

Study on the monetary policy under the fluctuation of RMB exchange rate in the background of RMB internationalization

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Abstract

Under the background of RMB internationalization, the international economic development pattern profound impact on china's real economy and the degree of central bank control to the economy, especially in the implementation of China's monetary policy. With the deepening of the openness of China's capital market, the unstable fluctuation of exchange rate accelerate the impact of China's capital market. This research analyzes the realistic performance of RMB exchange rate and monetary policy from 2008 to 2018, and makes an empirical analysis on the correlation between RMB exchange rate fluctuation and monetary policy. The results show that China's monetary policy and exchange rate policy are one-way linkage under the background of RMB internationalization, which further reflects that the effectiveness of monetary policy has not been fully reflected. In view of this, in the process of opening up the capital market to the outside world, China should pay more attention to the balance between the domestic money market and the foreign exchange market, and effectively enhance the coordination between the exchange rate policy and the interest rate policy.

Keywords

Internationalization of RMB, exchange fluctuations, monetary policy, capital market.

1. Introduction

The internationalization of RMB is accompanied by the strengthening of China's economic strength, and the increasing share of international trade. Under the background of RMB internationalization, the implementation effect of China's monetary policy will be affected by the unstable fluctuation of many economic factors. The exchange rate is the core element of the domestic and foreign economy, and its fluctuation will affect the actual economic index variables through a variety of direct and indirect ways, which will affect the demand and supply of money in China's domestic market. Therefore, the exchange rate has become an important role for the effective play of monetary policy under the condition of open economy. According to The Impossible trinity, open capital account, stable exchange rate level and independent monetary policy can not be realized at the same time in a country. The opening of capital account is the only way in the process of modernization in our country, therefore a stable exchange rate level and an independent monetary policy are difficult to achieve at the same time. The controlled fluctuation of RMB exchange rate in a wide range will be the normal state in the future, and it will also be an important guarantee for the independence of monetary policy and financial stability. After the RMB was officially included in the Special Drawing Rights (SDR) currency basket in 2016, the international status and recognition of RMB The degree has been greatly improved. At the same time, fluctuations in the RMB exchange rate are also intensifying. On the one hand, export-oriented development strategies make foreign markets and developing countries highly dependent on foreign countries, and the fluctuation of exchange rate has a significant impact on their imports and exports; on the other hand, the proportion of foreign currency-denominated debt in emerging markets and developing countries is high, and the fluctuation of exchange rate affects their balance sheets, which in turn is transmitted to the real economy through the role of financial accelerators.

Therefore, exploring the correlation and influence mechanism of exchange rate changes and monetary policy in the context of RMB internationalization has far-reaching significance for how to coordinate

the conflicts and contradictions between monetary policy and exchange rate in China's capital market in the process of gradually opening up to the outside world.

The relationship between exchange rate fluctuation and monetary policy regulation has always been a hot issue at home and abroad. The conclusions of scholars show that there are great differences in the transmission effect of exchange rate changes on a country's price level. Monetary policy will affect a country's income and expenditure through monetary transmission. Devereux and Engel (2007) think that the optimal degree of exchange rate fluctuation depends on the following two trade-off: (1) increasing exchange rate fluctuation helps to adjust the relative price of commodities and stabilize the domestic economy; (2) reducing exchange rate fluctuation can stabilize the real exchange rate and reduce the interference of exogenous shocks to household consumption. When the exchange rate is not completely transmitted, the latter is dominant and the optimal exchange rate fluctuation is obviously decreased, so the central bank should stabilize the nominal exchange rate. Yu Xiang (2016) explored the effect of monetary policy on the adjustment and guidance of the domestic economy from 1998 to 2005, and empirical analysis was carried out by establishing a model. The results show that the effectiveness of China's monetary policy is not complete during this period, and a country's monetary policy To a certain extent, the effect will also be affected by the environment and conditions in which monetary policy plays a role. Exchange rate fluctuations have an interactive effect on currency internationalization. Geweke (2015) considered that exchange rate fluctuation transmits the international market price to the domestic market, which has a certain impact on the domestic price. The empirical study based on VAR model shows that the dollar price index receives the exchange rate effect, and there is a significant negative correlation between the dollar exchange rate and the US price index in the long run. He Jinqi (2016) obtains the results through empirical research. Under the background of RMB internationalization, the promotion of the global economic situation and the strengthening of interaction will lead to the rise of RMB exchange rate. Zhao Xuezen (2014) analyzes the relationship between RMB internationalization exchange rate fluctuation and the relationship between the exchange rate and holds that keeping small exchange rate fluctuation is the guarantee of promoting RMB internationalization. Jiang Xianling (2012) believes that exchange rate fluctuations transfer international market prices to the domestic market, which has a certain impact on domestic prices. The empirical study based on VAR model shows that the dollar price index is affected by exchange rate instability, and there is a significant negative correlation between dollar exchange rate and US price index in the long run.

