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Research on the Fluctuation Relationship between Interest Rate, Exchange Rate and Stock Price

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ABSTRACT

From the very beginning, this article makes a brief exposition of the relationship and the transmission mechanism between interest rate, exchange rate and stock price. As to the empirical part, we establish the TVP-SV-VAR model to figure out the correlation between the interest rates, exchange rates, and stock prices by using the monthly data from July, 2005 to December, 2017 in China. The results show that the volatility of the stock price under the impact of interest rate has time-varying features and structural changes, the volatility of the exchange rate has time-varying features under the influence of stock index variables, and the Shanghai Composite Index has time-varying features under the impact of exchange rate, but it has a less significant effect between with them. In conclusion, we analyze the reasons for this phenomenon by combining with the reality in China, and give some suggestions.

KEYWORDS: Exchange Rate; Interest Rate; Stock Market; TVP-SV-VAR model

0. Introduction

From the Japanese bubble economy in the 1990s to the US subprime mortgage crisis in 2008, the economies of various countries in the world are facing the impact one after another, and the global economy is facing a very severe test. Since the late 1980s, due to the rapid development of financial derivatives, the increasing degree of economic globalization and market liberalization, and the slackness of financial supervision mechanisms, the frequency of financial crisis has increased, the nature has escalated, and the scope of spread has enlarged. Destructiveness is also getting worse. In this regard, major scholars in the economic field are eager to explore the causes of the financial crisis, as well as its transmission mechanism, to find approaches and methods to control and even resolve the financial crisis. The relationship among the fluctuation of interest rates, exchange rates, and stock prices, which are important components of macroeconomic variables, are even more important to economists.

Interest rates, exchange rates, and stock prices are important economic variables in the macro economy. Their volatility can also reflect the macroeconomic performance at the time. Therefore, investors in different countries can make an initial estimate of the macroeconomic trend at that time, analyze the specific situation, and then select the portfolio that they need most and can maximize their own profits by using the volatility of these three economic variables and the relationship among them all, thus reducing the risk of investment. With the continuous advancement of the global economic integration process and the continuous strengthening of Chinese foreign trade, the correlation between the currency market, the foreign exchange market, and the stock market, which occupy the major position in Chinese economic system, has been increasingly seen by scholars and policy authorities' attention.

1. Research status

With regard to the study of the relationship among interest rate, exchange rate and the stock market, many scholars at home and abroad have made a corresponding study of the

relationship among them, but the results obtained are all different. Some scholars believe that there is no significant fluctuation relationship among interest rates, exchange rates, and stock prices. Dan C(2014) used Toda Yamamoto's method to empirically test the relationship between stock prices and interest rates by selecting data on interest rates and stock prices for Kenya during the 10-year period from October 2002 to September 2012. It was found that there was no significant causal relationship between interest rate and stock price. Binhin W, Hui Z, and Jinfei C(2010) conducted empirical research by establishing the GARCH modelfamily of Chinese stock index and RMB exchange rate. The empirical results prove that there is no significant volatility spillover effect between stock price index and exchange rate. According to case studies, Guoying Z (2003) case study on the impact of macroeconomic factors such as interest rates and inflation on the stock market reveals that the response of Chinese stock market to interest rate shocks is not significant.

