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## **STUDY ON THE SPILLOVER EFFECT OF FED MONETARY POLICY ON RMB EXCHANGE RATE**

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**ABSTRACT:** *In this paper, the VAR model is constructed by using the US narrow measure of money M1, the exchange rate of RMB against dollar and GDP growth gap between China and the United States to conduct empirical analysis. The results show that the implementation of the Fed's monetary policy will have an impact on the exchange rate of RMB against the dollar in the short term, but the impact will be weakened in the long term. What really helps the RMB appreciates against the dollar is the widening gap between two countries economic growth. Conversely, the dollar reflux, the depreciation of RMB against the dollar can promote the rapid development of China's economy in the short term, but this exchange rate advantage will disappear with the passage of time in the long run. In addition, the loose monetary policy will stimulate the U.S. economy improving, but suppress the development of China's economy. As a result, the GDP growth gap between China and the United States has narrowed.*

**KEY WORDS:** Federal Reserve monetary policy; RMB exchange rate; Spillover effect; The VAR model

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### **INTRODUCTION**

After the global financial crisis and economic recession in 2008, to stimulate the economy, The Federal Reserve adopted the quantitative easing policy of lowering policy interest rate and purchasing large-scale asset. The implementation of QE policy led to the sharp expansion of the balance sheet of the Federal Reserve. From the crisis to June 14, 2017, the total assets of the Federal Reserve increased from about 0.9 trillion dollars to 4.5 trillion dollars, which soared by nearly five times. The Fed's large-scale holdings of MBS, an unconventional asset, and the large increase of financial institutions' deposits in the Fed resulted in the decrease of money multiplier, weakened the Fed's ability of money supply and counter-cyclical regulation. In addition, the macro economy of the United States has begun to recover. In 2015, the unemployment rate in the United States was 5% lower than the natural unemployment rate. Therefore, the United States, which no longer stimulate economic development by injecting liquidity, began to change the direction of monetary policy and withdraw liquidity from the market in 2015. The Federal Reserve has carried out four interest rate increases since the first interest rate increase in December 2015. In October 2017 the Federal Reserve also announced the launching of the contraction table, expecting to reduce the table by 450 billion dollars in five quarters.

With the advancement of globalization, the connection of the world economy has become more and more close, There will be the phenomenon that the policy changes of one country will affect other countries among the economies, The United States is the world's largest economy, the dollar is the global reserve currency and the currency of trade settlement, changes in US monetary policy will have different degrees of impact on the currencies of different countries. As the capital market increasingly open and the reform of exchange rate increasingly deepen step by step , The impact of international factors on the RMB exchange rate is also growing. The low benchmark interest rate at the early stage of the Federal Reserve, the path of quantitative easing and interest rate increase and contraction at the later stage will all have an impact on the fluctuation of the RMB exchange rate. The monetary changes directly affect the economic development of a country, and the monetary policy changes of the Federal Reserve will also affect the economic development of China and the United States, the economic development of China and the United States will be further reflected in the exchange rate of RMB against the dollar. Therefore, it is of great practical significance for relevant government departments and academic circles to scientifically calculate the impact of the quantitative easing policy of the Federal Reserve on the trend of RMB exchange rate and the economy of the two countries to analyze the impact of relevant monetary policies of the United States in the future. This paper chooses M1, the narrow measure of money in the United States, to represent the implementation of monetary policy in the United States, the implementation of monetary policy, and use VAR model to analyze the relationship between M1 and the exchange rate of RMB against the dollar and the difference between the GDP growth of China and the United States, Finally, based on the results of theoretical analysis and quantitative empirical results, this paper analyzes the impact of the fed's monetary policy on the RMB exchange rate and China's macro-economy, and puts forward several feasible countermeasures and risk prevention measures conducive to the RMB exchange rate's return to the equilibrium level.

This paper consists of 8 parts. Section 1 is a brief introduction of the current environmental background. Section 2 mainly introduces the impact on the implementation of monetary policy in the United States from domestic and foreign scholars. Section 3 describes the methodology used to study the spillover effect of Fed monetary policy on RMB exchange rate. Section 4 shows the empirical result of the spillover effect of Fed monetary policy on RMB exchange rate. Section 5 discusses the empirical results and section 6 puts forward countermeasures and suggestions on how to deal with the monetary policy changes of the Federal Reserve, section 7 makes a consulsion, section 8 is future research.

