A Study of the Factors Influencing the Fall of the RMB Exchange Rate Below Seven in the Context of the Fed's Interest Rate Hike

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Abstract: This paper selects the monthly data from June 2021 to June 2022 according to the Analysis of Influencing Factors of China's RMB Exchange Rate Based on VAR Model, and selects four factors of foreign exchange reserves, interest rate difference, inflation rate difference and foreign direct investment as the influencing factors of China's RMB exchange rate.[1] The multiple linear regression model and VAR model were constructed to compare the degree and effect of each influencing factor on China's RMB exchange rate.

Keywords: Fed Interest Rate Hike; RMB Exchange Rate; Multiple Linear Regression; VAR Model

Introduction

The RMB exchange rate reflects to some extent the external value of the RMB   and to some extent concentrates on the strength of the national economy, while the RMB exchange rate will have different impacts on both the domestic and international general circulation economies[2].

According to Li Houze's Analysis of the Influencing Factors of China's RMBExchange Rate Based on VAR Model, this paper intends to select four factors, namely foreign exchange reserves, inflation rate differential, interest rate differential and foreign direct investment, as the influencing factors of China's RMB exchange rate on top of the existing research. A multiple linear regression model and a VAR model are constructed for analysis to compare the degree of influence and the effect of each influencing factor on China's RMB exchange rate and to put forward relevant policy recommendations for stabilising the RMB exchange rate in order to prevent risks and promote stable economic development.

1. Selection of influencing factors and data sources
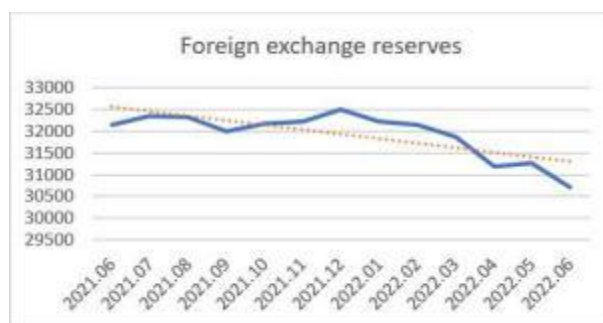
1.1 Selection of influencing factors

The sample data in this paper are monthly data from June 2021 to June 2022, with 13 observations, and the RMB exchange rate is expressed as the monthly average of the RMB mid-rate exchange rate. This paper selects foreign exchange reserves, interest rate differentials, inflation rate differentials and foreign direct investment as the four influencing factors of the RMB exchange rate according to Li Houze's Analysis of the Influencing Factors of China's RMB Exchange Rate Based on VAR Model.

1.2 Data sources

RMB exchange rate data is obtained from China Money, monthly foreign exchange reserve data is obtained from the National Bureau of Statistics, monthly foreign direct investment data is obtained from Oriental Wealth, monthly interest rate differential data is taken from the China Macro database and monthly inflation rate data is obtained from Baidu Encyclopedia.
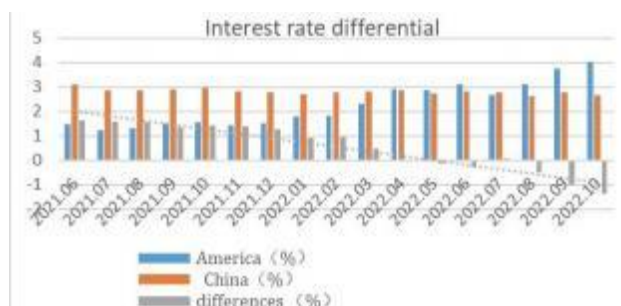
2. Changes in influencing factors in the context of the Fed's interest rate hike
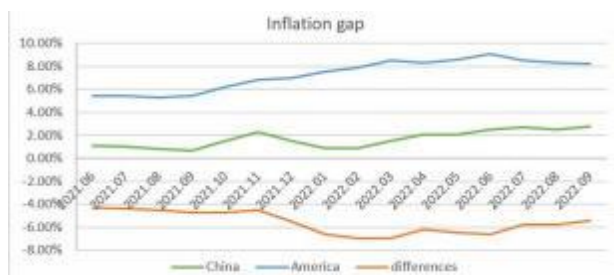
2.1 Foreign exchange reserves

From June 2021 to December 2021, the size of China's foreign exchange reserves remained largely stable, fluctuating narrowly above US$3.2 trillion most of the time. from January 2022 to June 2022, the size of China's foreign exchange reserves generally showed a downward trend, with a larger decline. in January 2022, the size of foreign exchange was around US$3.22 trillion, and in June 2022 the size of foreign exchange fell to around US$3.07 trillion, a decline of roughly 4.06%.