While another group of scholars hold different views, most of them believe that there is an interactive relationship between the three. Ying W(2000) established an ECM model to empirically test different exchange rates and Singapore stock market prices.The results show that the appreciation of the Singapore dollar against the US dollar and the Malaysian ringgit, or the depreciation against the yen or the Indonesian rupee, both led to the rise in stock prices during most of the 1990s. And the effect of exchange rates on stock prices has been a gradual increase over time during the 1990s. Dejing W, Hongwei W, and Xunbo C (2001) used the VECM model to empirically test the correlation between interest rates and stock prices in China. The results showed that, in the long-term, increases interest rates led to a drop in stock prices, while short-term increases in interest rates caused stock indices to rise.Yutaka K (2006) studied the relationship between Japan's macroeconomic variables and stock market prices and found that since the implementation of quantitative easing policies in Japan, interest rates cannot affect the volatility of the market price of stocks, but exchange rate changes and the volatility of the United States' stock market will cause Japan's stock market to fluctuate. Hilde CB(2008) conducted an empirical analysis of a small, open country like Norway and used a structural vector autoregressive (SVAR) model to analyze the actual data, and found that there was considerable correlation between interest rates and exchange rates.Richards ND, Simpson J, and Evans J (2009) empirically studied the correlation between stock prices and exchange rates in the Australian market through various measurement methods, and found that there is a long-term cointegration relationship between the stock price index and exchange rate. And there is a one-way Granger causality from the stock price index to the exchange rate. YangangL (2011) conducted cointegration test and panel data regression on relevant economic variables. The empirical results showed that there was correlation between exchange rate and stock price at both the micro level and the macro level, but the impact of exchange rates is different in different industry sectors.Lee W (2012) obtained a long-term cointegration relationship between the RMB exchange rate and the Hang Seng Index in Hong Kong by conducting a cointegration test and a Granger causality test. And there is a Granger causality between them, but there is an error correction between them in the short-term. Mazila M and Hamisah A R (2013) established a multivariate vector autoregressive (VAR) model to test the relationship between stock price fluctuations and exchange rates. The results show that Malaysia's stock market and exchange rate changes will affect each other. Rabia N and Khakan N (2016) selected data on the relevant exchange rates and stock prices in India from October 2008 to March 2010, and conducted corresponding empirical tests by established an econometric model between exchange rates and stock prices. It was found that there was a one-way Granger causality between them, and showed a the opposite trend of fluctuations between them. Attari M I J and Safdar L (2013) using EGARCHmodel and ARCH model empirically analyzes the conduction from the macroeconomic fundamentals to the systemic risks of stock market. The study found that fluctuations in macroeconomic factors have a significant impact on stock returns.

Based on the above research results at home and abroad, it can be found that due to the economic background environment, the research entry points, and the the measurement tools used by various scholars were different. It makes the research conclusions of various scholars unable to form a unified result.On the other hand, from the above-mentioned domestic and foreign research literatures, it can be found that the related effects between relevant economic variables are even more significant in Western developed countries which has a mature financial market.

This paper summarizes the research of the predecessors at first and further explores the correlation between exchange rates, interest rates, and stock prices. As Primiceri (2005) introduced the TVP-SV-VAR model based on stochastic volatility factors, it can capture potential changes in economic infrastructure in amore flexible and robust manner. Therefore, this article selects TVP-SV-VAR model which has

time-varying characteristics to establish the model between interest rates, exchange rates, and stock prices, and used the impulse response function to analyze the dynamic relationship between them, andrespectively exploring the relationship between interest rate, exchange rate and stock price from theoretical and empirical aspects.Finally, according to the results obtained, policy authorities and investment decision makers are provided with relevant recommendations.

2. Theoretical Analysis

2.1 The theoretical relationship between exchange rate and stock price

The current research on exchange rate fluctuations and stock price is divided into two schools in the theoretical community, and their conclusions are not consistent. The core difference between these two doctrines lies in determining whether the relationship between exchange rate fluctuations and the stock price level is a "Flow-oriented Model" or a "Stock-oriented Model." Flow-oriented Model is a theoretical model of economy which proposed by Dornbusch & Fisher in 1980 at first. This model mainly considers the current account in the market and trade balance in the market from the micro perspective. The theoretical part of the model emphasizes that changes in the exchange rate will lead to a change in company's ability to compete internationally, the country's trade balance, and the total amount of actual output in the country, thus affecting the amount of liquidity of the company, and ultimately leading to the price of the stock was changed in the open market. The Stock-oriented model is the theory of exchange rate determined by stock price which put forward by Banson and Frankel in 1983. This theory indicates that exchange rate and stock price are linked through the projects of capital finance. The rise in stock price will attract the inflow of foreign capital, which will cause the growth ofthe demandon local currency and make the relative appreciation of local currency at finally. The transmission mechanism of exchange rate to stock price in traditional economic theory can be summarized as follows:

Exchange rate↑→change in company profit or loss↑→change in Stock Price↑→Stock Price↑

However, when analyzed the effects of the relationship between exchange rate and stock price from international capital flows, international trade, interest rates, money supply, and psychological expectations, and so on, we find that the direction of fluctuation between exchange rate and stock price was uncertain.

