Research on the Impact of RMB Exchange Rate on RMB Internationalization

Qi Zhong [a], Lu Xu [b], Beinan Guo [c], Yanping Zhu [d]

School of Henan, Henan University, Kaifeng 475000, China.

[a]1542820835@qq.com, [b]15515650530@163.com, [c]15738858985@qq.com, [d]1349353571@qq.com

Abstract

With the continuous development of China's economy and the remarkable increase of international influence, RMB plays a more and more important role on the international stage. This paper introduces the related concepts of RMB internationalization, the influence mechanism of exchange rate fluctuation on RMB internationalization, and the development process of the US dollar, the euro and RMB internationalization. Then the VAR model is established by using RMB exchange rate and RMB internationalization indicators. Through the stability test, variance decomposition analysis, and Granger causality analysis, the dynamic relationship between the RMB exchange rate and the RMB internationalization process was studied. Empirical results show that RMB exchange rate fluctuation has a significant impact on the process of RMB internationalization. Finally, this paper puts forward some policy suggestions to establish a positive trend of RMB internationalization.

Keywords

RMB exchange rate, RMB internationalization, VAR.

1. Introduction

First, China has become the second largest economy and dominates international trade. With international trade, there will be currency exchanges. Chinese sovereign currency, RMB, plays a more and more important role in world trade. The internationalization of RMB can be said to be imperative. RMB internationalization refers to the currency that is widely accepted and used by the market as the main settlement currency in the international market. The essential meaning of RMB internationalization should include three aspects: first, the RMB enjoys a certain degree of circulation abroad, and the transactions settled in RMB in international trade should reach a certain proportion; second, financial products denominated in RMB have become the investment tools of major international financial institutions, and the financial market has reached a certain scale. Third, most countries in the world accept RMB as their reserve currency. From this definition, the relationship between exchange rate and RMB internationalization is worth our consideration. The influence of exchange rate on the internationalization of a country's currency cannot be underestimated. The fluctuation of exchange rate can reflect the trend of a country's economy and affect the improvement of a country's international status. The long-term trend of the RMB exchange rate depends on how it moves against the dollar. Figure 1 shows the changes in the RMB exchange rate during 2013-2017.

The RMB exchange rate has remained stable until 2015. On August 11, 2015, the People's Bank of China began to implement the reform of the central parity for foreign exchange trade, and then the trend of the RMB exchange rate changed. On October 1, 2016, China officially joined the International Monetary Fund's Special Drawing Rights (SDR) currency basket, which represents an increase in the international influence of the RMB. The internationalization of the yuan has been greatly promoted, but at the same time, the RMB exchange rate has faced greater volatility after joining the SDR, making the exchange rate more complex.

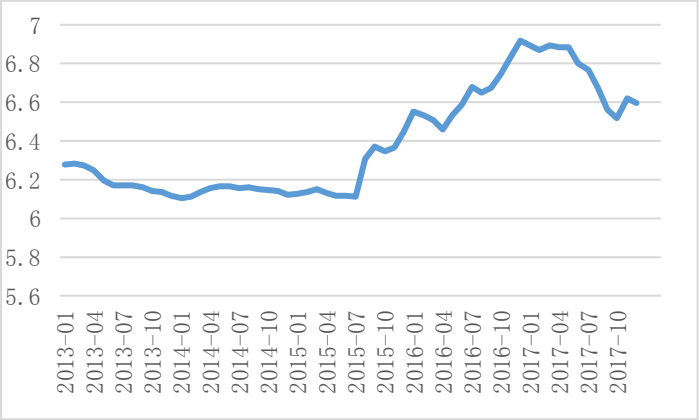

Fig. 1 RMB exchange rate against the US dollar

2. Theoretical Analysis

2.1 Theoretical Analysis of the Influence Mechanism of Exchange Rate Fluctuations on Currency Internationalization

In the international capital market, exchange rate volatility is a relatively important factor. Under the transmission of exchange rate fluctuations, the impact in the international environment causes the domestic monetary policy to change, thus the exchange rate change affects the currency internationalization. There are two main conduction pathways in this effect.

On the one hand, exchange rate fluctuations have an impact on the internationalization of the country's currency by affecting capital market. The capital market is a market for the government, residents and enterprises to prepare long-term funds. In the international capital market, the exchange of exchange rates has changed the relative amount of currencies of countries. In the process of redistribution, the supply of a country's currency has also changed. The participants in the international market will hold more assets for the currency valuation of the countries with the rise of the currency value. At the same time, when the exchange rate changes, the nationals will be more willing to give up all the currencies in exchange for another. Through these two ways, exchange rate volatility will affect the monetary policy of a country through the capital market, thus affecting the currency internationalization of a country.

