A Study on the Impact of Bond Market Development on RMB Internationalization

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Abstract. This paper uses the method of constructing a currency internationalization index to measure the degree of a country's currency internationalization, and selects the ratio of the stock of national debt denominated in currency to the country's GDP to measure the development of a country's domestic bond market, and selects the share of currency denominated in international bonds to measure the currency issuing country's development level of bonds in the international bond market. Then using a long-panel fixed-effect model and a comprehensive FGLS regression method to analyze the relationship between bond market development and the degree of currency internationalization. The results show a country's domestic bond market and its bond's development in the international bond market will significantly promote the internationalization of the country's currency, so the Chinese government should take measures to promote the development of the Chinese bond market in order to enhance the internationalization of the RMB.

Keywords: Currency internationalization, RMB internationalization, Bond market

1   Introduction

Both domestic and international studies on sovereign currencies becoming international currencies agree that a developed financial market in a sovereign country is an important prerequisite for the internationalization of its currency. Compared with equities, bonds have the characteristics of low risk and high liquidity, so a country's bond market will also be the main investment market for international capital. The development of the bond market is conducive to the better use of market functions such as resource allocation, price discovery and risk management, which will reduce the potential risks faced by China's economy in the process of opening up to the outside world, while increasing the enthusiasm of foreign investors to invest in RMB-denominated assets, consolidating the channels for the return of RMB funds and promoting it as a major international reserve currency. In the end, the RMB's currency function will be better utilized and the internationalization process will achieve a higher level of development.

Based on the existing bottleneck, facing RMB internationalization development based on RMB internationalization development facing the current problems to explore the significance of the development of the bond market, and by means of regression analysis and index to build research on the relationship between the development of the bond market and currency internationalization, and at this stage the internationalization of the renminbi and the existing problems in the development of China's bond market is analyzed, Finally, it puts forward some suggestions for the development of China's bond market.

2   Status of research

(1) An international currency is generally defined as a currency that is fully utilized as a medium of exchange and a store of value in international markets, i.e. the currency's use extends from the region in which it is issued to the world and is widely recognized [1]. At this stage, there are two main ways to study the degree of internationalization of a currency, one is to select one of the determinants of the internationalization of a currency to measure the degree of internationalization of the RMB. The degree of internationalization can be judged by the size of a country's currency acting as a reserve currency in the international market [2]. For the currency's function as a medium of exchange, the size of the over-the-counter foreign exchange market can be used to determine the degree of internationalization [3]. However, this method of selecting a single index to measure the international degree of currency obviously has the defect that it only considers the degree of a certain function of currency. Another approach is to construct an index to measure the degree of internationalization of a currency. Using principal component analysis, variables are selected and weighted to evaluate the different functions performed by currencies in different markets to construct an index of currency internationalization [4]. Although the method of constructing currency index has considered all the functions of currency in a comprehensive way, it also has the defect of not being able to reasonably determine the weight of various indicators in the index.

(2) Bond market has the functions of financing, price discovery and economic regulation, and its development has a profound impact on the level of a country's financial development. Compared with stocks, bond market has the characteristics of low risk and strong liquidity, so a country's bond market will also be the main investment market of international capital. In order to support a country's currency to become an international currency, the bond market of the currency issuing country must have considerable depth and breadth. Some scholars also judge the relationship between the two through empirical research, by selecting the ratio of international bond issuance to the country's GDP as an indicator of the degree of bond market development and the index of foreign exchange reserves of each country, which represents the degree of currency internationalization, to conduct a cointegration regression. The results show that the development of the international currency bond market can enhance the degree of currency internationalization [5]. The ratio of currency to foreign exchange reserves is also used as an indicator, but the ratio of domestic bond market

stock to GDP is used as an indicator of the level of bond market development, using a pvar model and a composite impulse corresponding graph.

The analysis shows that the development of bond market has a great positive effect on the degree of currency internationalization, and the short-term effect is particularly significant. [6].

In existing studies on the relationship between bond markets and currency internationalization, there is a single indicator for measuring the degree of currency internationalization and a single indicator for bond markets, and few scholars have conducted studies on the weighting of the current degree of development of China's bond markets on the internationalization of the RMB.

3   Methodology

3.1   Internationalization index measurement method

Drawing on the research of (Peng Hongfeng & Tan Xiaoyu, 2017), this paper uses principal component analysis to construct the currency internationalization index as follows: assume that there are k indicators reflecting the use of currency internationalization and the length of time is T. The constituted data set is a matrix $X_{T \times k}$, which is the covariance matrix of the sequence of k indicators, such that λ_i (i=1, ..., k) denotes the i-th observation of the matrix, and $a_{k \times 1}^i$ denotes the i-th eigenvector of the matrix. The ith principal component can be denoted as $PC_i = X_{\alpha^i}$ and $\lambda_i = \text{Var}(PC_i)$. Based on all the principal components and their relative importance [7], the composite index is constructed as follows:

$$\text{Index} = \frac{\sum_{i=1}^{k} \lambda_i PC_i}{\sum_{i=1}^{k} \lambda_i} = \frac{\sum_{i=1}^{k} \sum_{j=1}^{k} \lambda_i \alpha_j^i x_j}{\sum_{i=1}^{k} \lambda_i} = \sum_{j=1}^{k} \omega_j x_j \tag{1}$$

where (j=1, ..., k) is the j-th column of the matrix X whose weights are

$$\omega_j = \frac{\sum_{i=1}^{k} \lambda_i \alpha_j^i}{\sum_{i=1}^{k} \lambda_i} \tag{2}$$