## **LITERATURE UNDERPINNING**

There is a lot of foreign research on the quantitative easing policy and its subsequent withdrawal of the Federal Reserve. Mauliin John (2013), based on the analysis of the current high unemployment problems in US, pointed out that the QE has yet really help people out of the

shadow of the financial crisis in the United States, most residents are still unable to pay the high household debt, the false prosperity of economy did not improve the residents income and consumption level, quantitative easing monetary policy is too early to quit. Professor Hausmann (2013) from Harvard University explains, when the quantitative easing policy was withdrawn, the so-called hot money in the world began to withdraw from emerging market countries one after another, and led to a relatively large change in the exchange rate of emerging market countries. By comparing the annual GDP data of some developed countries (Britain, America, Japan and Germany) and emerging markets (China, Pakistan, Russia and India) and their growth rates from 2003 to 2011, he found that when emerging market countries economic prosperity, companies and investors in international markets allocate assets to these high-growth countries, and domestic investment banks will shift capital to Asian and South American markets, this has also led to economic growth in some countries. But the growth of these emerging markets is not real economic growth, but nominal GDP growth. When nominal GDP growth in emerging markets exceeds that of the real economy, this will not only lead to the country's asset prices to be higher unreasonably, the competitiveness of export products decline, make its foreign trade terms worsen, it is also lead to the balance of payments imbalance caused by the trade deficit between imports and exports, real economic growth weak, led to a sharp devaluation of the currency.

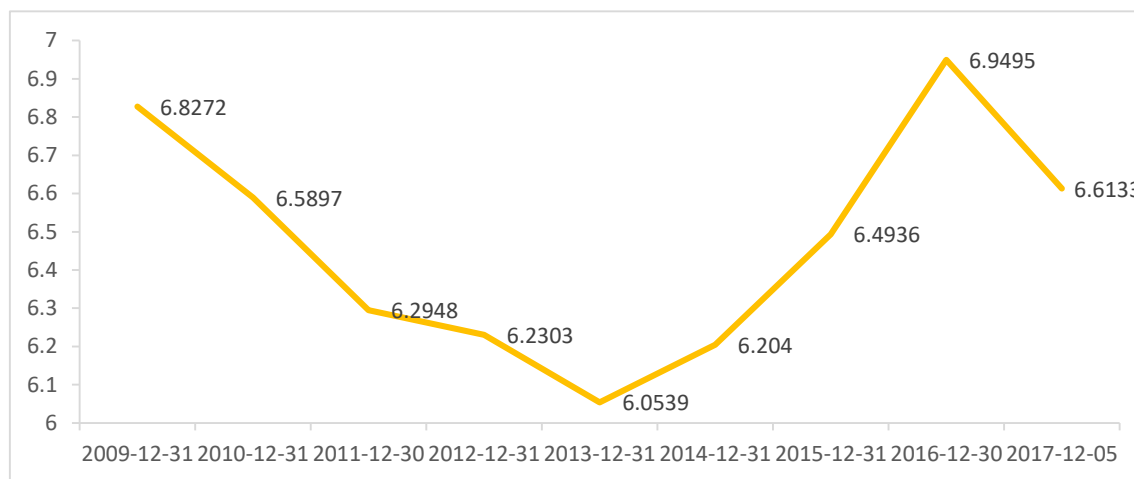
Domestic studies generally believe that the Federal Reserve has released a large amount of liquidity in the quantitative easing monetary policy, although these massive bond-buying programs have helped restore momentum of the U.S. economy, but the spillover of this liquidity has exacerbated the risk of bubbles in emerging markets, it's on the verge of rupture, as long as the dollar rises above a certain level against the country's currency, the bubble will burst, as happened in the U.S. financial crisis. Yi xianrong (2014) proposed in his economic analysis of QE withdrawal that although the entire international market does not want the withdrawal of QE in the United States, the withdrawal of QE in the United States is an inevitable trend. Lu siyuan (2013) made a comprehensive analysis of the possible impact of QE withdrawal on the operation of China's economy, which involved five points, first, a recovery in foreign demand and easing pressure on the yuan to appreciate would boost exports; second, the exit has eased China's imported inflationary pressures; third, the urgency of China's economic transformation will be further intensified; fourth, short-term changes in global capital flows have impacted China's capital; fifth, an exit would require greater flexibility in China's monetary policy. Luo xiao (2012) made a detailed study on how U.S. Treasury bonds affect the exchange rate of RMB, by made an in-depth analysis of the issuance scale of US Treasury bonds from 1941 to 2010 and the response degree of RMB exchange rate to the holding scale of US Treasury bonds in different periods, He sees China as a continuing counterparty to U.S. Treasury debt, he believes that as China continues to act as a counterparty to U.S. Treasury debt, short-term and medium - and long-term Treasury bond yield changes should be taken as an important indicator to predict the fluctuations of the RMB exchange rate, according to the trend of dollar exchange rate changes in different periods, the scale of holding US Treasury bonds should be controlled