On the other hand, exchange rate volatility has an impact on currency internationalization by influencing a country's international trade. International trade is the transaction of goods and services across national borders. The influence of exchange rate fluctuation on international trade has income effect and substitution effect. Exchange rate exports depreciate, so in order to hedge against the negative effects of exchange rate fluctuations, manufacturers and chambers of commerce correspondingly increased their export quotas, which is the income effect; and risk-averse manufactories have no incentive to export because of exchange rate fluctuations, so they reduce export quotas, which is the substitution effect. Changes in exchange rates can result in changes in the purchasing power of a country's currency, which can have an impact on imports; at the same time, changes in the exchange rate change the relative cost of a country's products, thereby changing the exports and affecting international trade.

2.2 The Development Process of Currency Internationalization

2.2.1 Currency Internationalization in Major Developed Countries

At present, there are two main internationalization paths of world currencies: the internationalization of national currency and the internationalization of regional currency. This article mainly introduces the internationalization of the national currency represented by the US dollar and the regional currency represented by the euro.

(1)Internationalization of the US dollar

Before First World War, the pound was the main world currency for international trade, and the international sphere of the dollar was weaker than that of pound. Two world wars and the world economic crisis of 1929 gradually reduced the status of pound. During World War II, the United States struggled to develop its own economy, taking advantage of the opportunity to overtake the rest of the world. After World War II, the United States, as a victorious nation, continued to open its foreign exchange system, had a strong economic strength and abundant supplies, and European countries imported a large amount of American goods, which made gold and European bonds flow into the United States in large quantities. In July 1944, the International Monetary and Financial Conference, attended by representatives of 44 countries, was held in Bretton Woods. After that, the Bretton Woods system, in which the US dollar was linked to gold and the currencies of various countries were linked to the US dollar, was established. The international currency system with the US dollar as the core is produced. The Marshall Plan, which was carried out in 1947-1951, accelerated the internationalization of the dollar, expanded the circulation scale and scope of the dollar abroad, strengthened Europe's dependence on the dollar, and formed the European dollar market. The inherent defects of the Bretton Woods system and the "Triffin" problem eventually led to the dollar crisis. The 1976 Jamaica Agreement declared that gold was not monetized and was not linked to the dollar, and the Bretton Woods system collapsed. While the euro and the yen have gained worldwide influence for a while, the dollar's dominance has become unshakable, and the dollar remains the most widely used and influential international currency.

(2)Internationalization of the euro

The advent of the euro is a new way to internationalize the currency, that is, some countries with similar economic base and economic structure will unify the currency. The Federal Republic of Germany enacted the Stability Act in 1967 and implemented Keynesian stabilization policy, thus forming a European monetary system centered on the Mark in 1979. With the gradual development of economic integration, the EU countries think that the common currency is the policy which conforms to the actual interests and national conditions of all EU member states. The establishment of the euro zone began in 1991 with the signing of the European Pact by the European Community, and in 1994, the European Monetary Agency was established. After the birth of the euro, the European Union accelerated the process of internationalization of the euro. Expand the proportion of international commercial transactions settled in euros, increase the euro as an investment currency in the international market share, and improve European financial markets. Although the internationalization process of the euro is very short, from the moment the euro was born, it can be said to be an international currency.

2.2.2 The Development Degree of RMB Internationalization

Since the middle and late 1990s, China's economic strength has increased and the border trade has become increasingly close. The RMB has gradually been accepted and used by neighboring economies. In April 2009, China has begun to implement a pilot reform program for RMB settlement of cross-border trade, and has confirmed that Hong Kong and 10 ASEAN countries are overseas pilots for RMB settlement. The RMB internationalization strategy was formally launched. In July 2009, the logical framework of RMB internationalization became clear after the release of the detailed rules for the implementation of RMB Cross-border Trade Settlement. In short, the logical framework for the internationalization of the RMB consists of two markets, domestic and foreign, and two cycles, namely, the cross-border cycle of current account, capital account, inter-bank cooperation and inter-governmental cooperation. In January 2011, the Chinese government launched a new pilot project---directly using RMB to settle overseas investment, which greatly promoted the development of RMB cross-border settlement business. In January 2016, China officially became the third largest shareholder in the International Monetary Fund, and at the same time, the level of internationalization of the RMB has been continuously rising. On October 1, 2016, the RMB officially became the SDR basket currency, with a weight of 10.92 percent and a currency quantity of 1.0174. It is also the first

time that emerging market currencies have joined the SDR, another important milestone in the internationalization of the RMB.