2.2 Theoretical relationship between interest rate and stock price

The interest rate affects the stock market price by changing the enterprise's borrowing costs so as to change the company's production cost, exerting an effect on investors' willingness to invest in the market, and affecting the ratio of consumption and investment in the market. In general, the transmission mechanism of interest rate to the stock price can be summarized as follows:

Interest rate↑→change in company profit and loss↑→company stock price↑→Stock Price↓.

In addition, the Gordon model also proves that the stock price in the financial market and the interest rate in the money market has a reverse fluctuation relationship. The stock price has an impact on the level of interest rate based on the transmission mechanism for credit, the transmission pathfor consumption, and the Tobin Q-value theory. And the interest rate rise as the stock price increases. In general, the transmission mechanism of stock price to interest rate can be summarized as follows:

Stock Price↑→total wealth value↑→ the demand of investment and consume↑→Interest Rate↑.

2.3 The theoretical relationship between interest rate and exchange rate

The effects of exchange rate fluctuations on the level of interest rates can be divided into two aspects that relative price and exchange rate expectations. From the aspect of the relative price changes of domestic products caused by changes in exchange rate, the devaluation of the local currency will increase the general price level of domestic commodities, resulting in a decrease in the level of domestic real interest rate. From the aspect of exchange rate fluctuations affect exchange rate expectations, the depreciation of local currency generally causes people to have expectations that the exchange rate may decrease in the near future. In the short term, it will cause the outflow of domestic capital, thus reducing the supply of domestic capital in supply. Under the pressure of supply and demand, it led to an increase in interest rate at eventually. In other words, the change in the interest rate of the local currency and the change in the exchange rate is in the same direction. In general, the transmission mechanism of exchange rate to the interest rate can be summarized as follows:

Exchange Rate↑→general price level↑→Interest Rate↑.

In general, changes in interest rate can affect the exchange rate through direct and indirect means. The direct

influence channels mainly affect the direction and size of international capital flows by adjusted the interest rate, thus affect the international demand for local currency, and affect the exchange rate of the currency at finally. From the perspective of indirect impacts, interest rate is mainly caused changes in aggregate demand through market forces, which cause exchange rate fluctuations at eventually. And fluctuation relationship between interest rate and exchange rate was opposite. In general, the transmission mechanism of interest rate to exchange rate can be summarized as follows:

Interest Rate↑→local currency demand↑→local currency appreciation↑→Exchange Rate↓.

3. Data Processing and Empirical Models

3.1. Data selection

On the choice of interest rate, as the marketization of interest rate in China is not perfect at this stage, and the interest rate of bank loans is still not fully marketized. Although the mechanism of bond market is relatively perfect, the scale has not reached the goal of guiding the overall situation, so that it cannot be used as a benchmark interest rate in the model. However, after several decades of development, the interbank interest rate has been basically marketized to reflect the supply and demand in the capital market. Therefore, we use the weighted average of interbank lending interest rate as the benchmark interest rate to introduce the model in this paper.And we choose the RMB exchange rate against the US dollar and the Shanghai Composite Index to express the exchange rate variable and the stock price variablerespectivelyat this article.

3.2. Empirical model

Since the fluctuation relationship between interest rate, exchange rate and stock price changes over time. The traditional VAR model cannot meet the needs of the analysis, so we introduce the variable-parameter vector autoregression (TVP-SV-VAR) model to analyze the variables. We will introduce the derivation process briefly from the traditional VAR model to the TVP-SV-VAR mode below.

