Comparison of Factors Affecting the Internationalization Level of SDR Basket Currencies

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Abstract: This research uses the panel entropy weight method to construct the Currency Internationalization Index (CII) to measure the internationalization level of the US dollar, euro, pound, yen, and RMB in the special drawing right (SDR) basket currencies. A systematic generalized method of moments (GMM) model with a variable considering the epidemic's influence was used to analyze the influencing factors of currency internationalization. The results showed that the monetary network externalities, economic strength of sovereign countries or regions, and financial market factors significantly and positively affected currency internationalization. The currency instability and the epidemic had negative influences on currency internationalization. A heterogeneity test showed that these factors had different effects on the internationalization levels of different sovereign currencies.

Keywords: Currency Internationalization, Panel Entropy Weight Method, Currency Network Externalities

1. Introduction

Since its launch in 2009, the internationalization of the RMB has experienced three stages: start-up and rapid development, adjustment and stable development, and stable and sustainable development. The internationalization of the RMB and its status in the global monetary system have been promoted since 2014 when China proposed a policy to expand the cross-border use of the RMB to the official launch of the Regional Comprehensive Economic Partnership (RCEP) in 2022. According to SWIFT statistics, RMB became the world's fifth-largest spot foreign exchange currency in 2021. The global foreign exchange reserves of the RMB increased from $90.29 billion in 2016 to $336.1 billion at the end of 2021, with a reserve share of 2.25%, ranking fifth globally.

In 2016, the RMB joined the special drawing right (SDR) basket created by the International Monetary Fund (IMF), indicating a new stage in the internationalization of the RMB and a new pattern of the international monetary system. The SDR basket currently consists of five currencies: the US dollar, the euro, the Chinese yuan, the Japanese yen, and the British pound. These currencies play different roles in the international economy. Therefore, a comparison of the internationalization levels of the RMB and these currencies can be used to determine the internationalization levels of currencies in different countries. According to IMF statistics, the US dollar accounted for 59% of the foreign exchange reserves held by financial authorities in various countries in December 2021, reflecting its importance and influence in the global financial system. The Eurozone has one of the largest economies and trade volumes globally; therefore, the euro is part of the SDR basket. The yen has substantial international influence. However, the Japanese economy has been relatively stagnant during the past few decades. Although the British pound is a major reserve currency, the post-industrial economy of the UK has developed relatively slowly. China, an outstanding representative of developing countries, has shown relatively strong economic growth. The level of the RMB internationalization is comparatively low but is increasing.

Recent studies on currency internationalization have focused on two aspects. The first is the measurement of the currency internationalization level. Research on the RMB internationalization level has received substantial attention [1-3]. The main approach is quantifying the level using the

RMB internationalization index (RII) based on the monetary function. However, due to the different perspectives of scholars, different results were obtained from index systems [4,5]. In addition, the compilation methods differ, resulting in different measurement accuracies [6,7]. Various influencing factors of currency internationalization have been investigated, including monetary network externality[8,9], economic [10,11] and financial influencing factors [12,13], currency stability [14,15], political stability [16], and military strength [17]. Different methods and factor combinations have been used, providing references for future studies.

Based on the existing research and a comparison of the internationalization of other currencies, this study provides the following three innovations. 1. The panel entropy method is used to improve and measure the currency internationalization index. The index weights are determined based on the amount of information to consider the influences of various indicators objectively in contrast to the subjective weighting or the weighted average used in previous studies. 2. A factor describing the epidemic's impact is incorporated, which was rarely done in empirical tests of monetary feasibility. 3. Heterogeneity testing was used to analyze the differences in the effects of factors on currency internationalization in countries or regions at different development stages. This approach is more practical for determining the RMB internationalization than that of most studies, which analyzed currency internationalization from a global or country perspective.

The rest of the paper is organized as follows. Section 2 describes the establishment of a currency internationalization index (CII) of SDR basket currencies. Section 3 presents the influence of the factors on currency internationalization. Section 4 provides the result of the heterogeneity test for different currency groups. Section 5 concludes the paper.

