseas RMB assets has a buffer effect on the negative impact of RMB appreciation on the balance of payments. [20]

From the perspective of related research on negative effects. Wang Nan (2014) believes that the unbalanced development of RMB internationalization hinders the development of China's import and export trade. [21] He Jinqi (2016) found through the construction of the SVAR model that there is a two-way positive impact between RMB internationalization and the RMB exchange rate in the short term; while in the medium to long term, the RMB exchange rate has limited impact on RMB internationalization. [22] Shan Guilan (2019) proposed that on the one hand, the internationalization of the renminbi will lead to a weakening of the price advantage through the appreciation of the renminbi, which is not conducive to exports; on the other hand, it will promote the marketization of the renminbi exchange rate and cause significant fluctuations in trade levels. [23] Zheng Zhongfei (2020) adopted the gravity model and found that in the process of RMB internationalization, signing currency swap agreements with foreign countries has a negative impact on China's import and export trade. [24]

In conclusion, there are two main views on the relationship between RMB internationalization and trade competitiveness. Most studies believe that RMB internationalization has a positive effect on trade competitiveness, and RMB internationalization can reduce international trade transactions cost to promote the development of international trade. There are also some studies that believe that the internationalization of

the RMB has a negative hindrance to trade competitiveness, and that the internationalization of the RMB may hinder the development of international trade by increasing exchange rate fluctuations.

3. CURRENT SITUATION AND PROCESS OF RMB INTERNATIONALIZATION

3.1. RMB settlement of cross-border trade

The scale of RMB settlement for cross-border trade maintained steady growth, and the settlement structure continued to be optimized. In 2020, the scale of cross-border trade renminbi settlement will accumulate 6.77 trillion yuan. An increase of 0.73 trillion yuan over the previous year, an increase of 12.09% year-on-year; RMB settlement of cross-border trade accounted for 21.06% of China's total trade in goods and services, an increase of 1.91% over the previous year. The RMB settlement structure is still dominated by goods trade settlement, while at the same time, the scale of service trade settlement continues to expand. In 2020, a total of 4.79 trillion yuan in RMB settlement of trade in goods occurred, an increase of 0.54 trillion yuan over the previous year, an increase of 12.75% year-on-year, accounting for 70.75% of the total cross-border trade RMB settlement; in 2020, a total of 1.98 trillion yuan in service trade RMB settlement occurred, an increase of 0.19 trillion yuan from the previous year, an increase of 10.53% year-on-year, accounting for 29.25% of the total cross-border trade RMB settlement.

3.2. RMB financial transactions

Direct investment in the RMB continued to grow, the securities market further deepened, the demand for overseas loans continued to increase, and foreign exchange transactions continued to make new progress. From the perspective of renminbi direct investment, China's direct investment in renminbi is 3.8 trillion yuan in 2020, of which foreign direct investment is 1.8 trillion yuan, a year-on-year increase of 42%, and foreign direct investment is 2 trillion yuan, a year-on-year increase of 43%. From the perspective of the renminbi securities market, offshore renminbi bonds have developed rapidly. In 2020, China's overseas bond issuance reached 16.5 trillion yuan, a year-on-year increase of 74%. International investors are gradually paying more attention to RMB assets. In 2020, the balance of RMB financial assets held by foreign investors will reach 8.98 trillion yuan, a year-on-year increase of 40.09%. In 2020, RMB turnover in the foreign exchange market reached 174.8 trillion yuan, a year-on-year increase of 1.4%.

3.3. RMB global foreign exchange reserves

The share of renminbi in global foreign exchange reserves continues to increase, and renminbi swap activities between China and central banks of various countries have become more frequent. From the perspective of renminbi's global foreign exchange reserves, in 2020, the global renminbi foreign exchange reserves totaled 267.52 billion U.S. dollars, an increase of 21.97 billion U.S. dollars over the previous year, and its share of global foreign exchange reserves reached 2.25%, an increase of 0.3% over the previous year.

3.4. RMB exchange rate

In 2020, the CFETS RMB Exchange Rate Composite Index, the BIS Currency Basket RMB Exchange Rate Index, and the SDR Currency Basket RMB Exchange Rate Index were 98.21, 102.23, and 96.89, respectively, an increase of 3.37, 3.55, and 2.66 from the previous year.

