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# The Impact of RMB Exchange Rate System Reform on the Cross-border Business of China's Commercial Banks

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**Abstract:** With the continuous development of China's economy, the renminbi has become more and more international. In the context of increasingly fierce international trade, the exchange rate risk faced by China's commercial banks is increasing, and the RMB exchange rate system is also undergoing continuous reform. Through the establishment of VAR model, study the gross domestic product (GDP), consumer price index (CPI) and RMB exchange rate. Study the impact of RMB exchange rate changes on cross-border business of commercial banks in China. Combined with the reform of the RMB exchange rate system and the status quo of China's commercial banks' development of RMB cross-border business, this paper proposes corresponding suggestions on how to control higher and higher exchange rate risks in China's commercial banks.

**Keywords:** RMB exchange rate, RMB cross-border business, VAR model test

## I. INTRODUCTION

In recent years, with the continuous development and maturity of China's economy, China's foreign trade import and export volume is also increasing. However, while the volume of foreign trade imports and exports has increased, the exchange rate risk has also increased steadily, and the pressure for RMB appreciation has gradually emerged. At present, China's RMB exchange rate system still has a lot of problems. In the continuous reform, with the gradual improvement of the RMB exchange rate system, the reform of the RMB exchange rate system also affects the cross-border RMB business of China's commercial banks. Therefore, China's commercial banks should pay attention to and increase the development of China's renminbi cross-border business.

There are many documents on the impact of the reform of the RMB exchange rate system on banks.

By collecting data on the RMB exchange rate and other indicators such as gross domestic product (GDP) for 2005-2015, Zhang Zhen found that with the continuous appreciation of the renminbi, the risks of commercial banks are also increasing, by analyzing the changes in the exchange rate of the renminbi. The influence of commercial banks found some problems and hidden dangers in exchange rate risk, and proposed a countermeasure to strengthen exchange rate risk [1].

Wang Guixian is mainly based on institutional analysis, supplemented by empirical analysis and normative analysis. Through analysis, it is found that the RMB exchange rate system is still imperfect. Using the historical data of the RMB exchange rate level, the empirical analysis was completed, and the RMB exchange rate system was qualitatively analyzed through a series of criteria for system efficiency evaluation. It answered the question of what the efficiency of the RMB exchange rate system should be, and proposed countermeasures to improve efficiency. Solve the problem of not enough efficiency [2].

After a cyclical study of the RMB exchange rate between 2015 and 2018, Wang Youxin expects the RMB to re-appear in 2019. Since the 8.11 exchange rate reform, the RMB has experienced two periods of rising devaluation, and the external impact of 2019 is expected to be compared. In the past, it will weaken, and the renminbi will rise first and then rise, and listed five factors. It is concluded that the RMB exchange rate will show a dynamic trend in the first half of the year, and will rise steadily in the second half of the year [3].

Zhang Qianyu established a VAR model by collecting GDP, GPI, RMB exchange rate, RMB cross-border business volume and RMB appreciation level in 2006-2015, and conducted a series of tests. It was found that these indicators changed the number of cross-border RMB business. In the event of a change, it is concluded that changes in exchange rate policy will affect the renminbi business, and policy recommendations are proposed to promote the development of commercial banks [4].

Xue Chang mainly studied the impact of RMB exchange rate changes on the assets, liabilities and various types of business of China's commercial banks. It is analyzed that under the new exchange rate mechanism, China's commercial banks should comprehensively improve the level of foreign exchange risk management, and have specific solutions [5].

Li Zhuona uses the GARCH-VaR model to calculate the exchange rate risk value faced by China's commercial banks, and then proposes that China's commercial banks need to improve exchange rate risk, and effectively control exchange rate risk while changing the RMB exchange rate [6].

Gu Jie and Liu Yujun proposed the necessity of foreign banks to develop cross-border business, and analyzed the various advantages of foreign banks in cross-border business: in terms of operating mechanism and concept, product innovation, linkage with the parent bank and low cost of foreign capital. The advantages, but also the analysis of the value of cross-border business products, the strategy for foreign banks to develop the business, or need to strengthen the product has been innovative business, while increasing the number of overseas banks [7].

Zhang Yiming mainly takes Daqing City as the main research area. Combined with its development status and characteristics, it finds that the city's cross-border business mainly relies on petroleum and its affiliated industries. There are many problems: the variety is too single, the business is too single, and the city develops. There are not many banks for cross-border business. In this regard, it proposes to expand the business, actively export and increase the importance of commercial banks to cross-border business [8].