to reduce the impact of external factors on the RMB exchange rate. Zhao Wensheng and Zhang Yishan (2012) studied the impact of the US monetary policy on the RMB exchange rate and found that 34% of the exchange rate fluctuations were explained by the impact of the US monetary policy.

Based on the above literature conclusions, it can be seen that the monetary policy changes of the Federal Reserve have a great impact on the RMB exchange rate. The Fed's quantitative easing policy will lead to the appreciation of the RMB exchange rate, however, this appreciation is not supported by strong economic development, but a short-term false high, which is extremely risky. And the Fed's policy of raising interest rates and shrinking the table will cause depreciation pressure on the RMB exchange rate, but it is good for China's real economy, with China's rising economic status, the yuan will have a solid basis for appreciation. This paper attempts to quantify the impact of the Fed's monetary policy changes on the RMB exchange rate through empirical research methods, and to reflect the changes and effects of the Fed's monetary policy implementation on the macroeconomy of China and the United States in combination with the current data of China and the United States' national economic growth. According to the analysis of VAR model, the implementation of the monetary policy of the Federal Reserve will have an impact on the exchange rate of RMB against the dollar in the short term, but this impact will be weakened in the long term, and the real driving force for the appreciation of RMB against the dollar is the widening gap between the economic growth of China and the United States; In the contrary, the repatriation of the US dollar and the depreciation of the RMB against the US dollar can promote the rapid development of China's economy in the short run, but in the long run, this advantage of the exchange rate will disappear over time, in addition, the implementation of quantitative easing policy in the United States will narrow the gap between the GDP growth of China and the United States. This is because the implementation of quantitative easing policy in the United States makes the RMB appreciate against the dollar, inhibits the development of China's economy, and infuses liquidity into the American market, leading to the improvement of the American economy.

Quantitative easing policy is essentially a kind of currency shock, which leads to a large number of dollars flowing into the market, resulting in a global flood of dollars. The most direct impact is that the dollar depreciates sharply while the relative currency keeps appreciating. As we can be seen from the trend line of the nominal exchange rate between the US dollar and RMB in figure 1, since the financial crisis, as the US launched quantitative easing, the RMB exchange rate has been in the process of appreciation. During the implementation of the quantitative easing monetary policy, the US dollar depreciated by 10.8% against the RMB (the RMB appreciated by 13% against the US dollar). The Federal Reserve's fourth round of quantitative easing policy ended in November 2013. After 2013, as the US economy returns to the track of steady recovery, the ultra-loose monetary policy of the Federal Reserve should return to normal, otherwise, the long-term excessively loose monetary policy will lead to the overheating of the

US economy, encourage financial institutions to take excessive risks to increase leverage, and may lead to the risk of asset bubbles and soaring inflation.



Source :Wind database

FIG. 1 Trend of RMB exchange rate against US

In 2014, although the US dollar interest rate hike has been delayed, market expectations have begun to ferment, and the RMB exchange rate against the US dollar has risen significantly since the beginning of the year. On December 16, 2015, the Federal Reserve announced that it would raise the federal funds rate by 25 basis points to the level of 0.25% to 0.5%, which is the first time for the Federal Reserve to raise interest rates since June 2006, marking that the world's largest economy enters the path of interest rate increase and the beginning of the normalization of monetary policy. Since then, the dollar began to continue to raise interest rates, the RMB against the dollar exchange rate gradually rose. On June 15, 2017, the Federal Reserve once again announced that it would increase the benchmark interest rate range by 25 basis points, from 0.75% to 1.0% to 1.25%, which is the fourth time for the us central bank to raise interest rates in the current cycle, the second rate increase this year. However, the effect of raising interest rates on long-term interest rates in the United States is limited. Long-term interest rates are still too low, which makes asset prices higher and does not quickly attract dollars back to the American market. Shrinking the balance sheet will directly push up long-term interest rates and raise the cost of financing for enterprises, thus tightening the country's financial environment. That leaves the Fed needing to start shrinking to adapt to changing external conditions and normalize its asset size and structure. The Fed's balance sheet reduction process was officially launched in October 2017, which is bound to bring a new round of depreciation pressure on the RMB exchange rate. However, from figure 1, we can see that the RMB has broken the market depreciation expectation. From the beginning of 2017 to December 2017, the central parity rate of the RMB against the US dollar has been on a downward trend as a whole, that is, the RMB has not depreciated but appreciated, the fundamental reason is that in