In summary, it can be seen from the aspects of cross-border trade RMB settlement, RMB financial transactions, RMB global foreign exchange reserves, and RMB exchange rate that China has taken many measures to better promote the internationalization of the RMB and have achieved great results.

4. EMPIRICAL ANALYSIS

4.1. Model design

This paper uses vector autoregressive model (VAR model) for empirical analysis. The VAR model adds the lagged term of endogenous variables, which is an extension of the AR model. The univariate is extended to the vector regression model composed of multiple variables. The model is expressed as follows:

$$y_t = A_1 y_{t-1} + A_2 y_{t-2} + \dots + A_p y_{t-p} + B_0 X_t + \dots + B_r X_{t-r} + \varepsilon_t$$

y_t is the endogenous variable vector, y_{t-p} is the vector of lagged endogenous variables, A_p is the endogenous variable coefficient, X is the exogenous variable, ε_t is the random error term.

4.2. Index selection and data description

4.2.1. Index selection

4.2.1.1. Trade competitiveness

This article selects the Trade Competitiveness Index (TC) to measure China's trade competitiveness. The

Trade Competitiveness Index (TC) refers to the ratio of a country's net exports of a certain industry or a certain commodity to the total trade volume, which can reflect the country's trade competitiveness status through foreign trade activities. The trade competitiveness index usually ranges from -1 to 1. The closer the index is to 1, the stronger the trade competitiveness. The specific calculation formula is as follows:

$$TC = \frac{\text{export value} - \text{import value}}{\text{export value} + \text{import value}}$$

4.2.1.2. RMB internationalization

This article selects the proportion of cross-border goods trade settled in RMB in my country's import and export trade (GOODS), the proportion of cross-border service trade settled in RMB in my country's import and export trade (SERVICE), and the proportion of foreign direct investment in RMB in the amount of foreign investment actually used The specific gravity (RFDI). These indicators respectively reflect the extent to which the renminbi is used in cross-border trade and direct investment. The larger the indicator value, the deeper the internationalization of the RMB.

4.2.1.3. Control variable

Taking into account that trade competitiveness will also be affected by other factors, combined with relevant literature, this article selects gross domestic product (GDP), exchange rate (ER), producer price index (PPI) and other important exogenous variables to analyse trade competitiveness.

4.2.2. data description

Combined with the availability of relevant data, the sample is selected as the monthly data in the interval from January 2012 to November 2019. Thus, a total of 95 sample data were obtained, and the data mainly came from the Wind database and the National Bureau of Statistics. The processing tool is EViews.

The meaning of each indicator and the data source are shown in the following table:

Table 1. Variable definitions and data sources

variable name	Indicator meaning	Economic meaning		Data Sources
TC	Export value-import value/ export value + import value	National Trade Competitiveness	Trade Competitiveness	National Bureau of Statistics and wind database
GOODS	Total RMB settlement of cross-border trade in goods/China's total imports and exports	The extent to which RMB is used in cross-border trade	The degree of RMB internationalization	
SERVICE	Total RMB settlement of cross-border service trade/China's total import and export			
RFDI	RMB foreign direct investment/ actual use of foreign capital	The extent to which RMB is used in direct investment		
GDP	Log of GDP	Domestic economic scale		
PPI	Production price index	Factor level of production	Control variable	
ER	USD/RMB monthly average exchange rate logarithm	exchange rate		

4.3. Descriptive statistical analysis

Combining the index selection and data description above, the descriptive statistical analysis of each index is shown in the following table:

Table 2. Descriptive statistical analysis

variable	average	Max	Min	Standard deviation
TC	0.094	0.217	-0.122	0.055
GOODS	0.148	0.344	0.055	0.058
SERVICE	0.048	0.116	0.018	0.019
RFDI	1.305	26.400	0.030	4.344
GDP	5.257	5.442	5.070	0.094
PPI	-0.306	7.800	-5.955	3.687
ER	0.810	0.850	0.786	0.020

4.4. Stationarity test

Non-stationarity is a relatively common problem in time series. We need to adopt a stationarity test to avoid the possible pseudo-regression situation in the analysis of econometric model time series. The unit root test is performed on the variables. The test results show that the time series of each variable have both stationary and non-stationary sequences, and the non-stationary sequences are all stable after the first-order difference or the second-order difference processing.