3.2.1. VAR model:

The basic description of VAR model is that:

$$\boldsymbol{A}\boldsymbol{y}_{\boldsymbol{t}} = \boldsymbol{F}_1 y_{t-1} + \boldsymbol{F}_2 y_{t-2} + \cdots + \boldsymbol{F}_s y_{t-s} + \mu_t, \quad t = s+1, s+2, \ldots, n, \qquad (1)$$

Where $\boldsymbol{y}_{\boldsymbol{t}}$ is a k×1-dimensional vector; $\boldsymbol{A}$, $\boldsymbol{F}_1$, $\boldsymbol{F}_2$, …, $\boldsymbol{F}_s$is the k×k dimensional coefficient matrix; $\boldsymbol{\mu}_{\boldsymbol{t}}$ is a k×1-dimensional structural shocks.

Assuming that $\mu_t \sim N(0, \boldsymbol{\Sigma}^2)$, $\boldsymbol{\Sigma} = \begin{pmatrix} \sigma_1 & \cdots & 0 \\ \vdots & \vdots & \vdots \\ 0 & \cdots & \sigma_k \end{pmatrix}$, and$A$ is a lower triangular matrix whose main diagonal is all 1, then equation (1) can be rewritten as follows

$$\boldsymbol{y}_{\boldsymbol{t}} = \boldsymbol{B}_1 \boldsymbol{y}_{\boldsymbol{t-1}} + \boldsymbol{B}_2 \boldsymbol{y}_{\boldsymbol{t-2}} + \cdots + \boldsymbol{B}_s \boldsymbol{y}_{\boldsymbol{t-s}} + \boldsymbol{A}^{-1}\boldsymbol{\Sigma}\boldsymbol{\varepsilon}_{\boldsymbol{t}}, \boldsymbol{\varepsilon}_{\boldsymbol{t}} \sim N(0, \boldsymbol{I}_{\boldsymbol{k}}), \qquad (2)$$

where $\boldsymbol{B}_{\boldsymbol{i}} = \boldsymbol{A}^{-1}\boldsymbol{F}_{\boldsymbol{i}}$, *i=1,2,…,s.*

Stack $\boldsymbol{B}_{\boldsymbol{i}}$ by rows to get the matrix $\boldsymbol{\beta}$, then define $\boldsymbol{X}_{\boldsymbol{t}} = \boldsymbol{I}_{\boldsymbol{k}} \otimes (\boldsymbol{y}_{\boldsymbol{t-1}} \boldsymbol{y}_{\boldsymbol{t-2}} \ldots \boldsymbol{y}_{\boldsymbol{t-s}})^T$, where $\otimes$ as the product symbol of Kronecker. Thus get the following model:

$$\boldsymbol{y}_{\boldsymbol{t}} = \boldsymbol{X}_{\boldsymbol{t}}\boldsymbol{\beta} + \boldsymbol{A}_{\boldsymbol{t}}^{-1}\boldsymbol{\Sigma}\boldsymbol{\varepsilon}_{\boldsymbol{t}} \qquad (3)$$

3.2.2. TVP –SV-VAR model:

Expand (3) to a TVP-VAR model with time-varying coefficients

$$\boldsymbol{y}_{\boldsymbol{t}} = \boldsymbol{X}_{\boldsymbol{t}}\boldsymbol{\beta}_{\boldsymbol{t}} + \boldsymbol{A}_{\boldsymbol{t}}^{-1}\sum_{\boldsymbol{t}}\boldsymbol{\varepsilon}_{\boldsymbol{t}}, \quad t = s+1, s+2, \ldots, n, \qquad (4)$$