2. Currency Internationalization Index for SDR Basket Currencies

The panel entropy weight method was used to assign weights to the indicator variables to improve the measurement accuracy (Wang Tianqian, 2022[18]). The currency internationalization index is defined as follows:

$$\mathrm{CII} = \frac{\sum_{i=1}^{5} X_{it} W_i}{\sum_{i=1}^{5} W_i} \quad (1)$$

2.1 Variable Selection

The three basic functions of a currency, i.e., valuation payment, investment transactions, and reserve value, were used as the first-level indices. They were determined based on the RII published by the Renmin University of China. The second-level indicators considered the proportion of major currencies traded in the foreign exchange market and derivatives market, broadening the measurement scope. The panel entropy weight method was used to achieve objective weighting and improve the accuracy of the results. Annual data for 21 years (from 2000 to 2020) were analyzed. Five variables were used as secondary indicators to measure the different functions of the currency in Table 1.

Table 1. Data Information for the Indicator Variables to Establish the CII

Dimensions	Secondary variables	Data source
Valuation payment function	The proportion of major currencies issued in the international bond market (X1)	BIS
Investment transaction function	The share of major currencies in global outward direct investment (OFDI) (X2)	UNCTAD
	The proportion of major currencies traded in the foreign exchange market (X3)	BIS
	The proportion of major currency transactions in the derivatives market (X4)	BIS
Reserve value function	The proportion of major currencies in the world's foreign exchange reserves (X5)	IMF

Note: UNCTAD refers to the United Nations Conference on Trade and Development.

2.2 Index Measurement Based on Panel Entropy Weight Method

The entropy weight method determines the weights based on the amount of information contained in the variables, and the variables do

not have to be independent. The panel data consisted of the five secondary indicators of the US dollar, euro, British pound, Japanese yen, and RMB were weighted to construct the CII. The following steps were used:

The standardized data $Z_{\propto ij}$ were obtained by positive processing of five secondary indicators:

$$Z_{\propto ij} = \frac{X_{\propto ij} - X_{min}}{X_{max} - X_{min}} \quad (2)$$

$Z_{\propto ij}$ was used in Eq. (3) to obtain the normalized result $P_{\propto ij}$:

$$P_{\propto ij} = \frac{Z_{\propto ij}}{\sum_{\propto=1}^{21} \sum_{i=1}^{5} Z_{\propto ij}} \quad (3)$$

We used the normalized $P_{\propto ij}$ value in Eq. (4) to obtain the entropy value e_j:

$$e_j = -\mathrm{k} \sum_{\propto=1}^{21} \sum_{i=1}^{5} P_{\propto ij} ln\, P_{\propto ij} \quad (4)$$

The entropy e_j was used in Eq. (5) to derive the degree of redundancy g_j:

$$g_j = 1 - e_j \quad (5)$$

w_j was determined using Eq. (6) to obtain the weight of the j indicators:

$$w_j = \frac{g_j}{\sum_{j=1}^{5} g_j} \quad (6)$$

Then w_j was used in Eq. (1) to calculate the CII of the currency.

Where $\propto$, i, and j represent the year, currency, and indicator, respectively; X_{max} and X_{min} represent the maximum and minimum values of the j indicator, respectively; $Z_{\propto ij}$ and $P_{\propto ij}$, respectively, represent the index value after data standardization and normalization; e_j represents the entropy value to be solved, whose range is 0-1. The smaller the value, the greater the dispersion degree of the index and the higher its weight. $K = \frac{1}{ln(m*k)}$, where m is the number of the major currencies, and k is the length of the sample period; m=5 and k=21. The entropy, redundancy, and weights of indicators are shown in Table 2.

2.3 Analysis of Currency Internationalization Index

The US dollar had the highest CII (50-60), followed by the euro. Both are mature international currencies. The CII of the pound and the yen was 5-10, smaller than the US dollar and the euro. The CII of the RMB was less than 2, indicating that it is much lower than the other currencies. Due to the increased internationalization of the RMB, its CII is shrinking with the yen and the pound. The results are shown in Table 3.