order to cope with the changes in the monetary policy of the Federal Reserve, the state foreign exchange control agency introduced counter-cyclical adjustment factors into the formation mechanism of RMB exchange rate against the US dollar, making the RMB exchange rate decline rather than rise in the short term. However, the strong upward trend of the Fed's policy of reducing the central bank's reserve rate is difficult to fundamentally reverse the expectation of RMB depreciation. In the future, the RMB exchange rate is still under the influence of the Federal Reserve's monetary policy implementation. Therefore, empirical study on the impact of the Fed's monetary policy changes on the RMB exchange rate is very important to prevent exchange rate risks and reduce foreign exchange losses caused by exchange rate changes.

## **METHODOLOGY**

Through the description of the spillover effect of the Fed's monetary policy on the RMB exchange rate in chapter 3, it can be seen that each change of the Fed's monetary policy has a greater impact on the people's exchange rate. To verify whether there is a correlation between the implementation of the Fed's monetary policy and the RMB exchange rate, and the impact of this process on the Chinese and American economies, In this chapter, the relevant quarterly data from 2008 to 2017 are taken as the research samples. With the help of SPSS20, EVIEWS7 and other software, VAR model is used for empirical analysis.

### **Selection of variables and indicators**

#### **Data is introduced**

Monetary policy refers to the sum of the policies and measures adopted by the central bank to adjust money supply and interest rate in order to achieve its specific economic goals (such as stabilizing prices, promoting economic growth, achieving full employment and balancing international balance of payments), and affecting the macro-economy. Monetary policy consists of policy tools operating objectives intermediate objectives and final objectives. The implementation process of monetary policy is using monetary policy tools to act on operational goals, and then influence intermediate goals through operational goals, so as to achieve the final goal. Then, as an intermediate target indicator connecting the monetary policy tool and the ultimate goal, it can fully reflect the monetary authority's policy intention and measure the current monetary policy situation, as can be seen, monetary policy measures include operational goals and intermediate goals.

This paper takes M1 in the narrow sense as the measurement index of monetary policy, which includes cash in circulation (generally expressed by M0) and demand deposits. Among them, demand deposits mainly include enterprise demand deposits, institutional group deposits, rural deposits, and credit card deposits held by individuals. Narrow sense of money is the medium of exchange of goods and services, which reflects the real purchasing power in the economy and has a more direct impact on the current price level. In addition, the fluctuation of M1 will have an important impact on the economy.



Gross Domestic Product (GDP) refers to the value of all final products and services produced within a certain period of time (a quarter or a year) in the economy of a country or region, It is often recognized as the best indicator of a country's economic condition. It can reflect not only the economic performance of a country, but also the national strength and wealth of a country, GDPC, the GDP growth gap between China and the United States, use the GDP growth rate of China from the first quarter of 2008 to the third quarter of 2017 minus the GDP growth rate of the United States.

### Model selection

In order to investigate the correlation between the US narrow definition of money, exchange rate of RMB against US dollar and the difference of GDP growth between China and the United States, the paper makes an empirical analysis using the time series with the data of the US narrow monetary quantity (M1), RMB/US dollar exchange rate (EX) and the GDP growth gap between China and the us (GDPC) from the first quarter of 2008 to the third quarter of 2017. VAR model can obtain the trusted variable relationship when the time series is unstable, but there is a co-integration relationship. Moreover, it can effectively avoid the problem of repeatedly building functions for each endogenous variable in structural modeling. Therefore, VAR model is built in this paper to analyze the relationship among the three. The following model is built in this paper:

$$\begin{aligned} EX_t &= \alpha_1 + \sum_{i=1}^n \beta_{1,i} EX_{t-i} + \sum_{i=1}^n \delta_{1,i} M1_{t-i} + \sum_{i=1}^n \lambda_{1,i} GDPC_{t-i} + \varepsilon_{1,t} \\ GDPC_t &= \alpha_2 + \sum_{i=1}^n \beta_{2,i} EX_{t-i} + \sum_{i=1}^n \delta_{2,i} M1_{t-i} + \sum_{i=1}^n \lambda_{2,i} GDPC_{t-i} + \varepsilon_{2,t} \end{aligned} \quad (1)$$

t is for the year, n is for the lag order and the error term for the groups.