Table 3. Unit root test

variable	ADF inspection value	Critical value at each significant level			test result
		1%	5%	10%	
TC	-6.380***	-3.501	-2.893	-2.583	stationary
GOODS	-2.901**	-3.501	-2.892	-2.583	non-stationary
SERVICE	-3.547***	-3.504	-2.894	-2.584	non-stationary
RFDI	-5.122***	-3.501	-2.893	-2.583	stationary
GDP	0.240	-3.511	-2.897	-2.586	non-stationary
PPI	-1.537	-3.503	-2.893	-2.584	non-stationary
ER	-1.231	-3.502	-2.893	-2.584	non-stationary

PS: ***, **, * indicate significant at the level of 1%, 5%, and 10%, respectively.

4.5. Cointegration test

Cointegration can explain the long-term stable equilibrium relationship between variables. In this paper, the Johansen co-integration test method is used to

test the long-term co-integration relationship between TC and various indicators of RMB internationalization. The following table shows the results of Johansen cointegration test:

Table 4. Johansen co-integration test results

Null hypothesis	Eigenvalues	Significance level is the critical value of 5%	Corresponding P value
None *	0.452084	46.23142	0.0035
At most 1	0.236691	40.07757	0.7601
At most 2	0.174459	33.87687	0.8860
At most 3	0.112090	27.58434	0.9640
At most 4	0.080094	21.13162	0.9176
At most 5	0.072774	14.26460	0.4860
At most 6	0.000158	3.841465	0.9034

4.6. Cointegration vector normalization

Usually the first cointegration vector has a strong economic interpretation ability. After the cointegration equation is standardized with respect to TC, the cointegration equation about the long-term equilibrium relationship between the sequences is obtained. The standardized co-integration relationship is shown in the following table:

Table 5. Standardized cointegration coefficients

TC	GOODS	SERVICES	RFDI	GDP
1.000000	-0.420012	0.782096	-0.002495	-0.047215
PPI	ER			
0.002770	-0.568195			

It can be seen from the table that, in the long run, trade competitiveness is positively correlated with RMB settlement of trade in goods and RMB foreign direct investment. Write the cointegration relationship as a mathematical expression to make it equal to ECM, and get the following formula:

$$ECM_t = TC_t - 0.4200GOODS_t + 0.7821SERVICES_t - 0.0025RFDI_t - 0.0472GDP_t + 0.0028PPI_t - 0.5682ER_t$$

4.7. VAR model

In order to further clearly judge the long-term competitive relationship between RMB internationalization and trade competitiveness, the

cointegration equation between the two can be obtained, and the model with error correction term is as follows:

$$ECM_{t-1} = TC_{t-1} - 0.4453GOODS_{t-1} + 0.8725SERVICE_{t-1} - 0.0016RFDI_{t-1} - 0.0694(-0.7370ECM_{t-1} = -0.0951\Delta TC_{t-1} - 0.3639\Delta GOODSt_{-1} + 0.7548\Delta SERVICE_{t-1} + 0.00413\Delta RFDI_{t-1} - 0.0324\Delta TC_{t-2} - 0.1324GOODSt_{-2} - 0.0824SERVICE_{t-2} + 0.001203$$

Through the above equations, the following conclusions can be drawn. First, there is a positive correlation between RMB internationalization and trade competitiveness. For every one percentage point change in RMB foreign direct investment, trade competitiveness will change by 0.0016 percentage point accordingly. Second, the level of RMB internationalization will be corrected by 0.7370 units and approach the long-term equilibrium. The third is that the model based on the error correction amount helps to make a reasonable prediction of China's future trade competitiveness.

4.8. Impulse response analysis

Through the impulse response function of trade competitiveness, it can be seen that the impact of RMB internationalization on trade competitiveness has been in a stable and positive effect, which further shows that RMB internationalization has promoted the improvement of trade competitiveness.