The goal of macro-control by the central bank is to ensure the independence of monetary policy implementation and the complete floating of RMB exchange rate. Looking back, China's capital account has not yet been opened. China maintains exchange rate stability and monetary policy independence mainly by strengthening the control of capital outflows. Nowadays, China's capital market has experienced a gradual transition from a restricted and one-way opening pattern to the establishment of a all-round and expansible market opening structure. At the same time, the process of internationalization has also accelerated the unstable fluctuations of the exchange rate, which has impacted the steady operation of China's capital market. As a result, the contradiction between monetary policy and exchange rate control is increasingly apparent. How to better coordinate the contradiction between monetary policy and exchange rate under the new environment has become a focus of academic attention.

This paper analyzes the degree of exchange rate change from 2008 to 2018 and the corresponding monetary policy implementation in stages, and empirically studies the linkage effect between exchange rate and monetary policy under the trend of RMB internationalization in China. It provides theoretical reference and practical support for the further improvement of China's exchange rate system and monetary policy in the future and the coordinated role of the two.

2. The approach of the influence of RMB Exchange rate fluctuation on Monetary Policy

2.1 Capital market route

When the RMB exchange rate rises, foreign investors will invest large amounts of money in China's domestic market in order to earn more income or carry out risk-avoidance activities. As a result, China's money supply will rise sharply in the short term, and interest rates will decline. At the same time, domestic investors will also increase their holdings of their own assets. On the contrary, if a country's currency exchange rate declines, compared with other countries, the national currency should depreciate. Investors will sell local currency to buy foreign currency, and through a large amount of capital migration to avoid losses, which will lead to further depreciation of the local currency.

Under the economic background of the sustained surplus of foreign exchange reserve, the expectation of RMB appreciation has gradually increased. In this case, international speculative capital flows into China to hedge. Domestic and foreign investors take this opportunity to use a variety of ways to carry out RMB asset speculation, in order to obtain huge speculative returns. The liquidity of international capital in the market has increased significantly. Since 2011, China's short-term capital flow has changed. As China's trade activities gradually enrich the trade surplus continues to heat up, there is a net inflow of international capital. Continued inflow of short-term capital has a negative impact on the stability of China's financial market.

Through the improvement of the RMB exchange rate mechanism, the floating range is expanded, and the elasticity is increased to improve the risk-avoiding ability of the unstable factors in the economic operation. The relaxation of the volatility of the exchange rate will help to contain short-term international capital inflows, which will help to improve the robustness of the capital market.

2.2 International trade route

The fluctuation of RMB exchange rate will have an important impact on economic development through the trade channels between China and foreign countries. First, it affects the net export situation of our country. The actual output of China is affected by changes in the economic factors of net exports. Secondly, the appreciation of RMB makes the cost of production enterprises rise. In order to maintain the price of profitable products, the competitiveness of domestic products in the international market is greatly reduced, which leads to the deterioration of China's net export situation. Since China's accession to the WTO, the import and export trade has shown a steady upward trend. However, factors such as the overall liquidity in international trade, the increase in foreign exchange holdings, and the lag in the development of financial markets have made the central bank's policy intentions not effectively transmitted in the banking system, and the expected policy effects have also been greatly reduced.