### Research hypothesis

According to the existing literature research and the trend of the exchange rate between RMB and US dollar, the implementation of US monetary policy largely affects the exchange rate between RMB and US dollar, and there is likely to be a correlation. In addition, the implementation of the monetary policy of the Federal Reserve not only affects the direction of the market economy of the United States, but also indirectly affects the market economy of China through its influence on the RMB exchange rate. Therefore, the narrow monetary amount of the United States and the exchange rate of the RMB against the dollar will also have an impact on the gap between the GDP growth of China and the United States. Therefore, the paper assumes that,

There is an equilibrium relationship between the exchange rate of RMB against US dollar, US narrow definition of money and the difference of GDP growth between China and the US.

## Data sources

The data used in this paper include the Us narrow definition of money, the exchange rate of RMB against the dollar and the gap between the GDP growth of China and the United States from the first quarter of 2008 to the third quarter of 2017.

## RESULTS

### Unit root test

The premise of co-integration relationship between variables and establishing VAR model is that variables in the model are of the same order. Therefore, to establish a regression model with time series, we should first check whether the variables are stationary or not, and whether a linear combination of non-stationary variables is stationary. In this paper, we using EIEWS7 to run the ADF test which tell us if the EX, GDPC and M1 pass the unit root test. The result as shown in table 1. The test equation form (C,T,K) respectively indicates that the test equation contains constant term, time trend term and lag order, and the columns in the table are the forms with the lowest associated probability under the same order. The lag order is automatically received according to the AIC criterion and rule of Schwarz. We can see the result of unit root test in the table 1. The variable EX, GDPC and M1 are non-stationary in 5% significance level, and the three under the first order difference are stable at the 5% significant level. This suggests that the variable EX, GDPC and M1 is the same order list, and obey the I(1) process. Therefore, we can continue the cointegration test with EX, GDPC and M1.

Table1 Unit root test

variable	Test equation form	ADF	Concomitant probability	significant level	Test result
EX	(0,0,0)	-1.624451	0.0975	5%	non-stationary
D(EX)	(0,0,1)	-2.951877	0.0043	5%	stable
GDPC	(0,0,0)	-1.263486	0.1859	5%	non-stationary
D(GDPC)	(0,0,1)	-4.394124	0.0001	5%	stable
M1	(0,0,0)	-2.612169	0.2774	5%	non-stationary
D(M1)	(1,0,1)	-7.120841	0.0000	5%	stable

### Co-integration test

According to 4.4.1, we know the original sequence of EX, GDPC and M1 is not smooth, but all three are of the same order and single integer. So, a cointegration relationship may exists. If the variables exist a cointegration relationship, there is still a way to establish the regression model with traditional regression method. To judge whether there is a co-integration relationship between them, this paper take a cointegration test with EX, GDPC and M1 sequences. In measuring method, there are two types of traditional test: EG two-step test and maximum likelihood estimation method (also called JJ test). EG two-step test based on the single equation



of regression residual, usually for the co-integration relationship between two variables. JJ test is no need to pay attention to model structure, endogenous or exogeneity variables and the number of cointegration vector, and just need to test the cointegration relationship between the multiple variables inspection with the regression coefficient. Therefore, in this paper, we choose JJ test for cointegration relationship among the CFA, EX, GDPC, LC and M1. And then, with Eviews7, we run the cointegration test for EX, GDPC and M1 sequence. The specific test results are shown in table 2. At the confidence level of 5%, trace statistics and maximum characteristic statistics show that there are three co-integration equations that are stable. Therefore, we can consider that there is a long-term equilibrium relationship among the above variables, and VAR model can be established for the three variables.