The course of currency internationalization shows that the way for the development of currency internationalization cannot be replicated according to the political and economic conditions of each country. The United States relies on the Bretton Woods system for a unique internationalization process, and the euro relies on regional alliances to promote the internationalization of the same currency in the region. The history of the process of transformation is not only the inevitable choice of the specific historical stage, but also the embodiment of the economic and political strength of its sovereign state. The internationalization of RMB conforms to the background of the post crisis era, and is also the strength of China as the second largest economy in the world. The internationalization of RMB is not a short-term goal and is still on the road.

3. VAR Model Analysis of RMB Internationalization and RMB Exchange Rate

3.1 Selection of Indicators

The RMB internationalization indicators mainly include the "Cross-border RMB Index" compiled by the Bank of China, the "RMB Global Index" compiled by Standard Chartered Bank, and overseas RMB deposits. In order to make the data available, this paper chooses the global index of RMB and the deposit of RMB offshore as the internationalization index of RMB. As the world's first industry indicator to track offshore RMB business, the RMB global index widely measures offshore RMB business in Hong Kong, London and Singapore. Overseas RMB deposits reflect the active level of RMB use in cross-border and overseas transactions, and reflect the development of RMB internationalization from the side. At present, the RMB offshore market is mainly concentrated in Hong Kong, Macau, Taiwan, Singapore and London. Since Hong Kong's offshore RMB market has remained active, Hong Kong's RMB deposits have been selected. The exchange rate of RMB is measured by the direct price of RMB and USD. Because of heteroscedasticity in time series, logarithmic transformation of selected data is taken before empirical analysis. The logarithmic exchange rate of RMB exchange rate, the RMB global index, and overseas RMB deposits are expressed by ER, RGI and CRI respectively.

3.2 Stationary Test

Since the time series will produce pseudo regression, the stationary test of each index is carried out before the establishment of the model. This paper adopts the ADF test method, and the test results are shown in the following table.

Table 1 ADF test results

Sequence	Inspection form (C，T，P)	Augmented Dickey-Fuller test statistic	Critical value	Stationary
ER	(C,T,11)	-1.854789	(5%) -3.467703	non-stationary
RGI	(C,T,11)	-1.005067	(5%) -3.470851	non-stationary
CRI	(C,T,11)	-1.175351	(5%) -3.467703	non-stationary
D(ER)	(C,0,11)	-5.547474	(5%) -2.898623	stationary
D(RGI)	(C,0,11)	-3.562007	(5%) -2.900137	stationary
D(CRI)	(C,0,11)	-4.890871	(5%) -2.898623	stationary

Note: (C, T, P) indicates that the constant term and the trend term are included in the test; (C, 0, P) indicates that the trend term is not included; P indicates the lag order determined according to the Schwarz information criterion.

The unit root result shows that under the 5% significant level, the ADF statistics of the original series of RMB exchange rate, RMB Global Index, and overseas RMB deposits are all greater than the critical value corresponding to the 5% level, so the original sequences of the three variables are non-stationary. The ADF values of the three variables after the first-order difference are less than the critical value corresponding to the 5% level, so D(ER), D(RGI), D(CRI) are considered to be stationary, and the original sequence is the first-order monolithic sequence.

3.3 Establishment of VAR Model

According to the above analysis, the first-order difference sequence of RMB exchange rate, RMB Global Index and overseas RMB deposits is a stationary sequence. Then the VAR model can be established for the first order difference sequence, and then the dynamic interaction between the three variables can be described. In order to estimate the VAR, the order of VAR model should be established according to the information criterion. The optimal lag order of this paper is 1, therefore, the VAR(1) model is established.

$$D(ER) = a_1 + b_1 D(ER)_{t-1} + c_1 D(RGI)_{t-1} + d_1 D(CRI)_{t-1} + e_{1t} \quad (1)$$

$$D(RGI) = a_2 + b_2 D(ER)_{t-1} + c_2 D(RGI)_{t-1} + d_2 D(CRI)_{t-1} + e_{2t} \quad (2)$$

$$D(CRI) = a_3 + b_3 D(ER)_{t-1} + c_3 D(RGI)_{t-1} + d_3 D(CRI)_{t-1} + e_{3t} \quad (3)$$

Among them, D(ER), D(RGI) and D(CRI) are the first-order difference sequence of RMB exchange rate, the first-order difference sequence of RMB global index, and the first-order difference sequence of overseas RMB deposit. e_{1t}, e_{2t} and e_{3t} are structural shocks that act on related variables, respectively.