2.3 Psychological expectation route

In the short term, monetary shocks can effectively change the current stable state of the economy. In the long run, people will learn from the various ways that the monetary policy adjusts the regularity of the economy and makes corresponding amendments to its expectations, which will partly offset the enforcement of the policy. If the appreciation of the RMB is expected to lead to an increase in demand for RMB, the central bank will expand its money supply to the market. For example, the financial crisis in Thailand caused a large amount of funds to withdraw from the Indian market, triggering a rapid depreciation of the Thai baht. The government uses foreign exchange reserves to prevent the expansion of currency depreciation. Under normal circumstances, because the public will anticipate the future based on past experience, the impact of such expected factors will be delayed under certain conditions, thus losing the effectiveness of monetary policy and even playing a negative role. The above analysis can be attributed to the impact of psychological expectations on the effectiveness of monetary policy: the expected rise in the RMB exchange rate, that is, the depreciation

of the RMB will lead to a decrease in the supply of money; on the contrary, the supply of money will increase.

3. The Fluctuation of RMB Exchange Rate and the Reality of Monetary Policy

3.1 Analysis of the Fluctuation of RMB Exchange Rate

The central bank has long dominated the trend of RMB exchange rate. In order to maintain the stability of RMB currency, the central bank has intervened in the market through policies for a long time, regulating China's macro-economy to maintain a relatively balanced state, and maintaining a relatively stable trend of the RMB exchange rate by restricting liquidity. However, China has also been facing the dilemma that the exchange rate is not dominated by market factors, its fluctuation range is limited, the implementation of monetary policy is limited, and the ability to control the economy is insufficient. In 2005, in order to solve the problem, China implemented the exchange rate reform, and the exchange rate began to float at this stage. However, the floating range is narrow, and the central bank wants to achieve the goal through the formulation of macroeconomic policies is difficult. In order to improve the flexibility of the policy implementation of the central bank, China has made timely adjustment and appropriate reform measures. In the ten years after the first exchange rate reform, the RMB exchange rate showed a continuous appreciation. In 2015, China implemented a new exchange reform policy based on the new economic development situation of the global exhibition. The RMB exchange rate changed from the previous continuous appreciation trend to a depreciation trend.

With the continuous expansion of opening up in recent years, the central bank has gradually reduced operational interventions in the foreign exchange market. The exchange rate fluctuations are increasingly dominated by the market. The increase in the exchange rate has made it more flexible. Under this circumstance, the degree of economic fluctuations in foreign markets has become more and more obvious to China's economy, and the transmission speed has also accelerated significantly. In this context, there has been more instability in the movement of the RMB exchange rate. The impact of exchange rate changes on our economy is even stronger.

According to the changes of china's economic system, the reform process of exchange rate system can be divided into three stages: the first stage is the planned economy period, the second stage is the economic transformation stage, and the third stage is the social main text market economy stage. Figure 1 shows the basic trend of the exchange rate of RMB against us dollar since 2008.

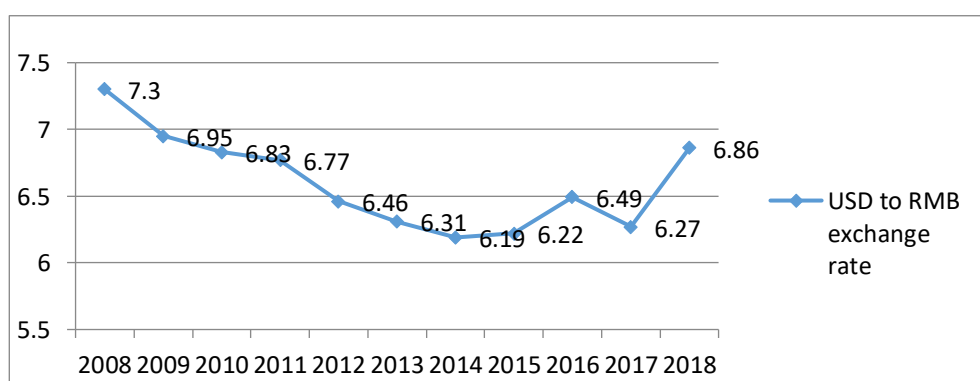


Fig. 1 USD to RMB Exchange Rate

3.2 Analysis of Monetary policy

3.2.1 Loose Monetary Policy in the context of the Global Economic crisis from 2008 to 2010

Due to the impact of the American subprime crisis, in 2008, China began to show a decline in the global depressed economy. Faced with the sluggish situation in the domestic and international markets, the central bank timely adopted appropriate easing measures and expanded China's exchange rate fluctuation range. The monetary policy gradually changed to a moderately loose monetary policy.