Table 2 Results of sequence cointegration test

H0	eigen value	Trace test	A threshold of 5%	Concomitant probability
None *	0.552074	56.28806	29.79707	0.0000
At most 1 *	0.429896	27.37546	15.49471	0.0005
At most 2 *	0.180035	7.145751	3.841466	0.0075
H0	eigen value	Maximum characteristic statistics	A threshold of 5%	Concomitant probability
None *	0.552074	28.9126	21.13162	0.0033
At most 1 *	0.429896	20.22971	14.2646	0.0051
At most 2 *	0.180035	7.145751	3.841466	0.0075

### VAR model and estimation analysis

Table 3 The optimal lag order judgment result of VAR model

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-149.1461	NA	0.748654	8.224113	8.354728	8.270161
1	10.59284	284.9397	0.000217	0.076063	0.598523*	0.260254
2	22.17347	18.77940*	0.000191*	-0.063431*	0.850874	0.258904*

At first, we set up VAR model and need to determine the optimal lag order in the model. In the Eviews, several criteria for judgment is given to get the optimal lag order number of the model such as LogL, LR, FPE, AIC, SC and HQ. An asterisk (\*) represent the optimal order number of specific rule. It can be seen in table 3 that all criteria to give the optimal lag order are 2 except for SC criteria which give the 1. According to majority rule, the optimal lag order of the VAR model is 2. Considering the variable EX, GDPC and M1 all obey the first-order single whole

process, we will directly establish a VAR model to test the relationship among the three variables (EX, GDPC and M1). The empirical results of two lag periods of explanatory variables on equation are as follows.

$$\begin{aligned}
 EX = & 1.661776 EX(-1) - 0.737493 EX(-2) - 0.145389 M1(-1) + 0.100993 M1(-2) \\
 & (0.17884) \quad (0.18644) \quad (0.57429) \quad (0.58730) \\
 & [9.29176] \quad [-3.95568] \quad [-0.25316] \quad [0.17196] \\
 & + 0.034206 GDPC(-1) - 0.013671 GDPC(-2) - 0.004060 C \\
 & (0.04011) \quad (0.04179) \quad (0.05883) \\
 & [0.85279] \quad [-0.32712] \quad [-0.06901]
 \end{aligned} \tag{2}$$

$$R\text{-squared} = 0.961954 \quad F\text{-statistic} = 126.4194$$

$$\begin{aligned}
 GDPC = & 0.110512 EX(-1) - 0.016788 EX(-2) - 0.576326 M1(-1) - 0.721824 M1(-2) \\
 & (0.78799) \quad (0.82146) \quad (2.53034) \quad (2.58766) \\
 & [0.14024] \quad [-0.02044] \quad [0.22777] \quad [-0.27895] \\
 & - 0.695421 GDPC(-1) - 0.314235 GDPC(-2) - 0.030466 C \\
 & (0.17673) \quad (0.18414) \quad (0.25920) \\
 & [-3.93494] \quad [-1.70650] \quad [-0.11754]
 \end{aligned} \tag{3}$$

$$R\text{-squared} = 0.349713 \quad F\text{-statistic} = 2.688908$$

It can be found from the regression results of the exchange rate of RMB/USD. In the short term, the increase of M1 in the US market will decrease the exchange rate of RMB/USD. It means the quantitative easing policy implemented by the Federal Reserve will cause the appreciation of RMB against USD. However, in the long run, this effect is not obvious, and the difference in GDP growth between China and the United States has the opposite effect on the exchange rate of RMB against the USD. In the short run, China's GDP growth will not immediately cause the exchange rate to decline and the RMB to appreciate. In the long run, the rapid development of GDP will gradually reflect the effect of RMB appreciation. This result shows that the implementation of the monetary policy of the Federal Reserve will have an impact on the RMB in the short run, but the impact will be weakened in the long run, and the real impetus for RMB appreciation against the dollar is the increasing gap between the GDP growth of China and the United States.

At the same time, this paper also listed the impact of the exchange rate of RMB against the USD and the changes of the monetary policy of the Federal Reserve on the economic development of China and the United States. From the regression equation, it was found that the depreciation of RMB/USD can promote the rapid development of China's economy in the short term, which is in line with economic laws. But in the long run is not significant, this advantage will vanish as time goes on. On the other hand, the implementation of quantitative