3.3.1 Stationary Test of VAR Model

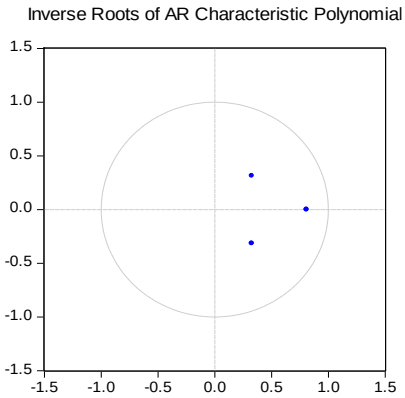

Fig.2 AR root diagram

In this paper, the unit root method is used to test. As shown in figure 2, the reciprocal values of all characteristic roots fall within the unit circle, so the VAR model is stable and can be further analyzed by variance decomposition.

3.3.2 Variance decomposition

Variance decomposition means that when a variable of the system is impacted by a standard deviation, the interaction between variables is reflected in the form of the variance percentage of the prediction error of a variable. From the variance decomposition, we can see which variables lead to the change of endogenous variables, and whether other variables predict the change of the variables.

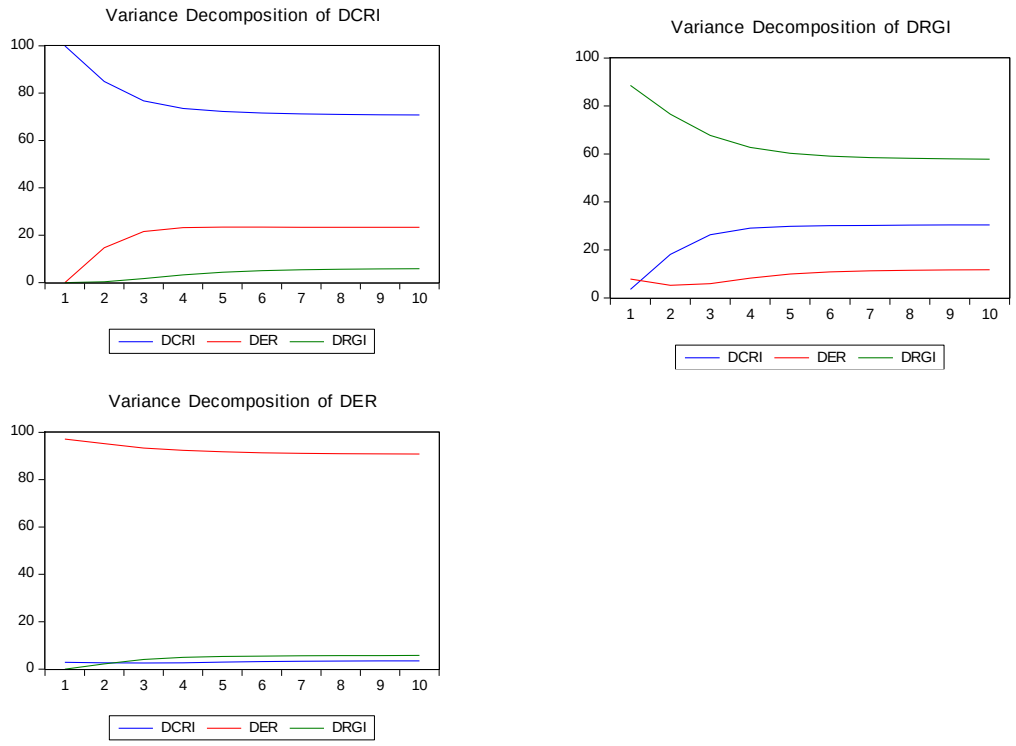

Fig. 3 Impulse response function

Figure 3 shows the contribution of three variables to the variance of one of the variables. The self-variable contributes the most to its own variance and is at the top. It can be seen that the other two variables have a significant impact on the RMB global index, so it is possible that other variables constitute the reasons for the change of the RMB global index. This hypothesis will be discussed in the Granger causality test below; RMB exchange rate is the biggest contribution to the variance of overseas RMB deposits, indicating that the change of RMB exchange rate will affect the index of offshore RMB deposits, and then affect the degree of RMB internationalization. The other two variables have a weak effect on the RMB exchange rate.

3.4 Granger Causality Test

In order to verify the conclusion of variance decomposition in the preceding section, this section will carry out Granger causality test. Granger causality test is used to analyze whether there is a causal relationship between variables and the direction of influence. In this paper, the variable data used in the analysis is stable, and the AIC information criterion and SC information criterion are used to determine the lag order.

