The Interaction between RMB Internationalization in Offshore Market and RMB Settlement in Cross-border Trade——Research Based on Trade Type

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Abstract. Based on the background of the " The Fourteenth Five-Year Plan " and the premise that the internationalization of RMB is different from other currencies, with the characteristic of internationalization is the construction of the offshore market as well as the reality that China is the world's largest trading country, this paper uses VAR method and the RMB global index from January 2012 to December 2019, the RMB settlement of cross-border trade, the RMB settlement of cross-border goods trade, monthly data of RMB settlement of cross-border service trade, quantifying the interaction between RMB internationalization in the offshore market and RMB settlement cross-border trade.

Keywords: RMB internationalization, Offshore market, RMB settlement of cross-border trade, Trade in goods, Service trade

1 Introduction

"RMB internationalization" is proposed in China in January 2015 for the first time and the Fourteenth Five-Year Plan clearly emphasizes to steadily and prudently promote the internationalization of RMB. The currency use of non-residents is the key link of currency internationalization, which is mainly reflected in the scale and frequency of RMB use in the offshore market, that is, the degree of RMB internationalization in the offshore market. As the world's largest trading power, China's cross-border trade is one of the motive powers of economic development from the demand side. The primary function of the three major functions of international currency -- settlement, pricing and reserves is trade settlement. The RMB settlement of cross-border trade provides a channel for the cross-border circulation of RMB and affects the use scale of people in the offshore market which can better reflect the market supply and demand of RMB due to less government control. The internationalization of RMB in offshore market is greatly affected by international political and economic factors, which will influence the scale of RMB cross-border trade settlement. Exploring the interactive relationship between RMB internationalization in the offshore market and RMB settlement in cross-border trade has research significance for China to steadily and prudently promote RMB internationalization, improve the driving force of the offshore market and

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promote the free use of RMB. Most of the relevant studies are qualitative studies, but empirical studies are insufficient. The research purpose of this paper is to quantify such the interaction by using VAR method and monthly data, so as to enrich relevant research based on trade type.

2 Literature Review

Relevant research on RMB trade settlement and RMB internationalization began to emerge [1] The common currency internationalization models in the world can be divided into the Japanese model and the German model. The Japanese model is characterized by "trade settlement plus offshore market", and the German model is characterized by "capital export plus multinational companies". The reason for the failure of the Japanese model is that the domestic financial reform has not been completed, but the capital account has been opened too early, resulting in a "refinancing game"[2]. The success of the German model depends on highly competitive multinational corporations. At present, the international competitiveness of Chinese multinational corporations needs to be further improved. The Chinese scheme of the currency internationalization mode is to actively build the offshore market under the background that the onshore market has not been fully opened [3], which shows that the offshore market is more important than the onshore market. At present, the important obstacle to the internationalization of RMB is insufficient liquidity, which can be solved by the offshore market [4], but the coupling between RMB offshore market and RMB cross-border settlement is low [5], which will affect the overall situation of RMB internationalization.

3 Data and Models

The data source of this paper is Guotai'an database. The time range is from January 2012 to December 2019 (subject to the availability of data and the impact of the epidemic). The data frequency is monthly. In order to reduce the volatility of data, the original data is taken as logarithm.

The main variable of this paper is the RMB settlement of cross-border trade(trade), RMB settlement amount of cross-border goods trade(goods), RMB settlement amount of cross-border service trade(service), Standard Chartered Bank RMB global index(RGI) (The comprehensive index reflecting the internationalization of RMB is synthesized by using the data of wealth storage, financing tools, international trade and trading channels of three major RMB offshore markets in the world, namely Hong Kong, Singapore and London), t as period, m as number of lag periods. VAR model can study the cause and effect of variables, so there is no absolute difference between explanatory variables and explained variables. The variables in the current period are interfered by the lag period itself and other variables, which avoids the randomness of the subjective selection of the model form. The benchmark model of this paper is as follows.