The CII of the five currencies changes dynamically in Figure 1 based on international monetary conditions. The establishment of the euro as the sole legal tender in 2002 increased its internationalization, but the financial crisis in 2008 and the European debt crisis in 2009 reduced the internationalization level of the US dollar and the euro, respectively. Since the pound faces competition from the euro, the level of internationalization of the two currencies is reflected in their substitution. The trend of internationalization of the yen has declined, but the rate of decrease has slowed in recent years.

In contrast, the internationalization of the RMB was characterized by a late start, rapid growth, and a gap between its CII and that of the other currencies. 2009 is considered the beginning of the internationalization of the RMB. The RMB's CII was previously below 0.2 and only exhibited an upward trend after 2009. Due to the implementation of favorable projects from 2009 to 2015, such as the Belt and Road project, China has strengthened its trade with countries along the route, rapidly increasing the RMB's internationalization. Since 2016, the internationalization of the RMB increased steadily.

3. Influencing Factors of Currency Internationalization

We investigate the factors influencing the currency internationalization of SDR basket currencies. We used the CII as the dependent variable and indicators describing the monetary network externalities, the economic strength of the sovereign country or region, the currency stability, and the integrity of the financial market as independent variables. The generalized method of moments (GMM) model proposed by Arellano and Blundell (1991) was used to conduct an empirical analysis of panel data from 2000 to 2020 [19].

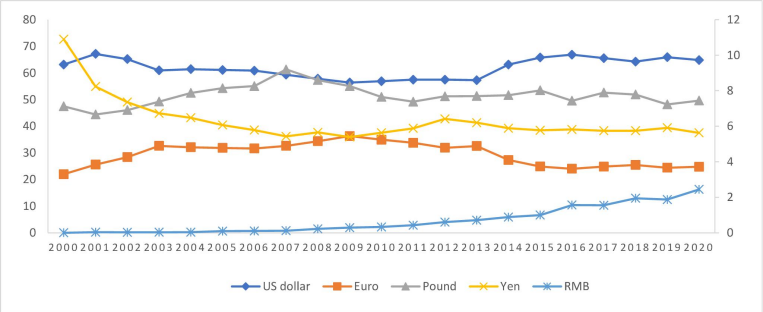
Table 2. Entropy and Weights of the Indices

Secondary variables	Entropy	Redundancy	Weight
The proportion of major currencies issued in the international bond market (X1)	0.886	0.114	0.207
The share of major currencies in global outward direct investment	0.981	0.019	0.035

(OFDI) (X2)			
The proportion of major currencies traded in the foreign exchange market (X3)	0.907	0.093	0.168
The proportion of major currency transactions in the derivatives market (X4)	0.848	0.152	0.276
The proportion of major currencies in the world's foreign exchange reserves (X5)	0.830	0.174	0.315

Table 3 CIIs of SDR Basket Currencies

Year	US dollar	Euro	Pound	Yen	RMB
2000	63.152	22.000	7.125	10.893	0.005
2001	67.165	25.601	6.662	8.234	0.037
2002	65.212	28.403	6.908	7.358	0.026
2003	60.952	32.631	7.389	6.728	0.032
2004	61.412	32.107	7.877	6.480	0.037
2005	61.140	31.853	8.143	6.068	0.095
2006	60.852	31.666	8.263	5.786	0.108
2007	59.326	32.634	9.200	5.429	0.122
2008	57.835	34.397	8.596	5.652	0.223
2009	56.421	36.316	8.260	5.394	0.290
2010	56.883	34.968	7.651	5.632	0.330
2011	57.484	33.778	7.383	5.882	0.427
2012	57.496	31.924	7.684	6.416	0.602
2013	57.283	32.571	7.698	6.202	0.712
2014	63.131	27.327	7.749	5.888	0.887
2015	65.768	24.893	8.023	5.771	0.999
2016	66.855	24.057	7.434	5.820	1.568
2017	65.568	24.846	7.894	5.744	1.551
2018	64.252	25.474	7.787	5.745	1.948
2019	65.915	24.441	7.229	5.913	1.876
2020	64.852	24.811	7.443	5.629	2.443



Note: The US dollar and the Euro are referenced to the left axis, while the Pound, Yen and RMB are referenced to the right axis.