2.2 Interest rate differential

Since 2022, as the Fed continued to raise interest rates, US Treasury yields moved rapidly upwards, Chinese Treasury yields oscillated in a range, and the US-China spread narrowed sharply. in April, the US-China spread became inverted for the first time since 2010. After that, except for July, the 10-year US bond yield continued to stabilize above the Chinese bond yield, and the US-China spread trended downward significantly, with the inversion widening. By October this year, the US-China spread had fallen to a low of 1.38%.

2.3 Differences in inflation rates

The short-term impact of the Fed's rate hike on China's monthly inflation rate was relatively significant. As a major trading partner of the US, US inflation has a greater impact on China's PPI, mainly in industrial goods. A Fed rate hike and a downward spiral of inflation will mitigate the ongoing imported impact on China, thus promoting lower industrial inflation. In addition, the

Fed's interest rate hike will, to a certain extent, push up the US dollar index, which will rebound and cause a certain depreciation of the RMB exchange rate, capital outflows and falling prices. As can be seen from the chart, after the Fed's interest rate hike, China's inflation rate tends to decline slightly from January to February 2022 compared to previous months, before returning to previous levels in March and remaining above 2% from June to September, with a higher year-on-year increase in inflation.

2.4 Foreign direct investment

The graph shows that from June 2021 to August 2022, China's actual FDI attraction was on an overall downward trend, with a significant decrease in actual foreign investment inflow, including a record low of US$9.78 billion in July 2021, down 49.5% year-on-year, which had a negative impact on China's economic growth.
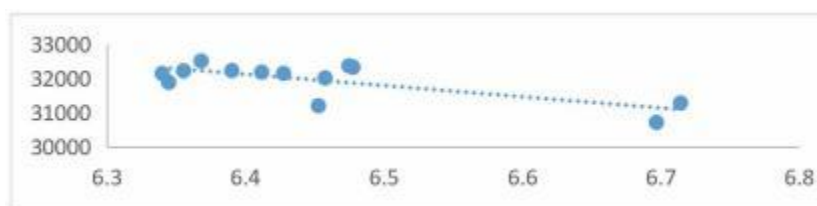
It did not return to its original level until June 2022, after which it rebounded rapidly to a large drop to US$11.57 billion due to the impact of the third interest rate hike by the Federal Reserve.

3. Empirical analysis of the factors influencing the RMB exchange rate

3.1 Multiple linear regression modeling

3.1.1 Multiple linear regression modeling

In order to explore whether there is a linear relationship between the variables so that further multiple regression models can be built, graphs can be made for visual judgement and analysis. Firstly, a linear fit between RMB exchange rate and foreign exchange reserves is made and the results of the fit are shown below.

The results of the fit show that all points fit well, i.e. there is a linear relationship between the RMB exchange rate and foreign exchange reserves. Therefore, we can speculate that the remaining variables (Sino-US interest rate differential, foreign direct investment and inflation rate) have the same linear relationship with the RMB exchange rate and build a multiple regression model with the general form of

$$Y_t = F_0 + F_1 X_{1t} + F_2 X_{2t} + \cdots + F_k X_{kt} + u_t \qquad (t = 1,2, \cdots n)$$

3.1.2 Empirical analysis

For the example of the RMB exchange rate, the data was first regressed and a multiple linear regression model was developed.

Let the linear regression model be

$$Y_t = F_0 + F_1 X_{1t} + F_2 X_{2t} + F_3 X_{3t} + F_4 X_{4t} + u_t \qquad (t = 1,2, \cdots n)$$

Where Y represents the exchange rate of RMB to USD, X_1 represents the level of inflation in China, X_2 represents the country's foreign exchange reserves, X^3 represents the level of interest rates in China, X_4 represents the amount of foreign direct investment, and by Eviews analysis it is obtained that

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	13.34208	2.371527	5.625945	0.0005
X1	-0.010545	0.055506	-0.189974	0.8541
X2	-0.000214	6.89E-05	-3.104424	0.0146
X3	0.050011	0.253770	0.197071	0.8487
X4	-0.001102	0.000650	-1.695961	0.1283

The regression model is.

$$Y_t = 13.34208 - 0.010545X_1 - 0.000214X_2 + 0.050011X_3$$

For the t-test, finding the t-distribution for a given significant level $\alpha = 0.05$ gives $t_{0.025}(8) = 2.306$. According to the results of the regression data in the above table, the absolute value of β_2 is greater than the critical value, indicating that the national foreign exchange reserves have a significant effect on the change of RMB exchange rate; the level of interest rate, the level of inflation rate, and the amount of foreign direct investment all have insignificant effects on the change of RMB exchange rate.