The central bank's monetary policy and the main problems facing China's macro-economy in this period are shown in Table 1.

Table 1 China's monetary policy, economic demand and exchange rate for 2008-2010

Year	Monetary policy	Major problems of macro economy	Exchange rate
2008	moderately tight to moderately loose	Rapid economic growth and International financial crisis	6.95
2009	Moderately loose monetary policy	International financial crisis	6.83
2010	Moderately loose monetary policy	Promote the sustained and steady development	6.77

In view of the impact of the financial crisis on China's economic development, China once again limits the range of exchange rate fluctuations. This measure effectively maintained the stability of the RMB exchange rate against the US dollar. . From 2009 to 2010, the negative impact of the international financial crisis on China's economy continued to extend to all fields of the market, and China's economy is in a state of sustained depression. The central bank aims to promote economic development and increase the flexibility of monetary policy. It begins to guide financial institutions to take commercial banks as the main body, expand the amount of credit loans, and control the structure and scale of credit loans from a macro point of view. These practices have played a strong role in maintaining and promoting the rapid growth of China's macro-economy. At this point, China's economy gradually began to improve, but inevitably appeared a certain degree of economic expansion. The economic development of our country in the past three years is is shown in Table 2.

Table 2 Statistical Table of Major Economic Indicators of China in 2008-2010

Index	2008	2009	2010
GDP growth rate(%)	9.6	9.2	10.4
CPI(%)	5.9	-0.7	3.3
M2 growth rate(%)	17.82	27.7	19.72

3.2.2 Targeted and prudent monetary policy for 2011-2015

During the period 2011-2015, the central bank implemented a prudent monetary policy. The policy objective in this phase is to maintain the relative stability of domestic price levels and prevent the rise of interest rates in the domestic market. In order to prevent inflation caused by loose monetary policy to save the national economy in the previous stage, China has reduced the reserve requirement ratio many times since 2012, and adjusted the transaction price of RMB against the US dollar on demand. The following year, the Central Bank proposed corresponding measures to deal with the phenomenon of short-term capital fluctuation, and innovatively played the convenience of standing loans. Dynamic adjustment of differential reserves In 2014, the international economy was faced with the problem of insufficient motive force of general economic growth. China began to enter the period of economic restructuring and adjustment. Since then, China's monetary policy has been adjusted to be moderately neutral. Looking at the implementation of monetary policy since 2005, it can be seen that the central bank has significantly enhanced the flexibility, pertinence and effectiveness of the use of monetary policy, and began to show strong predictability. China's macroeconomic indicators for the past five years are shown in Table 3.

Table 3 Statistical Table of Major Economic Indicators of China in 2011-2015

Index	2011	2012	2013	2014	2015
GDP growth rate(%)	10.3	7.65	7.67	7.4	6.9
CPI(%)	5.4	2.6	2.6	2	1.4
M2 growth rate(%)	17.32	14.39	13	16.7	13.3

3.2.3 Robust and neutral monetary policy for 2016-2018

At present, China's monetary policy adheres to a steady and neutral pace and constantly strengthens the guiding role of policy on market expectations. Fully carry out the de-leveraging activities of the financial market to prevent systemic risks and the impact on the development of China's economy. From the current situation, China's economic operation is expected to remain at a reasonable level in the future, but the international economic environment faced by the domestic market is still grim. First of all, the world economy has experienced a deep adjustment stage since 2008. The moderately loose monetary policy has gradually reversed the decline of the domestic market caused by the economic crisis. Secondly, at this stage, The trade protection doctrine in the international market gradually erodes the momentum of China's stable and forward-looking economy. Under this circumstance, maintaining a stable operation of the economy requires the central bank to cooperate with the implementation of a moderate monetary policy and continuously strengthen the guiding effect of policy objectives on the market.