Figure 1 Comparison of CIIs of Different Currencies

3.1 Variable Selection

The explanatory variable of the model was the level of currency internationalization measured by the CII. The following explanatory variables were used:

3.1.1 Monetary Network Externality

Theoretical analysis has shown that monetary network externality affects currency internationalization. We used the method proposed by Chinn & Frankel (2007) [20] and the lag period of the CII to measure the network externality of the currency. The lag period of the CII reflects the acceptance of the currency by the international market.

3.1.2 Economic strength

The economic strength of a sovereign country is measured by two indicators: the GDP and

the proportion of the country's trade in the global market. The stronger the economy, the stronger the country's currency, and the higher the acceptance of the currency globally.

3.1.3 Currency stability

Currency stability consists of internal and external stability. The internal stability is measured by a country's GDP deflator, and the external stability is measured by the degree of exchange rate fluctuations expressed by the standard deviation of the exchange rate of the country's currencies against the SDR.

3.1.4 Financial market factors

Financial market factors include the degree of development and openness of the financial market. The degree of development reflects the liquidity of the currency and assets in the country's currency, which is critical for international market players to choose currencies. Since the capital account of the RMB is not completely open, the Chinn-Ito index (KAOPEN) was used to measure the openness of the capital account in the financial market.

3.1.5 Military strength and political stability

Currency internationalization is a comprehensive issue. Strong military strength can improve the international status of the currency and enhance the confidence of the international community in holding the currency. Political stability means that the currency-issuing country has a good reputation and low sovereign risk. Military strength was defined as the proportion of a country's military expenditure to the country's total GDP, and the political stability coefficient published by the World Bank was used to measure the political stability of a monetary sovereign.

3.1.6 COVID-19 factor

The instability of the world economy has increased significantly due to the epidemic's impact, affecting the level of currency internationalization. Thus, a dummy variable D was used to measure the epidemic's impact on currency internationalization. We used a value of 1 for D to 1 in 2019 and 2020 and 0 in the remaining years.

3.2 GMM Model Establishment

Stata 14.0 was used for empirical analysis, and the sample period was from 2000 to 2020. The following GMM model was established:

$$LNCII_{i,t} = \alpha_0 + \beta_1 LNLCII_{i,t} + \beta_2 LNGDP_{i,t} + \beta_3 TR_{i,t} + \beta_4 INF_{i,t} + \beta_5 RER_{i,t} + \beta_6 FME_{i,t} + \beta_7 CAIO_{i,t} + \beta_8 MIL_{i,t} + \beta_9 POL_{i,t} + \beta_{10} D + \varepsilon_{i,t} \quad (7)$$

Where i and t represent different countries and years. The logarithmic CII (LNCII) is the explanatory variable, and LNLCII, logarithmic GDP (LNGDP), trade status (TR), inflation rate (INF), RER, and others are explanatory variables. $\alpha_i \, and \, \beta_i$ are the estimation coefficients, and ε is the random perturbation term. Table 4 lists the variables.

3.2.1 Descriptive statistics

The descriptive statistics listed in Table 5 show that the standard deviations of the variables range from 0 to 3, indicating low variability.

3.2.2 Model testing and regression

We used data for the five currencies for a 21-year period for empirical testing, i.e., balanced long-term panel data. Therefore, the Levin-Lin-Chu method was used to perform the panel unit root test. The result indicated the variables were stationary. The Haussmann test results showed that the fixed-effects model was suitable.

The explanatory variable was the first-order lag term, resulting in endogeneity. Therefore, the A-Bond test was performed to ensure no second-order autocorrelation of the perturbation term. The Sargan test was conducted to test overidentifying restrictions. The results indicated appropriate variable selection. Therefore, the proposed GMM model was reasonable. Tables 6-10 list the results.

3.3 Analysis of Empirical Results

The regression results showed that the monetary network externality was the dominant explanatory variable. It was significant at the 1% level. Due to monetary inertia, the market participants consider the number of users and the amount of currency. The larger the monetary network, the lower the transaction costs and the higher the convenience.