where the coefficient $\boldsymbol{\beta}_{\boldsymbol{t}}$, parameters $\boldsymbol{A}_{\boldsymbol{t}}$ and $\boldsymbol{\Sigma}_{\boldsymbol{t}}$ are all changes over time. The accumulation vector of the lower triangular elements in $\boldsymbol{A}_{\boldsymbol{t}}$ is $\boldsymbol{\alpha}_{\boldsymbol{t}}$, the logarithmic stochastic volatility matrix $\boldsymbol{h}_{\boldsymbol{t}} = (\boldsymbol{h}_{1\boldsymbol{t}}\boldsymbol{h}_{2\boldsymbol{t}} \ldots \boldsymbol{h}_{\boldsymbol{kt}})^T$, and for any j=1,2,…,k, t=1,2,…,n, $\boldsymbol{h}_{\boldsymbol{jt}} = \log\sigma_{jt}^2$. Assuming that all the coefficients in equation (14) obey the random walk process, $\boldsymbol{\beta}_{\boldsymbol{t}}$, $\boldsymbol{\alpha}_{\boldsymbol{t}}$ and $\boldsymbol{h}_{\boldsymbol{t}}$ is irrelevant on informational impact, and $\boldsymbol{\beta}_{\boldsymbol{t+1}} \sim N(\boldsymbol{\mu}_{\boldsymbol{\beta_0}}, \sum_{\boldsymbol{\beta_0}})$, $\boldsymbol{\alpha}_{\boldsymbol{t+1}} \sim N(\boldsymbol{\mu}_{\boldsymbol{\alpha_0}}, \sum_{\boldsymbol{\alpha_0}})$, $\boldsymbol{h}_{\boldsymbol{t+1}} \sim N(\boldsymbol{\mu}_{\boldsymbol{h_0}}, \sum_{\boldsymbol{h_0}})$, t=1,2,…n. So

$$\begin{bmatrix} \boldsymbol{\varepsilon}_{\boldsymbol{t}} \\ \boldsymbol{\mu}_{\boldsymbol{\beta}_{\boldsymbol{t}}} \\ \boldsymbol{\mu}_{\boldsymbol{\alpha}_{\boldsymbol{t}}} \\ \boldsymbol{\mu}_{\boldsymbol{h}_{\boldsymbol{t}}} \end{bmatrix} \sim N\left(0, \begin{bmatrix} \boldsymbol{I} & \boldsymbol{0} & \boldsymbol{0} & \boldsymbol{0} \\ \boldsymbol{0} & \sum_{\boldsymbol{\beta}} & \boldsymbol{0} & \boldsymbol{0} \\ \boldsymbol{0} & \boldsymbol{0} & \sum_{\boldsymbol{\alpha}} & \boldsymbol{0} \\ \boldsymbol{0} & \boldsymbol{0} & \boldsymbol{0} & \sum_{\boldsymbol{h}} \end{bmatrix}\right),$$

Where $\boldsymbol{\beta}_{\boldsymbol{t+1}} = \boldsymbol{\beta}_{\boldsymbol{t}} + \boldsymbol{\mu}_{\boldsymbol{\beta}_{\boldsymbol{t}}}$, $\boldsymbol{\alpha}_{\boldsymbol{t+1}} = \boldsymbol{\alpha}_{\boldsymbol{t}} + \boldsymbol{\mu}_{\boldsymbol{\alpha}_{\boldsymbol{t}}}$, $\mathbf{h}_{\boldsymbol{t+1}} = \boldsymbol{h}_{\boldsymbol{t}} + \boldsymbol{\mu}_{\boldsymbol{h}_{\boldsymbol{t}}}$.

Because of the large number of coefficients to be estimated in the model, we use the Markov-Monte Carlo simulation (MCMC) method to estimate the state variables.

4. Empirical Analysis

In the TVP-SV-VAR model, due to the huge number of parameters need to be estimated, we refer to the practice of most documents and choose to directly examine the impulse response function in this paper. In this paper, by using the TVP-SV-VAR model to test the impulse response function at different lag periods, the dynamic evolution process of each correlation variable at different lag periods is investigated, and the difference of impulse response under different economic background conditions is investigated. This paper selects the three time points of July 2008, July 2015, and October 2016.

They correspond to the period of Chinese financial crisis, the period of the stock market crash, and the period when theRenminbi officially joined the SDR period. The following is based on the TVP-SV-VAR model to test and analyze the relationship between the variables the logarithm of the Stock Price(lnsz), Interest Rate(r), and Exchange Rate(e).