Luo Lian tested the factors affecting the RMB exchange rate change by establishing a VAR model, and concluded that the RMB exchange rate has a positive relationship with the consumer price index, and the national consumer consumption index CPI increases, and China's RMB exchange rate will also increase. Subsequently, the proposal that the renminbi needs to be more internationalized was proposed [9].

It can be known from the above literature review that the RMB exchange rate is changing all the time, and the variables affecting the RMB exchange rate can also indirectly affect the RMB cross-border business of China's commercial banks. We must seize the opportunity, not only to carry out a single business, to carry out diversified business, but also to optimize the deficiencies of China's commercial banks while paying attention to the cross-border business of RMB.

## II. MODEL ESTABLISHMENT AND ANALYSIS

### A. Selection of the model

This paper uses the VAR model to study the impact of the RMB exchange rate reform system on the cross-border RMB business of banks. It mainly selects three factors that affect the RMB exchange rate system: GDP GDP, CPI household consumption index and HL RMB exchange rate. as follows:

The VAR model, the vector autoregressive model, is a very common econometric model. The VAR model is mainly used to test the relationship between multiple variables. All the current variables in the model are used to regress several lagging variables of all variables. The univariate autoregressive model is extended to a vector autoregressive model consisting of multiple time series variables. VAR models are often used to predict interconnected time series systems, analyze the dynamic impact of stochastic changes on variable systems, and explain the impact of various aspects.The VAR model essentially examines the dynamic relationship between multiple variables. For example, if we consider a set of variables, ..., then each variable is actually a time series variable. Thus, we can define an n × 1 vector time series, as in Equation 1 below:

$$Y_t = \begin{Bmatrix} y_{1t} \\ y_{2t} \\ \cdots \\ y_{nt} \end{Bmatrix}, t = 1,2,...,T \quad (1)$$

Then a p-order VAR model, VAR(p), can be defined as:

$$Y_t = C + \Phi_1 Y_{t-1} + \Phi_2 Y_{t-2} + \cdots + \Phi_p Y_{t-p} + \varepsilon_t \quad (2)$$

C is a constant term of $n \times 1$, which is an $n \times n$ matrix, which is an error vector of $n \times 1$. (The error term average is 0, and there is no autocorrelation in the error term).

**B. Selection of data**

GDP (Gross Domestic Product), CPI (Consumer Price Index), JS (RMB Cross-border Business Settlement), HL (RMB Exchange Rate).Select quarterly data for 2010-2018,GDP, CPI and RMB exchange rate data are all from the National Bureau of Statistics.The data on the settlement volume of RMB cross-border business comes from the annual financial data report of China Central Bank.

**C. Model establishment**

$$Y = \partial_0 + \partial_1 HL + \partial_2 GDP + \partial_3 CPI + \varepsilon \quad (Y=JS) \qquad (3)$$

GDP means gross domestic product, CPI means consumer price index, HL means RMB exchange rate, JS means cross-border RMB settlement business volume of China's commercial banks, and $\varepsilon$ is an error term.

*D. Data processing and establishment of regression equation*

**1) Unit root test**

First, perform the stationarity test on the above data to obtain Table **I**.

TABLE II
COMPARISON OF THE ADF VALUE OF EACH DATA WITH THE CRITICAL VALUE OF 10% SIGNIFICANT LEVEL

| variable | ADF value | Critical value at 10% significant level | Comparison of ADF value with 10% significant level |
|---|---|---|---|
| GDP | 0.313177 | -2.625121 | more than |
| CPI | -0.063855 | -1.610907 | more than |
| HL | -1.713695 | -2.612874 | more than |
| JS | 1.246299 | -2.614300 | more than |

It can be seen from the table that the ADF values of the four data are greater than the critical value at the 10% significant level, and thus it can be judged that the sequence has a unit root, and the sequence is non-stationary.

TABLE Ⅱ P VALUES FOR EACH VARIABLE

| variable | GDP | CPI | HL | JS |
|---|---|---|---|---|
| P | 0.9748 | 0.6543 | 0.4158 | 0.9978 |

As can be seen from Table Ⅱ, the p-values of China's commercial banks' RMB cross-border business settlement (JS), RMB exchange rate (HL), gross domestic product (GDP), and consumer price index (CPI) are all greater than 5%, and the sequence is not stable. So continue to select the first order difference, the results are shown in Table Ⅲ.

TABLE Ⅲ P-VALUES OF EACH VARIABLE AFTER FIRST-ORDER DIFFERENCE

| variable | GDP | CPI | HL | JS |
|---|---|---|---|---|
| P | 0.0434 | 0.0001 | 0.0019 | 0.8318 |

As can be seen from Table Ⅲ, the cross-border RMB settlement (JS) quantity p value is still greater than 5%, because to ensure that the four data p values are within 5%, so continue to select the second-order difference, the results are shown in Table Ⅳ.