The economic strength and financial market factors also had significant positive impacts on currency internationalization. They were significant at the 5% level. The larger the country's trade volume and the higher the degree of openness, the easier it is for the country to formulate favorable trading rules

and the stronger the liquidity and security of currency-denominated assets, which are favored by world market participants. Therefore, the economic strength and the degree of development of financial markets are crucial factors affecting the internationalization of sovereign currencies.

The model results showed that the country's GDP deflator and the exchange rate of the sovereign currency against the SDR were inversely correlated with the degree of currency internationalization. These results are consistent with those of Chinese and international scholars. These variables were significant at the 10% level. The high inflation level alters the price transmission mechanism in the domestic market and results in long-term depreciation of the country's sovereign currency, preventing currency internationalization.

The military strength had positive and significant effects (at the 1% level) on currency internationalization. An inverse relationship existed between the epidemic factor and the level of currency internationalization, indicating that the epidemic resulted in global economic recession and increased uncertainty in the financial sector, adversely affecting currency internationalization.

Table 4. Variables Influencing Currency Internationalization

Influencing factors	Variables	The meaning and handling of variables	Symbols	Data source
Currency internationalization	CII	The degree of internationalization of the currency are, expressed by the logarithmic CII.	LNCII	Calculated by the author
	Monetary network externality	The logarithmic lag of the CII in one period.	LNLCGI	
Economic strength	Economic status	The logarithmic GDP of the country.	LNGDP	World bank; UNCTAD
	Trade status	The proportion of a country's trade volume to the global trade volume	TR	World bank
Currency stability	Inflation rate	A country's GDP deflator	INF	World bank
	SDR Currency Exchange Ratio	The standard deviation of the exchange rate of a country's currency against the SDR	RER	International Monetary Fund
Financial market factors	The degree of development of the financial market	Financial Market Development Index	FME	International Monetary Fund
	The degree of openness of the financial market	Capital Account Openness Index	CAOI	Chinn-Ito index
Military strength	Military expenditure	The proportion of a country's military expenditure to the country's total GDP	MIL	World bank
Political stability	Political stability	Political stability coefficient	POL	World bank
COVID-19 factor	Epidemic factor	Dummy variables	D	International events

Table 5. Descriptive Statistics

Symbols	Variables	Observations	Average value	Standard deviation	Minimum	Maximum
LNCII	Currency Internationalization Index	105	2.004	2.036	-5.298	4.207
LNLCII	Monentary network externality	100	1.984	2.068	-5.298	4.207
LNGDP	Economic status	105	29.492	0.769	27.823	30.694
TR	Trade status	105	0.111	0.086	0.022	0.305
INF	Inflation rate	105	1.783	1.906	-1.881	8.076
RER	SDR Currency Exchange Ratio	105	0.840	1.877	0.004	12.025
FME	The degree of development of	105	0.743	0.171	0.280	0.950

	financial markets					
CAOI	The degree of openness of financial markets	105	1.559	1.408	-1.234	2.311
MIL	Military spending	105	2.084	1.049	0.898	4.923
POL	Political stability	105	0.448	0.538	-.657	1.198
D	Epidemic factors	105	0.095	0.295	0.000	1

Table 6. Unit Root Test Results

Variables	Adjusted t*
LNCII	-5.66358***
LNLCII	-4.5346***
LNGDP	-4.7485***
TR	-2.3109**
INF	-3.3576***
RER	-3.7593***
FME	-2.5473***
CAOI	-4.1976***
MIL	-2.7045***
POL	-2.4669***

Table 7. Hausman Test Results

Hausman test	Reject null hypothesis H0: random-effects model	
	$Chi^2(4)$	Prob > Chi^2
	11.35	0.0229

Table 8. Results of Autocorrelation Test

A-Bond test	AR(2) does not reject the null hypothesis H0: There is no autocorrelation in the perturbation term.		
	Order	Z value	P>Z
	1	-2.26	0.024
	2	-0.16	0.873

Table 9. Over-Identification Test Results

Sargan test	Do not reject null hypothesis H0: The tool variable is valid.	
	$Chi^2(89)$	Prob > Chi^2
	102.27	0.159