3.2 Impact of influencing factors on RMB exchange rate - an empirical analysis based on VAR model

1. VAR modeling : $y_t = c + \varnothing_1 y_{t-1} + \varnothing_2 y_{t-2} + \ldots + \varnothing_n y_{t-n} + \varepsilon_t$

2. Empirical analysis of the RMB-USD exchange rate

1) Comparison of different lag orders

lag order	logL	AIC	SC	HQ	FPE
0	127.481	-36.459	-36.278	-36.573	0
1	320.273	-72.244	-71.336	-73.24	0
2	1521.467	-340.071	-338.866	-342.672	0.0
3	1405.422	-345.545	-344.751	-350.903	0

As shown, the optimal lag order is 2. Since the data produces a singular matrix at a lag order of 2, a lag order of 1 was chosen for the VAR algorithm.

2) VAR lag order of 1 Calculated as.

arguments	estimator	CPI first order	FER second order	rate first order	ER	FDI first order
CPI first order(-1)	coefficie	0.061	0.698	-1.107	0.505	-11.326
	standar	0.353	0.839	2.007	0.846	16.04
	t	0.171	0.832	-0.552	0.597	-0.706
FER second order(-1)	coefficie	0.035	-0.896	-0.949	-0.496	6.207
	standar	0.164	0.389	0.93	0.392	7.436
	t	0.213	-2.304	-1.02	-1.264	0.835
rate first order(-1)	coefficie	0.149	0.092	-0.102	0.122	-3.478
	standar	0.07	0.167	0.398	0.168	3.183
	t	2.123	0.555	-0.256	0.728	-1.092
ER (-1)	coefficie	0.1	0.171	1.014	1.043	5.782
	standar	0.138	0.329	0.788	0.332	6.295
	t	0.72	0.52	1.287	3.14	0.919
FDI first order(-1)	coefficie	0	-0.008	0.06	-0.036	-0.137
	standar	0.01	0.023	0.055	0.023	0.443
	t	0.019	-0.33	1.074	-1.542	-0.309
constant	coefficie	-0.183	-0.321	-1.889	-0.076	-10.69
	standar	0.258	0.613	1.466	0.618	11.719
	t	-0.712	-0.523	-1.288	-0.122	-0.912

The chart in green shows the values of the coefficients on the exchange rate and the first-order lagged data, which leads to the

conclusion that the exchange rate moves in the same direction as inflation and interest rates, and in the opposite direction as foreign reserves and foreign direct investment.

4. Conclusions and Recommendations

This study selected data from June 2021 to June 2022 and theoretically analysed the impact of four factors, namely foreign exchange reserves, inflation rate differential, interest rate differential and foreign direct investment, on the RMB exchange rate, and established a multiple linear regression model with VAR model for empirical analysis. The results of the study showed that.

Firstly, the level of interest rates, the level of inflation and the amount of foreign direct investment have no significant impact on the change in the RMB exchange rate.

Secondly, the exchange rate moves in the same direction as inflation and interest rates, and in the opposite direction to foreign exchange reserves and foreign direct investment.

Based on the findings of the study, and considering that changes in economic policy uncertainty can lead to economic volatility, the following policy recommendations are made for stabilising the RMB exchange rate.

China should continuously improve the RMB exchange rate formation mechanism, increase exchange rate flexibility, effectively avoid negative spillover effects of disorderly RMB exchange rate adjustments and competitive currency depreciation, and allow the exchange rate to absorb some of the negative spillover effects of US monetary policy and lay the foundation for further policy coordination between the two sides[3].

In order to avoid fluctuations in economic development caused by RMB appreciation and depreciation, the PBoC should implement appropriate monetary and fiscal policies and camera choices to prevent expectations of RMB devaluation[4].

Promote the reform of the RMB exchange rate formation mechanism and accelerate the process of RMB internationalisation Given the overall limited negative impact of the Fed's interest rate hike policy on the Chinese economy, China should seize the favourable opportunity to continue to push forward market-oriented exchange rate reform and simultaneously promote the internationalisation of the RMB.

For the time being, the weakening of the RMB relative to the USD is within the normal range[5]. It is believed that through the regulation of macroeconomic policies the RMB exchange rate will be in a stable and narrow fluctuation and maintained in a stable and healthy state.

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