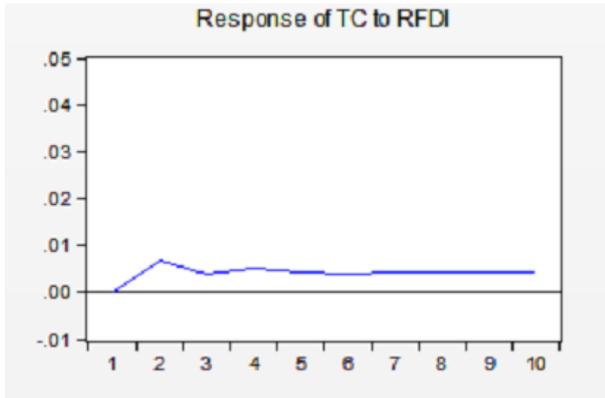


Figure 1. Response of TC to RFDI

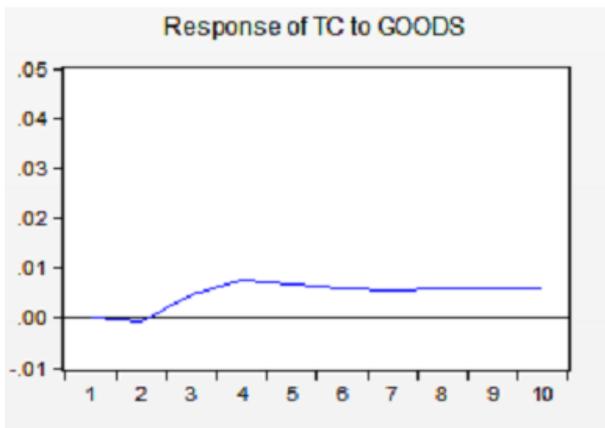


Figure 2. Response of TC to GOODS

5. CONCLUSION

This paper conducts an empirical analysis based on the VAR model, and examines the impact of RMB internationalization on China's trade competitiveness.

1. From the perspective of long-term effects, the internationalization of the RMB has a positive effect on the improvement of trade competitiveness. The increase in the level of RMB internationalization has positive economic benefits for China's international trade and international settlement, which is consistent with the current mainstream views at home and abroad.

2. From the perspective of the co-integration equation, cross-border goods trade settled in RMB has a larger coefficient as a proportion of my country's import and export trade, while RMB foreign direct investment accounts for a smaller coefficient in the amount of foreign investment actually used. It shows that the influence of foreign direct investment settled in RMB on China's trade competitiveness is relatively weak. The enhancement of China's trade competitiveness mainly depends on the continuous expansion of people-settled goods trade. The main reason is that global trade frictions have become more frequent under the influence of the epidemic, and the growth rate of foreign direct investment has declined. At the same time, foreign investment mainly focuses on investment in processing

trade products, which are located at the lower end of the industrial chain and value chain, and have little effect on the improvement of China's trade competitiveness.

3. From the results of impulse response, the impact of RMB internationalization on trade competitiveness was relatively weak in the initial stage, then gradually increased, and finally stabilized in a positive direction.

To sum up, the following suggestions are given:

1. Optimize the renminbi cross-border settlement system for international trade to provide a stable internal and external environment for the internationalization of renminbi. The first is to strengthen multilateral trade cooperation, especially to continue to deepen trade cooperation with countries along the "Belt and Road", and promote the wider application of the RMB in international trade. Secondly, it is necessary to optimize the structure of foreign trade products, increase the proportion of high-tech products in export products, and improve the competitiveness of export products, so as to improve China's settlement status in international trade and strive for the right to choose currency. Finally, it is necessary to deepen regional cooperation in foreign trade, enhance China's international status and international influence, strengthen cultural propaganda, and promote the rise of the RMB's international settlement status with the rise of China's political and cultural status.

2. Make good use of foreign direct investment and give full play to the role of foreign direct investment in promoting the growth of China's trade competitiveness. This requires China to accelerate the transformation and upgrading of its industrial structure, optimize its trade structure, increase the proportion of high-tech products in my country's trade exports, and realize the transformation from "Made in China" to "Created in China". At the same time, China should improve the corresponding supporting facilities for overseas investment. Conditions, improve the construction of the financial system, so as to attract more high-quality overseas investment.

3. Improve the quality of the service industry and promote the transformation and upgrading of service trade. Promote the development of new service industries, improve the service industry systems such as finance and information services, and enhance the international competitiveness of the service industry and service trade.

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