$$trade_t = \beta_0 + \beta_1 trade_{t-1} + \cdots + \beta_m trade_{t-m} + \alpha_1 RGI_{t-1} + \cdots + \alpha_m RGI_{t-m} + \varepsilon$$

$$RGI_t = \beta_0 + \beta_1 trade_{t-1} + \cdots + \beta_m trade_{t-m} + \alpha_1 RGI_{t-1} + \cdots + \alpha_m RGI_{t-m} + \varepsilon \quad (1)$$

$$goods_t = \beta_0 + \beta_1 goods_{t-1} + \cdots + \beta_m goods_{t-m} + \alpha_1 RGI_{t-1} + \cdots + \alpha_m RGI_{t-m} + \varepsilon$$

$$RGI_t = \beta_0 + \beta_1 goods_{t-1} + \cdots + \beta_m goods_{t-m} + \alpha_1 RGI_{t-1} + \cdots + \alpha_m RGI_{t-m} + \varepsilon \quad (2)$$

$$service_t = \beta_0 + \beta_1 service_{t-1} + \cdots + \beta_m service_{t-m} + \alpha_1 RGI_{t-1} + \cdots + \alpha_m RGI_{t-m} + \varepsilon$$

$$RGI_t = \beta_0 + \beta_1 service_{t-1} + \cdots + \beta_m service_{t-m} + \alpha_1 RGI_{t-1} + \cdots + \alpha_m RGI_{t-m} + \varepsilon \quad (3)$$

4 Empirical part

4.1 Stationarity test

As shown in Table 1, all four variables are stable after first-order difference.

Table 1. (Stationarity test) [Data source: owner-draw]

Variable	ADF Inspection value	T value (5%level)	P value	Stable or not
lgoods	-2.323209	-2.892879	0.1669	No
lRGI	-2.872755	-2.893589	0.0525	No
ltrade	-2.567538	-2.892879	0.1034	No
lservice	-2.380350	-2.892879	0.1500	No
dlgoods	-12.08701	-1.944324	0.0000	Yes
dlRGI	-2.576711	-1.944404	0.0104	Yes
dltrade	-12.99206	-1.944324	0.0000	Yes
dlservice	-13.42984	-1.944324	0.0000	Yes

Notes: The variable prefix l denotes the logarithm, and the form d denotes the first-order difference.

4.2 Determine the lag order

As shown in figure 1 to figure 3, according to the information standard, the lag order of VAR of RMB internationalization and cross-border trade RMB settlement in the offshore market is determined to be 4. The lag order of VAR of RMB internationalization and RMB settlement of cross-border goods trade in offshore market is 2. The lag order of VAR of RMB internationalization and cross-border service trade RMB settlement in offshore market is 4.

Lag	LogL	LR	FPE	AIC	SC	HQ
0	190.6002	NA	4.49e-05	-4.335637	-4.278950	-4.312811
1	212.6040	42.49003	2.97e-05	-4.749517	-4.579454	-4.681038
2	241.5374	54.54117	1.67e-05	-5.322699	-5.039261*	-5.208567
3	244.0913	4.696766	1.73e-05	-5.289455	-4.892642	-5.129670
4	255.8064	21.00638*	1.45e-05*	-5.466813*	-4.956625	-5.261376*
5	259.2318	5.984721	1.47e-05	-5.453605	-4.830043	-5.202516
6	262.7013	5.901999	1.49e-05	-5.441408	-4.704470	-5.144666
7	265.5469	4.710089	1.54e-05	-5.414872	-4.564559	-5.072477
8	269.5702	6.474264	1.54e-05	-5.415408	-4.451719	-5.027360

Fig. 1. (The VAR lag orders of RMB internationalization and RMB settlement of cross-border trade in the offshore market) [Data source: EVIEWS10]

Lag	LogL	LR	FPE	AIC	SC	HQ
0	161.3840	NA	8.79e-05	-3.663999	-3.607312	-3.641173
1	183.0655	41.86779	5.85e-05	-4.070471	-3.900409	-4.001992
2	199.1971	30.40905	4.43e-05	-4.349359	-4.065921*	-4.235228*
3	202.4632	6.006488	4.51e-05	-4.332486	-3.935673	-4.172702
4	210.9076	15.14180*	4.07e-05	-4.434658	-3.924470	-4.229221
5	215.4618	7.956689	4.02e-05*	-4.447397*	-3.823834	-4.196308
6	217.0779	2.749314	4.26e-05	-4.392596	-3.655658	-4.095854
7	219.2955	3.670434	4.45e-05	-4.351620	-3.501307	-4.009225
8	222.5528	5.241613	4.54e-05	-4.334546	-3.370858	-3.946499

Fig. 2. (The VAR lag orders of RMB internationalization and RMB settlement of cross-border goods trade in the offshore market) [Data source: EVIEWS10]