TABLE Ⅳ
P-VALUES OF EACH VARIABLE AFTER SECOND-ORDER DIFFERENCE

| variable | GDP | CPI | HL | JS |
|---|---|---|---|---|
| P | 0.0001 | 0.0000 | 0.0000 | 0.0098 |

As can be seen from Table Ⅳ, the p values of the four variables after the second-order difference are less than 5%, and the processed data is already a stable sequence. Therefore, it can be judged by co-integration test whether the above four variables exist. Co-integration relationship.

**2) Cointegration test**

TABLE Ⅴ
JOHANSEN TEST RESULTS TABLE FOR JS AND CPI VARIABLES

| **Relationship measurement** | **Eigenvalue** | **Tracking statistics** | **5% threshold** | **P value** |
|---|---|---|---|---|
| None | 0.681740 | 42.22689 | 15.49471 | 0.0000 |
| At most 1 | 0.160295 | 5.590564 | 3.841466 | 0.0181 |

TABLE Ⅵ
JOHANSEN TEST RESULTS TABLE FOR HL AND GDP VARIABLES

| **Relationship measurement** | **Eigenvalue** | **Tracking statistics** | **5% threshold** | **P value** |
|---|---|---|---|---|
| None | 0.572784 | 52.02250 | 15.49471 | 0.0000 |
| At most 1 | 0.539406 | 24.80763 | 3.841466 | 0.0000 |

From the trace statistics Trace Statistic in Table Ⅴ and Table Ⅵ and the 5% threshold and p value, it can be seen that there are co-integration relations among the four variables. Next we continue to test the sequence using the Granger causality test to obtain Table Ⅶ

TABLE Ⅶ
GRANGER CAUSALITY TEST

| Pairwise Granger Causality Tests | | | |
|---|---|---|---|
| Date: 05/06/19 Time: 15:09 | | | |
| Sample: 2010Q1 2018Q4 | | | |
| Lags: 2 | | | |
| Null Hypothesis: | Obs | F-Statistic | Prob. |
| HL does not Granger Cause JS | 32 | 3.12451 | 0.0434 |
| JS does not Granger Cause HL | | 4.59641 | 0.0191 |
| GDP does not Granger Cause JS | 32 | 3.96839 | 0.0392 |
| JS does not Granger Cause GDP | | 0.55989 | 0.5778 |
| CPI does not Granger Cause JS | 32 | 3.33871 | 0.0417 |
| JS does not Granger Cause CPI | | 1.05406 | 0.3624 |

From the above table Ⅶ, the critical value p value is less than 5%, then reject the null hypothesis, confirm the gross domestic product (GDP), the consumer price index (CPI) and the RMB exchange rate (HL) are the settlement amount of RMB cross-border business(JS) Granger reason.

**3) Analysis of regression equation**

Get the regression results:

TABLE ⅧREGRESSION RESULTS

| Dependent Variable: Y | | | | |
|---|---|---|---|---|
| Method: Least Squares | | | | |
| Date: 05/06/19 Time: 14:44 | | | | |
| Sample: 2010Q1 2018Q4 | | | | |
| Included observations: 36 | | | | |
| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
| C | -871965.2 | 174698.7 | -4.991251 | 0.0000 |
| X1 | 3.092360 | 0.178440 | 17.32993 | 0.0000 |
| X2 | 8431.248 | 131838.9 | 1.305820 | 0.0009 |
| X3 | 86646.13 | 26358.38 | 3.287233 | 0.0025 |
| R-squared | 0.916690 | Mean dependent var | | 151445.4 |

| | | | |
|---|---|---|---|
| Adjusted R-squared | 0.908880 | S.D. dependent var | 128381.0 |
| S.E. of regression | 38753.22 | Akaike info criterion | 24.07225 |
| Sum squared resid | 4.81E+10 | Schwarz criterion | 24.24820 |
| Log likelihood | -429.3006 | Hannan-Quinn criter. | 24.13366 |
| F-statistic | 117.3694 | Durbin-Watson stat | 2.129746 |
| Prob(F-statistic) | 0.000000 | | |

Based on this, the residual resid01 of the sequence is tested by ADF, as shown in the following table:

| | | | |
|---|---|---|---|
| Null Hypothesis: D(RESID01) has a unit root | | | |
| Exogenous: Constant | | | |
| Lag Length: 0 (Automatic - based on SIC, maxlag=8) | | | |
| | | t-Statistic | Prob. |
| Augmented Dickey-Fuller test statistic | | -5.301595 | 0.0001 |
| Test critical values: | 1% level | -3.653730 | |
| | 5% level | -2.957110 | |
| | 10% level | -2.617434 | |
| MacKinnon (1996) one-sided p-values. | | | |

As can be seen from Table 2.9 above, the test value -5.301995 is significantly smaller than all the critical values, and the p value is 0.0001, which is far less than 5%. Then it can be concluded that the residual term resid01 is stable, then the settlement of RMB cross-border business is explained. There is a link between quantity (JS) and gross domestic product (GDP), consumer price index (CPI), and RMB exchange rate (HL).