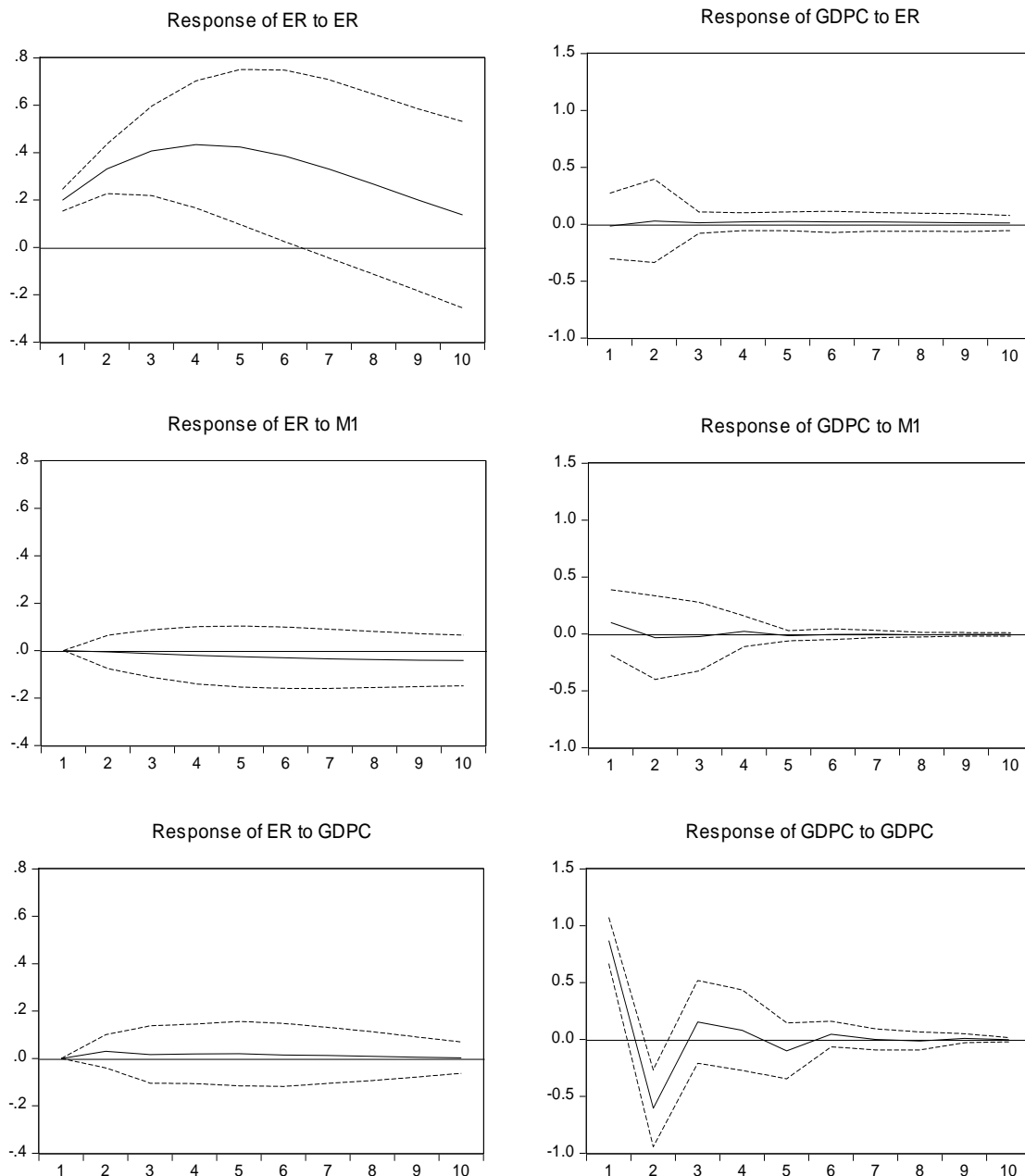
easing will make narrow GDP growth gap between China and the United States. This is because the implementation of quantitative easing in America would make the RMB appreciation against the USD and it inhibits the development of China's economy. However, it injects liquidity to the U.S. market, which driving the U.S. economy better.

### **Impulse response analysis**

Impulse response, means the positive impact of a variable in the model are given, and what the rest of the variables response to the impact in order to analyse if there is a random shocks, the dynamic effect will effect the whole model. In figure 2, the impact comes respectively from the exchange rate of RMB against the USD, narrow measure of money supply of U.S. and gap of GDP growth between China and the United States. Under such one unit impact of structural disturbance, the exchange rate of RMB against the USD and gap of GDP growth between China and the United States can be found from the figure 2. We found the changes of RMB against USD has self-regulation function. In the short term, it is obviously positive influence, but then it is a weak negative influence and eventually into balance. From the impact of the fed's monetary policy on the RMB exchange rate, it can be found that the change of the fed's monetary policy has a slight negative impact on the RMB exchange rate. It means that as the implements of the fed quantitative easing, the RMB exchange rate against USD will drops and the RMB will appreciates. Otherwise, draw back the market liquidity will push the exchange rate of RMB against USD increase and RMB will depreciate. The influence will last a long time. The graph describes the influence of gap of GDP growth between China and the United States on exchange rate of RMB. The shock of gap of GDP growth between China and the United States will have a poor negative impact on exchange rate of RMB against USD in the short term but appeared for the equilibrium in a long term.