Table 4 Statistical Table of Major Economic Indicators of China in 2011-2015

index	2016	2017	2018
GDP growth rate(%)	6.7	6.9	6.6
CPI(%)	2	1.5	2.2
M2 growth rate(%)	11.3	9.6	8

According to the data, the RMB has a tendency to depreciate since 2015, and the central bank has continuously reduced Statutory deposit reserve ratio by a total of 2.5 percentage points to support the expansion of domestic credit and continuously enhance the vitality of the domestic market. In 2018, the onshore RMB exchange rate against the dollar and the RMB midpoint changed from rise to fall throughout the year, and depreciation occurred mainly in the second half of the year. The change of RMB exchange rate from rise to fall is mainly a reflection of market supply and demand and fluctuations in international currency markets. The Fed has raised interest rates continuously, the dollar has strengthened, and the financial turmoil in emerging economies, coupled with trade frictions, has caused certain disturbances to market sentiment, so the RMB exchange rate has depreciated under the impetus of market forces. From the internal environment, China's economy is expected to stabilize in a reasonable range, so "stability" is still the main tone of policy implementation. With the tightening of global monetary policy, deleveraging and liquidity contraction of domestic monetary policy remain the trend in the future.

3.3 RMB exchange rate and monetary policy trend in 2008.

After the reform of RMB exchange rate system, the balance of China's foreign trade has continued to increase for several years in a row. While exports drive the overall development of the economy, China begins to face the pressure of RMB appreciation. Under such circumstances, China has adopted the way of maintaining the small appreciation of RMB, maintaining the relative stability of the exchange rate, and implementing a sound monetary policy. This measure can effectively solve the problem of long-term trade surplus and promote the continuous growth of China's economy. Its effect can be confirmed by China's declining trade surplus in 2010, which not only includes the impact of the international financial crisis, but also reflects the exchange rate regime and the exchange rate regime. The result of the joint coordination of monetary policy.

In a word, in this stage, the relationship between China's exchange rate system and monetary policy is more about the improvement of coordination. Especially after the global financial crisis, the coordinated treatment of the two in China is more flexible and mature, and the policy tools are also developing towards a more diversified trend. At the same time, the reform of RMB exchange rate system has also brought more room for the effectiveness of monetary policy.

4. Empirical Analysis of the Influence of Exchange Rate Fluctuation on Monetary Policy

4.1 Model construction

According to the theoretical analysis of the influence of RMB exchange rate fluctuation on monetary policy, the nominal exchange rate between RMB and US dollar(ER) is chosen as the proxy variable of RMB exchange rate, the monetary supply(M2)and interest rate(R)monetary policy. The exchange rate and interest rate of RMB are the factors affecting monetary policy. Interest rate(R)uses the current interest rate monthly data. The regression equation is established as follows:

$$\ln ER = \beta_0 + \beta_1 \ln M2 + \beta_2 \ln R + u \quad (1)$$

β_0 stands for the constant, β_1 , β_2 is the response coefficient and u is the random disturbance term.

4.2 Design of data sources and indicators

This paper selects the annual data from 2008 to 2018 for analysis. The nominal exchange rate of RMB to the United States dollar (ER) is selected as the proxy variable of RMB exchange rate. The nominal exchange rate of RMB against the US dollar comes from the website of the State Administration of Foreign Exchange. Choose money supply (M2) and interest rate (R) as the agent variable of monetary policy. The data come from the National Statistical Yearbook.To eliminate heteroscedasticity, take the logarithm of the above **three variables**.

4.3 The results and Analysis of empirical Test

The DF unit root test method is used to test the stationarity of variables. If the DF test value is less than the critical value, the tested sequence is determined to be a stationary sequence, and vice versa, it is a non-stationary sequence. The test results show that the exchange rate ER is a stationary sequence, the money supply M2 and the interest rate R are non-stationary sequences. Therefore, the first order difference of the original data of money supply and interest rate is further carried out, and it is found that the first order difference sequence $dM2, dR$ is stationary.