Therefore, the model results can be derived:

$$R^2 = 0.916690; \text{ adjusted } R^2 = 0.908880; \text{ DW} = 2.129746.$$

$$JS = -871965.2 + 86646.13HL + 8434.248CPI + 3.092360GDP + \varepsilon \quad (4)$$
$$(3.287233) \quad (1.305820) \quad (17.32993)$$

The above formula 4 shows that for every 1% increase in GDP, the RMB cross-border settlement amount JS will increase by about 3.09%; and when the RMB exchange rate HL rises by 1%, the RMB cross-border business settlement amount will increase by 86,646.13 billion yuan; 1%, the settlement of RMB cross-border business will increase by 843.224 billion yuan. It can be seen that changes in GDP, CPI and RMB exchange rate will indeed affect China's cross-border RMB settlement.

**E. Conclusion**

From the results of the above empirical tests, changes in gross domestic product (GDP), consumer price index (CPI), and renminbi exchange rate (HL) do have different degrees of impact on China's renminbi cross-border business, and gross domestic product ( As a major factor in measuring the national economy, GDP reflects the quality of the living standards of our residents. It is the core indicator for calculating the economy. The consumer consumption index CPI reflects the general consumption level of Chinese residents and reflects to some extent. The forecast for the renminbi has a positive impact on the cross-border business of the renminbi.The RMB exchange rate is also a major indicator for measuring cross-border RMB business. For example, when the RMB exchange rate rises by 1%, the US dollar against the RMB exchange rate is 6.6118, the US dollar against the RMB exchange rate will change to 6.6779, and China’s RMB cross-border settlement will increase accordingly. 86646.13 billion yuan. However, the current RMB exchange rate system is undergoing continuous reforms, which means that the RMB exchange rate is also constantly changing. The cross-border RMB business will continue to change with the changes in the RMB exchange rate. Therefore, China needs to take necessary and reasonable Strategy to promote the development of RMB cross-border business of commercial banks in China.

## III. RECOMMENDATIONS

**A. Strengthening the recruitment and training of professional personnel**

Renminbi cross-border business is a new business, so the number of professionals in China's commercial banks' RMB cross-border business is not enough. With the development of China's economy, the

renminbi is becoming more and more international, which means that China's import and export volume will become larger and larger, and the RMB exchange rate is constantly changing. It is necessary to predict the future trend of the RMB exchange rate at any time based on the reform of the RMB exchange rate system. There is more and more demand for professional talents in commercial banks. Therefore, China's commercial banks should attach importance to and strengthen the recruitment of professional personnel, and cultivate a certain reserve talents to be able to work immediately.

**B. Strengthening exchange rate risk management capabilities**

The exchange rate is an important factor to measure the economic development of a country. The impact of exchange rate changes on a country's economic development is very large. China's commercial banks must increase their prevention of exchange rate risks. Since the reform of China's RMB exchange rate system, the impact of exchange rate changes on the market has become more and more important, and in the context of the gradual internationalization of the renminbi, China's renminbi cross-border business will accelerate in a certain period of time, China's commercial banks More attention should be paid to the prevention of exchange rate risks, improvement of exchange rate risk management methods, and more rigorous development of RMB cross-border business.

**C. Enhance exchange rate risk management awareness**

The most basic way to enhance exchange rate risk management ability is to raise the awareness of commercial banks on exchange rate risk management. Management and the highest decision-makers are very important in the management of exchange rate risk management. It is also important to strengthen employees' training on exchange rate risk management awareness.

**D. Innovate in conducting business and products**

Although the commercial cross-border business of China's commercial banks is gradually developing, it still needs innovative business and products. It cannot apply the old-fashioned business philosophy and methods. First of all, we must expand our foreign trade business. Don't be too geographically limited. We must pay attention to cross-border RMB business. Secondly, it is possible to carry out more affiliated banks overseas and maintain close contact with the parent bank to actively develop and innovate overseas business.

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