Lag	LogL	LR	FPE	AIC	SC	HQ
0	101.7688	NA	0.000346	-2.293535	-2.236848	-2.270709
1	132.4362	59.21990	0.000187	-2.906580	-2.736517	-2.838101
2	145.1882	24.03820	0.000153	-3.107775	-2.824337*	-2.993643
3	148.6013	6.276943	0.000155	-3.094282	-2.697470	-2.934498
4	158.1695	17.15684	0.000137*	-3.222288*	-2.712100	-3.016851*
5	159.7686	2.793745	0.000145	-3.167094	-2.543531	-2.916004
6	160.7302	1.635926	0.000156	-3.097247	-2.360309	-2.800505
7	161.2607	0.878011	0.000169	-3.017487	-2.167174	-2.675092
8	167.3833	9.852471*	0.000161	-3.066283	-2.102595	-2.678235

Fig. 3. (The VAR lag orders of RMB internationalization and RMB settlement of cross-border service trade in the offshore market.) [Data source: EVIEWS10]

4.3 Establish VAR system and conduct unit circle inspection

Establish three outcome equations of VAR (RMB global index with RMB settlement of cross-border trade, RMB settlement of cross-border goods trade and RMB settlement of cross-border service trade respectively) as shown in formula (4) - formula (6). According to figure 4 to 6, all three VAR models passed the unit circle test.

$$RGI_t = 0.0030 + 0.5292RGI_{t-1} - 0.0242RGI_{t-2} - 0.2446RGI_{t-3} + 0.3255RGI_{t-4} + 0.0172trade_{t-1} + 0.0779trade_{t-2} + 0.0282trade_{t-3} + 0.0665trade_{t-4}$$

$$trade_t = 0.0110 - 0.6493RGI_{t-1} + 0.2972RGI_{t-2} - 0.9332RGI_{t-3} + 1.8481RGI_{t-4} + 0.4536trade_{t-1} + 0.4801trade_{t-2} + 0.0632trade_{t-3} + 0.0309trade_{t-4} \quad (4)$$

$$goods_t = 0.0224 - 0.9047RGI_{t-1} + 0.7326RGI_{t-2} - 0.4658goods_{t-1} - 0.3780goods_{t-2}$$

$$RGI_t = 0.0046 + 0.3822RGI_{t-1} + 0.2368RGI_{t-2} + 0.0172goods_{t-1} + 0.0325goods_{t-2} \quad (5)$$

$$RGI_t = 0.0028 + 0.5050RGI_{t-1} + 0.2165RGI_{t-2} - 0.4024RGI_{t-3} + 0.3792RGI_{t-4} + 0.0105service_{t-1} + 0.0226service_{t-2} + 0.0211service_{t-3} + 0.0162service_{t-4}$$

$$service_t = 0.0273 - 1.2238RGI_{t-1} - 0.5655RGI_{t-2} - 0.5757RGI_{t-3} + 1.6369RGI_{t-4} - 0.8218service_{t-1} - 0.3887service_{t-2} + 0.1119service_{t-3} + 0.1621service_{t-4} \quad (6)$$

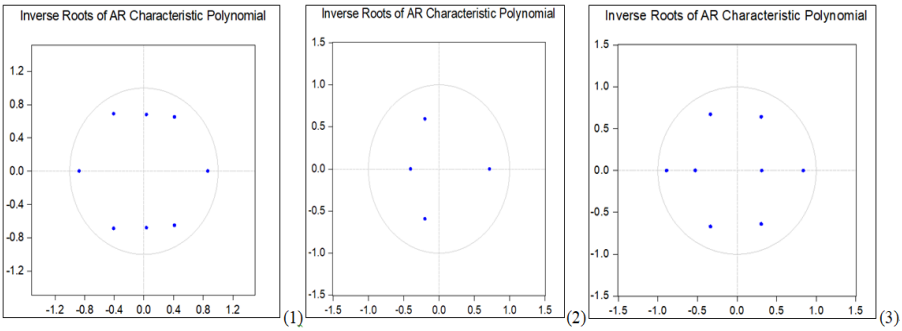

Fig. 4. (VAR unit circle test) [Data source: EVIEWS10]

In figure 4, (1) shows the VAR unit circle test of RMB internationalization and cross-border trade RMB settlement in the offshore market, (2) shows the VAR unit circle test of RMB internationalization and cross-border goods trade RMB settlement in the offshore market, and (3) shows the VAR unit circle test of RMB internationalization and cross-border service trade RMB settlement in the offshore market.

4.4 Impulse response

As shown in figure 5, the impact of RMB internationalization has a positive response and the response index gradually increases, and the RMB settlement has a positive response to the impact of RMB internationalization in the offshore market and the response index fluctuation decreases. The response of RMB settlement goods trade to the impact of RMB internationalization in the offshore market fluctuates around 0, and the influence of RMB internationalization in the offshore market on the RMB settlement of goods trade has a positive response and the fluctuation of the response function decreases. The effect of RMB internationalization has a positive response and the response function fluctuates up and down, and the response function of RMB settlement of service trade to the impact of RMB internationalization in the offshore market fluctuates around 0.