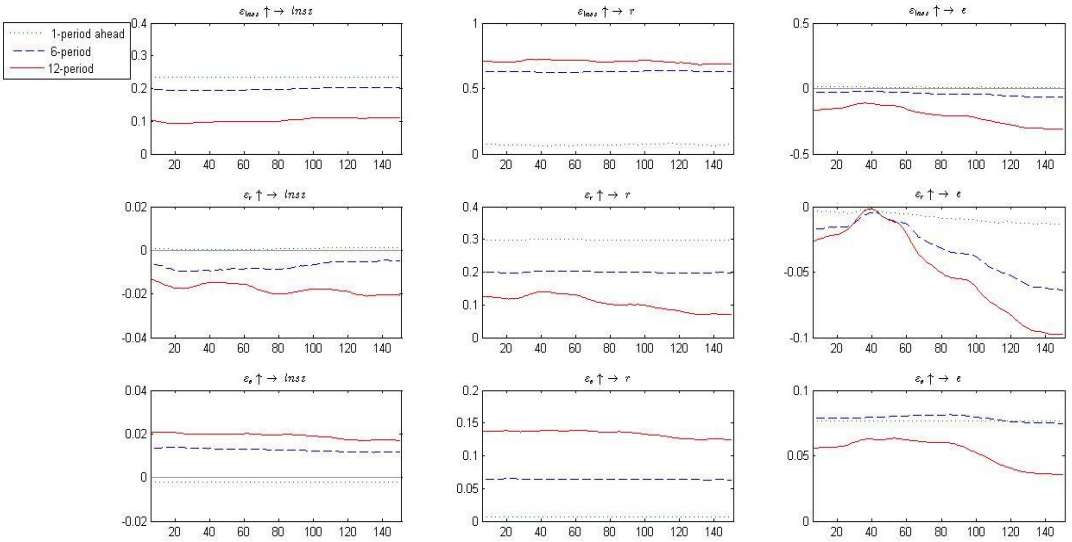

Fig. 1 The impulse response of the various variables in different lead time

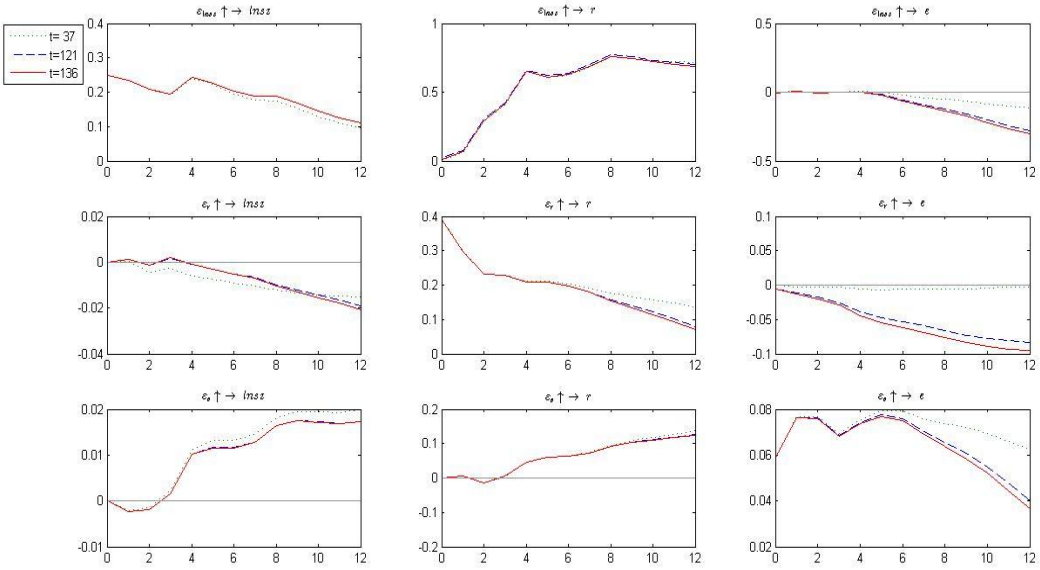

Fig.2 Impulse response of each variable at different time points

Figures 1 and 2 show the impulse response of each variable under the impact of Interest Rate, Exchange Rate, and Stock Price Index on the TVP-VAR model. Figure 1 shows the dynamic evolution of the impulse response results at first, sixth and ninth period. The horizontal axis represents the time (the unit is the month), and the vertical axis represents the deviation percentage between the value of variable and the original value under the impact of each variable. Figure 2 shows the impulse response at three different time points; it is used to analyze the structural mutations of the variables in different economic stages. The selected time points are t=37, t=121, and t=136, which corresponding to the above-mentioned three time points of July 2008, July 2015, and October 2016. The horizontal axis response the number of different lags (the unit is the month) after the shock, and the vertical axis represent the deviation percentage between the value of variable and the original value under the impact of each variable.