Table 10. Regression results of the dynamic panel model

LNCII	Coef.	St. Err.	t-value	p-value	[95%Conf	Interval]	Sig
LNLCII	0.575	0.167	3.43	0.001	0.247	0.903	***
LNGDP	0.236	0.137	1.72	0.085	-0.032	0.504	*
TR	4.092	1.664	2.46	0.014	0.831	7.353	**
INF	-0.014	0.008	-1.78	0.076	-0.003	0.001	*
RER	-0.008	0.013	-0.62	0.537	-0.034	0.018	
FME	1.952	1.154	1.69	0.091	-0.309	4.213	*
CAOI	0.184	0.083	2.23	0.025	0.023	0.346	**
MIL	0.089	0.019	4.76	0.000	0.052	0.125	***
POL	0.033	0.076	0.43	0.067	-0.117	0.182	
D	-0.033	0.019	-1.77	0.078	-0.007	0.004	*
Constant	-8.424	4.831	-1.74	0.081	-17.893	1.044	*
Mean dependent var	2.041	SD dependent var	1.938				
Number of obs	100	Chi-square	1202.985				

*** *p<0.01*, ** *p<0.05*, * *p<0.1*

Table 11. Regression results of different models

	(1) Fe	(2) Fe(robust)	(3) FGLS
LNLCII	0.339***	0.339	0.355***
	(0.064)	(0.270)	(0.067)

LNGDP	0.735***	0.735	0.597***
	(0.113)	(0.400)	(0.100)
TR	8.140***	8.140	6.852***
	(1.398)	(4.304)	(1.293)
INF	-0.018*	-0.018	-0.002
	(0.011)	(0.009)	(0.009)
RER	-0.006	-0.006	0.001
	(0.014)	(0.005)	(0.008)
FME	0.798*	0.798	0.482
	(0.444)	(0.593)	(0.362)
CAOI	-0.492**	-0.492	-0.549**
	(0.234)	(0.235)	(0.220)
MIL	0.055	0.055	0.068*
	(0.056)	(0.038)	(0.040)
POL	0.107	0.107	0.042
	(0.091)	(0.146)	(0.052)
D	-0.026	-0.026	-0.025
	(0.052)	(0.020)	(0.034)
_cons	-21.178***	-21.178	-19.674***
	(3.147)	(11.690)	(3.186)

3.4 Robustness Test

A robustness test was conducted to assess the reliability of the results using different models and data. Various econometric methods have been used. We compared the results of the GMM, fixed-effects model, fixed-effects robust regression model, and generalized least squares regression model. The regression results of the three models were consistent with the GMM, indicating the reliability of the proposed model. Table 11 shows the regression results.

Different data were used to compare the results. 1. The real effective exchange rate (REER) was used in the original model. It is a nominal effective exchange rate adjusted for relative prices that reflect the external value of a country's currency. 2. We replaced the financial market development index in the original model with the financial market index to reflect the financial market level comprehensively. The data source was the IMF. 3. We replaced the GDP deflator with the CPI. 4. The data for 2008 and 2020 were deleted because the global economy was in a recession, resulting in significant data fluctuations.

The regression results in Table 12 show that the results did not differ from those of the proposed model, indicating the model was robust and the regression results are accurate.

Table 12. Regression Results Using Different Data

Models	**(1)**	**(2)**	**(3)**	**(4)**
	LNCII	LNCII	LNCII	LNCII
LNLCII	0.515***	0.658***	0.584***	0.630***
	(0.048)	(0.049)	(0.046)	(0.054)
LNGDP	0.310***	0.211***	0.246***	0.249***
	(0.056)	(0.061)	(0.054)	(0.068)
TR	3.982***	3.014***	3.844***	3.011***
	(0.637)	(0.807)	(0.672)	(0.879)
INF	-0.003	-0.010	-0.004	-0.015
	(0.011)	(0.012)	(0.014)	(0.014)
RER	-0.004	-0.013	-0.007	-0.033
	(0.012)	(0.014)	(0.013)	(0.021)
NEED	0.486***			
	(0.146)			
FME	1.838***	0.922***	1.869***	0.976***