Table 2 Results of the Granger causality test

	ER	RGI	CRI
ER	-	0.1577	0.0189*
RGI	0.0007**	-	0.0002**
CRI	0.0013**	0.3359	-

Note: The above table assumes that the variables in the first row are the cause and the variables in the first column are the result. * indicates that a hypothesis test with a significance level of 5% was passed, and ** indicates that a hypothesis test with a significance level of 1% was passed.

Through the Granger causality test, it can be seen that there is a complex empirical causal relationship between the RMB exchange rate, the global index, and overseas RMB deposits. The direction of action can be expressed as the following figure:

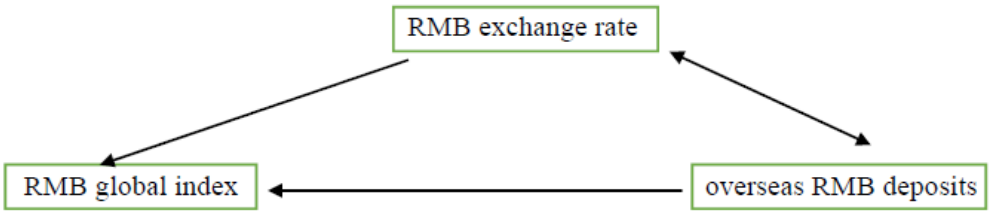

Fig.4 Transmission relationship between RMB exchange rate and RMB internationalization indicators

It can be seen that the changes in the RMB exchange rate constitute the reason for the RMB Global Index, and the changes in overseas RMB deposits constitute the reason for the RMB Global Index. There is a significant two-way causal relationship between changes in the RMB exchange rate and changes in overseas RMB deposits. On the one hand, exchange rate changes will affect the decision of overseas markets to supply RMB funds; on the other hand, changes in the scale of overseas RMB deposits also represent changes in the supply and demand of funds in overseas markets, which will affect the exchange rate changes in the country.

4. Conclusions and Policy Implications

4.1 Conclusions

This paper studies the relationship between RMB exchange rate and RMB internationalization. The results show that there is a transmission mechanism between RMB exchange rate and RMB internationalization. The econometric analysis of the two indicators of RMB exchange rate and RMB internationalization shows that the change of RMB exchange rate constitutes the reason for the change of RMB global index and RMB deposits abroad. Exchange rate changes will really impact on the RMB internationalization process. Therefore, maintaining the stability of RMB exchange rate is of great significance to promote the positive trend of RMB internationalization.

4.2 Policy Implications

The exchange rate policy plays an important role in the process of RMB internationalization, and the process of RMB internationalization needs the active cooperation of exchange rate policy. In the process of enhancing the international status of RMB, the government should formulate macro-policy according to China's national conditions. To guide the expectation of RMB exchange rate market and create favorable external currency value conditions for RMB internationalization.

Further reform the exchange rate formation mechanism and improve the RMB exchange rate system. In the process of promoting the reform of the exchange rate formation mechanism, it is necessary to take into account the strategic goal of RMB internationalization, to retain the appropriate means to intervene in the exchange rate during the necessary period, and to guard against the impact of large fluctuations of the exchange rate on the internationalization of the RMB.

Improve the financial market. Diversified financial markets will bring more financial innovation. When the financial structure is diversified and there are enough types of financial hedging instruments, financial institutions and individuals will have more options to hedge investment risks. In this way, the risks in financial markets and foreign exchange markets will be significantly reduced, and will be more conducive to promoting a positive trend of internationalization of the RMB.

References

[1] R. N. Huang: Research on the Impact of Exchange Rate Fluctuation on RMB Internationalization(Shanghai Academy of Social Sciences, China 2017).
[2] W. B. Sha, H. Z. Liu: RMB internationalization, exchange rate changes and exchange rate expectations, International Finance Research, vol. 08 (2014).
[3] B. Wang, M. Zhao: Research on the process and path selection of RMB internationalization, Modern Management Science, vol. 05 (2018).

[4] D. X. Yu, Y. Wang: The overseas stock of RMB, the balance of payments and the internationalization of RMB, Economic Theory, vol. 04 (2015).
[5] Ronald McKinnon, W. Li: The Conflict between China's Exchange Rate, Financial Repression and RMB Internationalization, Comparison of Economic and Social Systems, vol. 02 (2014).
[6] H. F. Peng, W.B. Chen: A Review of the study of RMB Internationalization, International Finance Research, vol. 10 (2015).