The empirical results show that the Shanghai Composite Index shows different reaction trends at different times under

the impact of interest rate shocks. Observing Figure 1, the growth of the Shanghai Composite Index was positive in the lagged phase 1, and negative in the lag phase 6 and lag phase 12. This means that the increase in the final interest rate will result in a reduction in stock price, but this effect will have a certain time lag, indicating that the changes in the Shanghai Composite Index have time-varying characteristics under the impact of interest rate. From Figure 2, we can see that the Response of Shanghai Composite Index under the Impact of Interest Rate is different at t=37 and t=121 and t=136 when the monetary authorities implement the clauses to increase the interest rate. It can be observed that after applying a positive impact on the interest rate, the response of the Shanghai Composite Index was negative after the first phase of lag at t=37, while the response at t=121 and t=136 was uncertain. However, since the four periods of lag, the response of the Shanghai Composite Index under the impact of interest rate has been all negative, indicating that there are structural mutations. But we can clearly see that the impact of interest rate shocks on the stock price index is very small. Observing Figure 1 and Figure 2, we can see that the exchange rate shows a downward trend when the interest rate is affected by a positive impact, and the trend and degree of change are basically the same in different periods. But there is a slight difference in the extent of changes in different lead times. The declines in advance 6 periods and 12 periods are significantly greater than the decline in advance 1 period. In other words, the longer the lead time, the greater the degree of change, but the response rate of the exchange rate is relatively low, indicating that the impact of interest rate changes on the exchange rate level is still relatively weak.

Observing Figure 1, we can see that after applying a positive impact on the exchange rate, the impulse response of the Shanghai Composite Index in advance 1 period is roughly negative, while the impulse response of the 6 lead times and the 12 lead times is positive. That explained the Shanghai Composite Index's response has the time-varying characteristics under the impact of the exchange rate shocks. Observing Figure 2, we could see that the Shanghai Composite Index showed a downward trend in the first two periods, but it showed a steady upward trend after three periods of lag, and the rate of increase in different periods will be different. And with the delay of time, the degree of increase will increase, and it will reach the peak in the lag 8 periods. In other words, the increase in the exchange rate will lead to an increase in the stock price level at last. However, it can be seen from the chart that the impact of exchange rate changes on the stock price level is still very small and does not adequately reflect the impact of exchange rate changes on stock market volatility. Observing Figure 1 and Figure 2, we can see that after a positive impact on the exchange rate, the change trend of the interest rate is not stable during the first three periods, and the volatility is almost zero. But it showed an upward trend after the three periods of lag. When the exchange rate is impacted at different times, the trend of reaction of the interest rate is basically the same, but the degree of response of interest rate will be different at different lead times. The more lead time periods, the more obvious the change trend will be. However, whether the periods or the lead times are different, the degree of reaction of interest rate is very inadequate.

Observing Figure 1 and Figure 2, we can see that after applying a positive impulse to the Shanghai Composite Index, the interest rate shows an upward trend, and the exchange rate shows a positive trend in advance 1 period, and it showed a downward trend in advance 6 periods and 12 periods, indicating that the fluctuation behavior of the exchange rate under the impact of the variableof stock index has a time-varying character. The reaction trend and degree of interest rate and exchange rate in different periods are basically the same, but the degree of response is different in different lead times. It still shows that the volatility is greater in the longer lead time, and the degree of response of the interest rate is significantly higher than the volatility response of the exchange rate after the Shanghai Composite Index was impacted.