	(0.345)	(0.317)	(0.369)	(0.342)
CAOI	0.250***	0.224***	0.186***	0.257***
	(0.051)	(0.057)	(0.050)	(0.062)
MIL	0.093***	0.059**	0.083***	0.048
	(0.024)	(0.030)	(0.025)	(0.033)
POL	0.100	0.021	0.044	0.043
	(0.074)	(0.085)	(0.075)	(0.094)
D	-0.020	-0.020	-0.037	-0.044
N	100.000	100.000	100.000	90.000
r1				
ar2	-0.050	0.042	-0.036	0.676

4. Heterogeneity Analysis

Since the impact of the factors on the internationalization of sovereign currencies may differ for sovereign countries or regions with different development levels, we divided the five currencies into two groups: the US dollar and the euro, and the pound, yen, and RMB. The results listed in Table 13 were consistent with those of the original data. The two indicators representing financial market factors were not significant for the US dollar and the euro. The reason is that market participants in developed countries have a relatively high tolerance for the vulnerability and liquidity of their financial markets. If the currency has a low degree of internationalization and the market participants have low confidence in it, the network externalities of the currency are lower than that of the core world currencies. This is a major problem emerging currencies, including the RMB, face to participate in the international monetary system.

Table 13. Regression Results for Different Currency Groups

	(1) Core world currencies	(2) Major world currencies
LNLCII	0.745***	0.117
	(0.090)	(0.092)
LNGDP	0.095	1.009***
	(0.070)	(0.175)
TR	2.061**	15.210***
	(0.749)	(3.510)
INF	0.010	-0.014
	(0.012)	(0.013)
RER	0.401	-0.006
	(0.835)	(0.016)
FME	0.168	0.439
	(0.636)	(0.568)
MIL	-0.007	0.080
	(0.022)	(0.169)
POL	0.074	0.314*
	(0.044)	(0.164)
D	-0.000	0.022
	(0.033)	(0.080)
_cons	-2.497	-29.880***
	(1.943)	(4.949)
N	40.000	60.000
r1		
ar2		

5. Conclusion

This study used the panel entropy method to determine the internationalization level of the US dollar, euro, pound, yen, and RMB in the SDR basket currencies, with a focus on RMB internationalization. We used the GMM model to reveal the main factors influencing currency

internationalization. A heterogeneity test was utilized to analyze the differences in the impacts of the factors on the internationalization level of five currencies.

The following conclusions were obtained. First, the US dollar and euro had the highest internationalization levels, followed by the pound, yen, and RMB. Second, network externality, economic strength, and financial market conditions were the dominant factors influencing currency internationalization. The currency instability, especially within the country, significantly hindered currency internationalization, and the epidemic significantly affected currency internationalization in various countries. Third, the effects of network externality, economic strength, and political stability differed for different currencies. The network externality had a more significant effect on the core currencies (US dollar and euro), whereas economic power and political stability had larger effects on the other world currencies.

The following recommendations are provided to improve the RMB's internationalization. First, high-quality macroeconomic development is required. Second, the stability of the RMB must be ensured. A certain amount of inflation is required to stimulate economic development in China. The focus should be the market-oriented reform of the exchange rate to determine that supply and demand in the foreign exchange market determine the exchange rate. Third, the financial market requires continuous development. It is necessary to focus on RMB-denominated financial products and open capital accounts to improve financial and macroeconomic stability.

Acknowledgements

This study is supported by the Philosophy and Social Sciences Research Project of Heilongjiang Province, China (Project No. 21JLD262).

References

[1] Ding Yibing, Shen Weiwen. Research on the mechanism of China's trade with countries along the "Belt and Road" affecting the internationalization of RMB. Social Science Front, 2020 (06): 84-92+281-282.

[2] Xiang Weixing, Zhong Hong, Li Hongjin. An Empirical Study on the Influencing Factors of Currency Share of International Bond Issuance: Enlightenment to RMB Internationalization. World Economic Research, 2017(09): 3-12+135. DOI: 10.13516/j.cnki.wes.2017.09.001.