This paper also empirically demonstrates the impact of the exchange rate of RMB/USD, narrow measure of money supply and gap of GDP growth between China and the United States on gap of GDP growth between China and the United States. In figure 2, it can be found units of shock of the exchange rate of RMB/USD, narrow measure of money supply effect on the GDP of China and the United States is not obvious, but the impact of gap of GDP growth between China and the United States has a more obvious influence on itself. And it presents the volatility over time. In the first year, it presents a significant positive influence, but it presents a significant negative impact in the second year. Then in the third year, it keeps the negative and finally, more and more smooth and going to end up in equilibrium.

Response to Cholesky One S.D. Innovations ?2 S.E.



## DISCUSSION

Through the empirical analysis, it can be found that there are different equilibrium relations among the narrow measure of money supply of the United States, the exchange rate of RMB/USD and the difference between the GDP growth of China and the United States in different periods. Our previous hypothesis is true. In particular:

Something can be found by analyzing the autoregressive equation of the narrow measure of money supply of the United States, the difference of GDP growth between China and the United States on the exchange rate of RMB/USD. Results are as follows:

The implementation of the monetary policy of the Federal Reserve will have an impact on the RMB exchange rate in the short term. With the quantitative easing policy of the Federal Reserve, the RMB exchange rate against the dollar will decline and the RMB will appreciate. The Federal Reserve implements the monetary tightening policy, the RMB exchange rate against the dollar rises and the RMB depreciates, but the impact of the us monetary policy changes on the RMB exchange rate will be weakened in the long run.

### **Implication to Research and Practice**

We need to pay special attention to the release of the monetary policy of the Federal Reserve. If we expect a big impact on the RMB exchange rate, the central bank should intervene in due course to offset the adverse impact. At the same time, relevant institutions must pay attention to the media and network information to prevent the spread of adverse news on a large scale, causing herd effect and economic fluctuations. We can also adopt diplomatic measures to cooperate with the United States on international monetary policy to avoid a lose-lose situation. The monetary authorities should be rational allocation of foreign exchange reserve currency structure of the us Treasury, according to data released in 2014, China's holdings of U.S. Treasury bonds totaled 1.24 trillion yuan, is still the first big holder, in the process of QE to exit, China's foreign exchange reserve managers become the largest flange, large amount of buying U.S. Treasury bonds, the scale is far beyond the hedge demand, increase the exposure of the Federal Reserve's monetary policy change Monetary authorities have realized this problem at present, deep cuts in the purchases of Treasury bonds, the original plan to buy us Treasury capital capital markets spread over Europe, which not only have the effect of the RMB exchange rate risk hedge, also help the development of the European economic recovery at the same time, improve the structure of the assets and liabilities currencies.

### **CONCLUSION**

The difference in GDP growth between China and the us has the opposite effect on the exchange rate of RMB against the us dollar. The rapid economic development of China will not immediately push the exchange rate of RMB against the dollar down and the RMB appreciation in the short term. This effect will be gradually reflected in the long run. Therefore, the real strong support for the appreciation of RMB against the dollar is the widening gap between the economic growth of China and the United States

RMB devaluation can promote the rapid development of China's economy in the short term, but this advantage of exchange rate will weaken with the passage of time, that is, China cannot rely on RMB devaluation to achieve rapid economic development for a long time.

The implementation of quantitative easing policy in the United States will narrow the gap between the GDP growth of China and the United States. Because the implementation of quantitative easing in the United States makes the RMB appreciate against the dollar, inhibits the development of China's economy, but infuses liquidity into the American market and promotes the improvement of the American economy.

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## Future Research

Determinants of the fluctuation of RMB exchange rate is the focus of theory and practice both at home and abroad, the domestic and foreign literature emerge in endlessly, based on the VAR model, the empirical research U.S. monetary policy on the fluctuation of RMB exchange rate, but there are still some limitations, future research can be perfect in the following aspects: research methods of different is the important reason for the differences in results, so the future research could attempt to use other methods to study; Secondly, different data selected will also lead to differences in research conclusions. Quarterly data are used in this paper, and other types of analysis can be used in future studies. Finally, exchange rate fluctuations need to vary greatly in a specific period and background, so future studies can be conducted in combination with other realistic backgrounds.

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