3.2   Regression analysis method

After performing F test and LM test on the data, we found that the P values of both tests were close to 0, so we decided to use a long-panel fixed-effects model, and then performed intra-group autocorrelation, inter-group heteroscedasticity and contemporaneous correlation tests on the data. Later, it was found that the P values were also close to 0, so it was decided to use the comprehensive FGLS method to perform regression analysis on the index of currency internationalization index and the ratio of national debt stock/GDP. In order to improve the effectiveness of the regression, the logarithm of both indicators is processed, and the regression relationship function between the currency internationalization index and the national debt stock/GDP is calculated as follows:

$$lni_{it} = \beta_o + \beta_1 lng_{it} + \varepsilon_{it} \tag{3}$$

The logarithm of the index of currency internationalization for country i in period t, and the logarithm of the indicator national debt stock/GDP for country i in period t.

3.3   Indicator system and selection of variables

This paper refers to the study of (Peng, Hongfeng & Tan, Xiaoyu, 2017) and selects six indicators to measure the degree of currency internationalization by comprehensively examining the three functions of currency, one of the indicators, the currency denominated share of international bonds, can also represent the degree of development of that country's bonds in the international market, the names and sources of the indicators are shown in Table 1.

Due to the availability of data and the prevalence of currency usage considerations this paper selects the US dollar, the euro, the Japanese yen, the British pound, the Chinese renminbi and the Swiss franc as the subjects of the study, with a sample interval of four quarters of 2016 to four quarters of 2019, all of which have been processed using the quadratic-match method to ensure consistency of data frequency, converting annual data into quarters.

Table 1. Variable descriptions and data descriptions

index	variable name	Data Sources
Proportion of global foreign exchange transactions	GFET	BIS
Proportion of foreign exchange reserves	FER	IMF COFER
Proportion of international trade settlement currency	CITS	SWIFT
Currency share of global direct investment	CSGDI	WORLD BANK
Proportion of global credit currency	SGCM	WORLD BANK
Proportion of internationally denominated bonds	PIDB	WIND
National debt stock/GDP	GSG	WIND

4   Conclusion

After constructing the currency internationalization index through principal component analysis, we can find that the weight of the international bond denomination ratio, which represents the degree of development of a country's bonds in the international bond market is 0.167, so we can find that the development of a country's bonds in the international bond market has a significant contribution to the internationalization of its currency.

Table 2. Weighting table for indicators of the degree of currency internationalization

Indicators	SGCM	FER	CITS	GFET	CSGDI	PIDB
Final weighting	0.147	0.190	0.096	0.200	0.199	0.167

Through the final measurement of currency internationalization indexes of various countries, we can find that the internationalization index of RMB is still at a lower level than that of European and American countries, but the overall internationalization index of RMB has a rising trend in recent years. By analyzing the data on the proportion of international bonds denominated, we can find that bonds denominated in US dollars and euros have always accounted for a considerable proportion of international bonds since 2016, and have remained at around 48% since 2016, while bonds denominated in RMB have always been in the international bond market. It is at a low level and has a downward trend year by year. It has been maintained at about 1% in recent years. It can be seen that the development level of Chinese bonds in the international bond market is still low, which leads to the lack of RMB-denominated financial assets for overseas investors to invest. It also reduces the enthusiasm of overseas investors to hold RMB.

Table 3. Table of currency internationalization indices

	2016	2017	2018	2019
USD	5.19	5.30	4.64	4.89
EUR	2.70	2.77	2.59	2.51
JPY	0.60	0.57	0.75	0.76
GBP	0.58	0.70	0.51	0.48
CNY	0.21	0.17	0.36	0.28
CHF	0.20	0.14	0.01	0.11

Using a long panel fixed effects model and a full FGLS regression we can find that there is a significant positive correlation between the Treasury stock/GDP index and the currency internationalization index, with a correlation coefficient of 0.6094 and a Z-test value of 4.34, which also indicates that the development of a country's domestic bond market has a significant contribution to the improvement of the country's currency internationalization, and analyzing the data we can also find that Analyzing the data we can also see that China's national debt stock/GDP indicator has averaged around 0.6 in recent years, compared to 2.5 for the euro and 6.9 for the yen, so the development of China's domestic bond market is at a lower level compared to other countries.

In summary, China also needs to take measures to promote the development of its bond market and the development of RMB-denominated international bonds to promote the internationalization of the RMB, specifically by taking the following measures: Firstly, the government should steadily expand the scale of treasury bond issuance and optimize the treasury bond issuance mechanism. Secondly, it should improve the development of the RMB offshore bond market to strengthen product innovation in the offshore market and promote a steady increase in the issuance of

RMB-denominated international bonds. Finally, it should further introduce policies to steadily and orderly relax the restrictions on foreign investors trading in China's bond market, improve the capital inflow and outflow mechanism, increase the supply of bonds while boosting foreign investors' demand for RMB-denominated bonds, and truly enhance the performance of RMB as a denominated currency in the global market.

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