From the above analysis, it can be seen that when any one of the three variables of the stock price index, interest rate, and exchange rate changes, its impact on the other two variables will have a certain lag. At the same time, the volatility behavior of the stock index under the impact of interest rate or exchange rate, and the volatility of the exchange rate under the impact of the stock price index, all have time-varying characteristics. And under different economic backgrounds, the trend of reactionof some variables will have a big difference. We can see that the effect of interest rate on the stock price index has structural mutation characteristics under different economic background. From Figure 2, we can see that at t=37, the period of the financial crisisin 2008, the Shanghai Composite Index quickly rises then decline in a short period of time after a positive disturbance in interest rate. At t=121 and t=136, ie, the stock market crash in 2015 and the RMB was officially included in the economic background of SDR, the Shanghai Composite

Index maintained an upward trend for a long period of time before it became a downward trend after a positive impact on interest rate. In other words, the interest rate policy in 2008 was more notable.

5. Conclusion

This article starts from the theory and makes a simple explanation of the fluctuating relationship between interest rate, exchange rate and stock price. In the empirical analysis, we figure out the correlation between interest rate, exchange rate, and stock price by a TVP-SV-VAR model that has time-varying characteristics. The empirical results are as follows:

Firstly, the volatility of the stock price under the impact of interest rate has time-varying features and structural changes, and the rise of the interest rate will increase the stock index temporarily, but the stock index will fall eventually. The rise in stock price will lead to an increase in the interest rate, but the influence may have a time-lag. Secondly, the volatility of the exchange rate has time-varying features under the influence of stock index variables, and the exchange rate will show a downward trend under the impact of stock price volatility eventually. The Shanghai Composite Index has time-varying features under the impact of exchange rate, and the increase in the exchange rate will lead the stock price to fall in the short term, but the stock price will rise eventually. Finally, the exchange rate has always shown a downward trend under the influence of interest rate. When a positive impact was imposed on the exchange rate, the interest rate will show an upward trend after a downward fluctuation in the short term at last.

From the actual situation of the Chinese stock market, the fluctuating relationship between interest rate, exchange rate and stock priceare basically the same as the traditional economic theory, but the volatility between them is not significant. The main reason for this result is that even though the Chinse interest rate liberalization and the internationalization of the exchange rate have not stopped, the marketization structure has not been perfected, the transmission mechanism between it and the stock price in the financial market has not been perfected,and the link between interest rate, exchange rate and the stock market is not close enough. Coupled with the speculative behavior and irrational practices of some investors, the result is an inefficient result of the mechanism of action between interest rate, exchange rate, and stock price.However, due to the high degree of marketization and internationalization of interest rate and exchange rate in China, interest rate and exchange rate are basically adjusted in accordance with market mechanisms.Especially in the development of interest rate over the past 20 years, the interest rate mechanism has become more completing relative to the exchange rate in China.Therefore, the linkage between interest rate and exchange rate changes will inevitably become more and more notable.Therefore, relevant departments need to take into consideration the circumstances while implement acertainpolicy, and take into account the lagged impact of policy measures, so that need to use countercyclical economic policies prudently in order to prevent adverse effects on the stock market and even the entire economic system.Moreover, it is necessary to continue to improve and deepen the degree of marketization of the Chinese economy, promote the independence of the Chinese economic system, make full use of the self-regulating ability of the free markets, form a healthy inertial development of the economy, and improve the interrelationship between the money markets and the departments of financial markets. Thereby increase the effectiveness of the correlation mechanism between interest rates, exchange rates and stock prices.For investors, it is necessary to strengthen the basic financial knowledge reserves, pay attention to the development of domestic and foreign economic investment, and is necessary to cultivate a good sense of rational psychological quality and long-term vision of long-term investment, then make a rational investment in securities.

This paper hopes to provide a new perspective for the relevant departments to study the relationship between interest rates, exchange rates and stock prices, which conducive to enhance the central bank's macro-control ability in the process of marketization of interest rate. However, there are still some shortcomings in this article. Because not all investors are rational and risk-neutral, we can continue to expand the research from these two aspects.

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