Response to Cholesky One S.D. (d.f.adjusted) Innovations

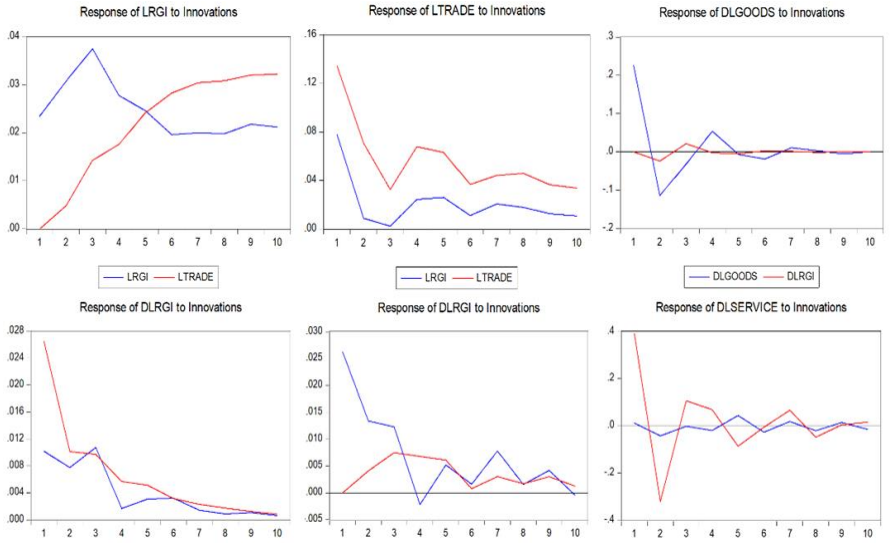

Fig. 5. (Schematic diagram of impulse response function) [Data source: EVIEWS10]

4.5 Variance decomposition

As shown in figure 6, the contribution of RMB settlement to RMB internationalization in the offshore market increased from 0 in the first phase to 15% in the tenth phase. In phase 1 to 10, the contribution of RMB internationalization in the offshore market to the change of RMB settlement in cross-border trade is stable at about 25%, the contribution of RMB internationalization in the offshore market to the change of RMB settlement in cross-border goods trade is stable at about 1.5%, and the contribution of RMB settlement in cross-border goods trade to the change of RMB internationalization in the offshore market is stable at about 23%. Besides, the contribution of RMB settlement of cross-border service trade to the change of RMB internationalization in the offshore market is stable at 13%, and the contribution of RMB internationalization in the offshore market to the change of RMB settlement of cross-border service trade is stable at 2%.

Variance Decomposition of DLRGI:

Period	S.E.	DLRGI	DLTRADE
1	0.024725	100.0000	0.000000
2	0.028707	99.34587	0.654131
3	0.032928	89.00570	10.99430
4	0.033230	87.77845	12.22155
5	0.034316	85.10717	14.89283
6	0.034397	85.17540	14.82460
7	0.035172	85.80856	14.19144
8	0.035308	85.83014	14.16986
9	0.035966	85.05141	14.94859
10	0.035985	84.99779	15.00221

Variance Decomposition of DLTRADE:

Period	S.E.	DLRGI	DLTRADE
1	0.154903	24.31702	75.68298
2	0.174076	27.73902	72.26098
3	0.178967	27.01125	72.98875
4	0.185827	25.32271	74.67729
5	0.189527	27.71044	72.28956
6	0.191595	27.32807	72.67193
7	0.196314	26.45911	73.54089
8	0.196844	26.74677	73.25323
9	0.197079	26.80036	73.19964
10	0.197219	26.76465	73.23535

Variance Decomposition of DLGOODS:

Period	S.E.	DLGOODS	DLRGI
1	0.225808	100.0000	0.000000
2	0.254251	99.11283	0.887173
3	0.257107	98.43997	1.560027
4	0.262716	98.49824	1.501764
5	0.262853	98.46286	1.537142
6	0.263537	98.45993	1.540074
7	0.263758	98.45909	1.540906
8	0.263782	98.45600	1.544004
9	0.263835	98.45653	1.543469
10	0.263837	98.45600	1.544003

Variance Decomposition of DLRGI:

Period	S.E.	DLGOODS	DLRGI
1	0.028356	12.85379	87.14621
2	0.031091	16.92548	83.07452
3	0.034301	23.71135	76.28865
4	0.034813	23.25439	76.74561
5	0.035325	23.34856	76.65144
6	0.035610	23.78979	76.21021
7	0.035713	23.81044	76.18956
8	0.035766	23.79956	76.20044
9	0.035803	23.83945	76.16055
10	0.035819	23.84991	76.15009

Variance Decomposition of DLRGI:

Period	S.E.	DLRGI	DLSERVICE
1	0.026278	100.0000	0.000000
2	0.029778	98.10598	1.894025
3	0.033074	93.31391	6.686094
4	0.033833	89.59352	10.40648
5	0.034772	87.06273	12.93727
6	0.034818	87.04560	12.95440
7	0.035807	87.03327	12.96673
8	0.035883	86.86093	13.13907
9	0.036251	86.43323	13.56677
10	0.036276	86.32995	13.67005

Variance Decomposition of DLSERVICE:

Period	S.E.	DLRGI	DLSERVICE
1	0.389822	0.093014	99.90699
2	0.506209	0.741249	99.25875
3	0.517329	0.710477	99.28952
4	0.522238	0.828698	99.17130
5	0.531071	1.499788	98.50021
6	0.531751	1.741421	98.25858
7	0.536223	1.831295	98.16871
8	0.538711	1.953230	98.04677
9	0.538933	2.027042	97.97296
10	0.539372	2.095067	97.90493

Fig. 6. (Variance decomposition diagram) [Data source: EVIEWS10]

5 Conclusions and Policy Recommendations

5.1 Conclusions

The RMB settlement amount of cross-border trade is helpful to its internationalization of the offshore market and gradually increases. Besides, the RMB settlement of goods trade has a positive influence on its internationalization offshore market, but the influence is gradually decreasing. The RMB internationalization of the offshore market has a weak impact on the its settlement of goods trade. Moreover, the RMB settlement amount of service trade has a positive effect on its internationalization of the offshore market and it does not only have a single direction of action, but the RMB internationalization of the offshore market has a weak impact on the its settlement of service trade. The contribution of RMB settlement of trade to the change of its internationalization in the offshore market is gradually increasing, but the contribution of RMB internationalization in the offshore market to the change of its settlement of cross-border trade is stable. What's more, the contribution of RMB settlement of goods trade to the change of its internationalization in the offshore market is far greater than the contribution of RMB internationalization in the offshore market to the change of settlement of goods trade, indicating that the offshore market has not fully played a positive role in RMB settlement of cross-border trade. The contribution of RMB settlement of service trade to the change of its internationalization in the offshore market is greater than that of RMB internationalization in the offshore market to the change of settlement of service trade, indicating that it is urgent to improve the RMB internationalization in the offshore market.

5.2 Policy recommendations

(1) Accelerate the construction of offshore RMB markets in Shanghai and Shenzhen. By building an offshore RMB market in China, the risk and fluctuation of the offshore RMB market can be effectively reduced and the internationalization level of the offshore RMB market can be promoted.

(2) Sign currency swap agreements and bilateral free trade area agreements. Through currency swap agreements and free trade regional agreements, the scale of local currency settlement and cross-border trade RMB settlement can be increased, and the internationalization of RMB can be further promoted.

(3) Deepen the reform of the financial system, steadily and prudently promote financial openness. On the premise of avoiding systemic financial risks, expand the opening of capital account, reduce the restrictions on RMB financial investment in the offshore market, and promote the increase of RMB liquidity in the offshore market.

References

1. Zhang Yanhua. RMB Trade Settlement Pilot -- Practice and RMB Internationalization of Yunnan Province [J]. China finance,2009(07):86-91.
2. Yin Jianfeng. RMB Internationalization: "Trade Settlement plus Offshore Market" or "Capital Export plus Multinational Enterprises"—— Take the Lessons of Yen Internationalization as An Example [J]. International Economic Review,2011(04):53-68+4.
3. Qiao Yide, Li Rui, Ge Jiafei. RMB Internationalization: Interaction between Offshore Market and Onshore Market [J]. International Economic Review,2014(02):93-104+6.
4. Ding Yibing. The Development of Offshore Market and the Promotion of RMB Internationalization [J]. Northeast Asia Forum, 2016, 25(01):21-30+126. DOI:10.13654/j.cnki.naf.2016.01.003
5. Yan Jiajia, Fu Binfa. A Study on the Synergistic Effect of Hong Kong RMB Offshore Market and RMB Cross-border Settlement [J]. Times Finance,2017(14):10-11+14.