[3] Li, Yao. Non-International Currencies, Currency Internationalization and Capital Account Convertibility. Journal of Financial Research, 2003, (08): 104-111.

[4] Research Group on RMB Internationalization. The Timing, Approach and Strategy of RMB Internationalization. China Finance, 2006(05): 12-13.

[5] Cao Yujin. Economic Research Reference, 2014(09): 72-85. DOI: 10.16110/ j.cnki.issn2095-3151.2014.09.004.

[6] Fan Zuojun, Xia Wenxiang, Chen Yaowen. Journal of Central University of Finance and Economics, 2018(04): 30-43. DOI: 10.19681/j.cnki.jcufe.2018.04.003.

[7] Li, Jing, Guan, Tao, & He, Fan. The Current Situation of RMB Cross-Border Circulation and Its Impact on the Chinese Economy. Management World, 2004, (09): 45-52+155. DOI: 10.19744/j.cnki.11-1235/f.2004.09.006.

[8] Flandreau M, Jobst C. The Empirics of International Currencies: Network Externalities, History and Persistence. The Economic Journal, 2009, 119(537): 643-664.

[9] Chen, Weidong, & Zhao, Xueqing. Research on the Development Path of RMB Internationalization: Reflections Based on Ten Years of Development. International Economic Review, 2020, (04): 28-37+4.

[10] Tian Tao, Liu Luping, Xu Yang. The evolution trajectory of sovereign currency internationalization and the path of RMB internationalization——An analysis based on Marx's monetary theory. Journal of Business Research, 2021(01): 59-65. DOI: 10.13902/j.cnki.syyj.2021.01.008.

[11] Flandreau, Marc & Jobst, Clemens. (2006). The Empirics of International Currencies: Historical Evidence. Kevin D, Greenaway D. Currency Competition, Network Externalities and Switching Costs: Towards an Alternative-View of Optimum Currency Areas. The Economic

Journal, 1993, 103(420): 1180-1189.

[12] Qing He, Iikka Korhonen, Junjie Guo, Fangge Liu. The geographic distribution of international currencies and RMB internationalization. International Review of Economics & Finance, 2016(42): 442-458.

[13] Que Chengyu, Cheng Liyan. Does exchange rate fluctuation have a nonlinear effect on currency internationalization? Based on the perspective of financial market development. Journal of International Finance, 2018(03): 14-24. DOI: 10.16475/j.cnki.1006-1029.2018.03. 002.

[14] Peng Hongfeng, Tan Xiaoyu, Zhu Xiaoquan. Currency Internationalization: Research on the Influencing Factors and Action Path of Cost Channel. World Economy, 2017, 40(11): 120-143. DOI: 10.19985/j.cnki.cassjwe.2017.11.007.

[15] Ba Xiaoyan, Yu Xiaoning. Currency internationalization from the perspective of international financial investment——Index construction and long-term and short-term driving factors analysis. Journal of International Finance, 2019(03): 55-64. DOI: 10.16475/j.cnki.1006-1029.2019.03. 006.

[16] Wu Cong, Zhao Ran. How does politics play a role in the internationalization of currency? Review of Political Economy, 2015, 6(06): 162-182.

[17] Gong Xiuguo, Yu Enfeng. Research on the impact of alliance relationship on the status of the US dollar and the internationalization of non-US dollar currencies: Theory and empirical evidence. Journal of Sichuan University (Philosophy and Social Science), 2020(05): 128-139.

[18] Wang Tianqian, Zhu Xiaomei. Measurement of RMB internationalization level and analysis of influencing factors——An empirical study based on the perspective of dual circulation and national finance. Journal of Financial Economics, 2022, 37(06):127-143.

[19] Arellano, M. and Bond, S. 1991. Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations. Review of Economic Studies, 58, 277-297.

[20] Chinn, Menzie and Jeffrey A. Frankel. 2007. Will the euro eventually surpass the dollar as leading international reserve currency? In G7 Current account imbalances: sustainability and adjustment. University of Chicago Press. pp. 283-338.