4.3.1 Unit root test

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Table 5 DF test results

variable	Measurement statistics	Sig. (1%)	Sig. (5%)	Sig. (10%)
dM2	-11.957	-3.498	-2.888	-2.578
ER	-4.296	-3.497	-2.887	-2.577
dR	-9.157	-3.498	-2.888	-2.578

4.3.2 The order determination and stationarity of the model are tested.

Vector autoregressive model is a function of the endogenous variables in the system as a function of the hysteresis of all endogenous variables in the system. Autoregressive models are generalized to autoregressive models composed of multiple time series variables. Let P be the lag order. According to the information criterion, this paper determines the VAR regression model with 5 lags.

4.3.3 Granger causality test

Granger causality test can be used to investigate the guiding relationship between variables. The steps are as follows: the VAR model is constructed, and the optimal lag order is selected by residual test, so as to determine the lag order of Granger causality test. In this paper, the information criterion method (AIC and SC rule) is used to select the optimal lag order of the model. It is proved that the optimal lag order of the model is of the fifth order. The original hypothesis is that exchange rate change is not the Granger cause of monetary policy. The test results are shown in Table 7. For the

original assumption that "ER is not the Granger reason for M2", the P value is 0.002 to reject the original hypothesis, that is, to reject the ER not It's the cause of M2.

Table 6 Granger causality test results

Equation	Excluded	chi2	df	Prob > chi2
dM2	ER	21.428	6	0.002
dM2	dR	5.4408	6	0.489
dM2	ALL	31.758	12	0.002
ER	dM2	9.6899	6	0.138
ER	dR	7.9487	6	0.242
ER	ALL	17.097	12	0.146
dR	dM2	4.6123	6	0.594
dR	ER	11.37	6	0.078
dR	ALL	14.018	12	0.300

The Granger causality test is used to determine whether there is causality between RMB exchange rate fluctuation and monetary policy. The test results show that rejection of exchange rate change is not the cause of monetary policy change, that is to say, exchange rate fluctuation will cause the floating change of money supply.

RMB exchange rate fluctuation ER is the cause of money supply M2. It can be seen that there is a one-way Granger causality between exchange rate and money supply, but there is no Granger causality between exchange rate and interest rate. Thus it can be seen that China's monetary policy and exchange rate policy are linked, but mainly through the intermediate index of money supply. Because the marketization of interest rate in our country is not completely, the result shows that the exchange rate does not affect the interest rate, while the other original assumptions can not be rejected at the established significant level, which also reflects to a certain extent that monetary policy has no significant correlation to the transmission of the target, especially the money supply policy variables to the interest rate and foreign exchange rate. The rate does not reflect the significant Granger reasons, which further reflects the effectiveness of monetary policy has not been fully reflected.

5. Conclusion

RMB exchange rate fluctuation will affect the change of interest rate and money supply through trade channel and capital market channel respectively, but the effect is not significant. With the opening of capital account and the reform of exchange rate system in China, the exchange rate transmission mechanism of monetary policy will become more and more important, but the exchange rate can not become the main goal of monetary policy. Therefore, under the background of RMB internationalization, monetary policy regulation and control should pay more attention to the exchange rate fluctuation caused by RMB internationalization, and strengthen the sensitivity analysis of monetary policy regulation to exchange rate fluctuation, so as to improve the effectiveness of economic structure optimization through monetary policy regulation and control. In person In the process of the reform of the exchange rate system, the coordination between the local currency market and the foreign exchange market should be carried out cautiously in order to promote the development of benign interaction between the two sides.

China has carried out many reforms to the exchange rate system according to various problems in the market at different stages. However, the direct impact of monetary policy on the macroeconomic situation is still weak, the interest rate has not been fully marketed for a long time, and the linkage between the interest rate market and the foreign exchange market is relatively inadequate. The reason for these results is likely that the market of interest rate in China is not perfect, which can not effectively transmit the information of monetary policy and exchange rate policy, so as to give full play to the decisive role of the market. With the further acceleration of RMB internationalization, currency. Policy should pay more attention to the use of price-based tools-interest rate tools. The internationalization of RMB has brought about new changes in the relationship between exchange

rate fluctuation and monetary policy regulation, and the interaction effect between interest rate and exchange rate has become more and more close in China. Therefore, while realizing the internal equilibrium, monetary policy regulation and control need to pay more attention to the external equilibrium and constantly strengthen the coordination between exchange rate policy and interest rate policy.

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