Research on the Influence of Monetary Policy on China's Stock Market

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Abstract: This paper explores the relationship between China's monetary policy and the stock market, and uses the VAR model to conduct empirical research. The research shows that there is a long-term co-integration relationship between monetary policy and stock price. gdp growth rate,inter-bank offered rate, m2 have a positive impact on stock price.

1. Introduction

The 19th National Congress of the Communist Party of China clearly pointed out that it is necessary to deepen the reform of the financial system, enhance the economic ability of financial services, increase the proportion of direct financing, and promote the healthy development of multi-level capital markets. Monetary policy is one of the important means of national macro-control, and is adopted by the central bank. Controlling the money supply, or changing the money supply to adjust interest rates can affect investment and the overall macro-economy, in order to achieve certain economic goals. Adjusting the deposit reserve ratio and the money supply are common monetary policies. In 1990 and 1991, since the establishment of the Shanghai Stock Exchange and the Shenzhen Stock Exchange, the Chinese securities market has undergone continuous institutional reforms to achieve marketization. The more prominent events were in October 1992, the Securities Commission of the State Council and the China Securities Regulatory Commission were established, and regional pilots were launched nationwide. In November 1997, the financial system further determined the principles of banking, securities, and insurance industry operations, standardized the development of securities investment funds, and increased opening up. Launched RMB special stocks (b shares), domestic companies gradually listed on overseas markets such as Hong Kong, London and Singapore; In December2001, China joined the World Trade Organization, China's economy was fully open, and financial reforms cont. In used to deepen. From 2001 to 2005, the market entered a four-year adjustment phase, the stock index fell sharply, and the industry suffered a total loss for fouronsecutive years; The share-trading reform realized the new and old exchanges in China's securities market; in August 2006, the State Administration of Foreign Exchange launched the pilot of the fund management company; in August 2007, the State Administration of Foreign Exchange approved the Tianjin Binhai New Area to conduct direct domestic investment in China. The pilot of the securities market marks that individual investors are expected to engage in overseas direct investment in the future.As of September 2019, the number of listed companies in China reached 2, 494.The stock market capitalization of Shanghai Stock Exchange and Shenzhen Stock Exchange was 134. 294 billion yuan and 473. 738 billion yuan respectively. The proportion of GDP in China has increased year by year, and the stock market has already increased. It is an indispensable part of the macro economy. In real economic life, the direct financing ability unique to the stock market is more conducive to the stimulation of monetary policy to the investment and financing activities of enterprises. The People's Bank of China has frequently adjusted the deposit reserve in recent years,but it has not been very effective. Therefore, studying how the changes in monetary policy affect the stock market transmission mechanism and the adjustment of monetary policy will affect the stock market, both in theory and practice. The capital market and even the entire macro-economy have very important significance. This paper selects the main instruments of

monetary policy, the money supply, the inter-bank lending rate, and the relevant data of macroeconomic indicators to empirically analyze the reaction of the stock market to find out the impact of monetary policy changes on the stock market returns, and based on the results. Give explanations about economic outcomes in monetary policy, as well as policies and recommendations for monetary policy makers and investors in the stock market.

This paper studies the influence of the main policy instruments of monetary policy on China s stock market. The SSE index is selected as the research object of the stock market. The inter-bank lending rate and m2 are used as the monetary policy proxy variables, and the GDP growth rate is used as the proxy variable of macroeconomic indicators. The vector auto-regressive (var) model is used for empirical analysis.

2. theoretical review and literature review

Liu Zhiyang (2002) introduced the theoretical model and the method of quantitative analysis in the impact of China's capital market on the effectiveness of monetary policy. In the empirical study, he selected the money supply M1 and M2 Shanghai and Shenzhen indices as variables, and established a regression model with his quarterly growth value as a sample. Their research conclusion is: With the continuous improvement of China's capital market, the positive correlation between stock price index and money supply is gradually enhanced; the influence of capital market on the effectiveness of monetary policy is continuously strengthened. In view of the research results, it is in line with the needs of the times that the monetary authorities must take into account the impact of the capital market in the formulation of monetary policy.

Hua Weirong, Zhang Zhiwei and Song Yu (2003) selected interbank lending rates, money supply (M0, M1, M2) and stock price return as key in the study of the relationship between China's monetary policy and securities market volatility. Variables and build models. Their research shows that the money supply M2 and interest rates can explain the volatility changes in the stock market and in recent years these two variables have an increasing influence on the stock market. They believe that the monetary authorities in China should take into account the important factor of the stock market when formulating and implementing monetary policy, and should pay close attention to the changes in the stock market. When the securities market is highly volatile, the monetary authorities should intervene through various monetary policies.

Sun Huaxuan and Ma Yue (2003) applied the rolling VAR method to analyze the data from October 1993 to June 2002. They found that all the money supply had no effect on the stock market. Wang Xueqian (2004) and Liu Jian and Hu Yue (2004) analyzed the reasons for reducing the efficiency of China's monetary policy. Zhou Yingzhang (2002) analysis shows that stock prices are highly correlated with money supply, stock price changes have a significant effect on money supply, and money supply has no significant effect on stock prices. Wang Limin and Wang Ting (2008) found that the frequent changes in the central bank's monetary policy (mainly through the deposit reserve ratio and interest rate adjustment) did not cause the stock market to fall, but continued to rise. And an analysis of its root causes, that is, the difference between the nominal interest rate and the real interest rate in China has led to this abnormal performance of the stock market. Yi Gang et al. (2000) separately analyzed the impact of money supply on stock prices according to the length of time, and the long-term performance was monetary neutral, that is, the unexpected changes in money supply did not affect stock prices; however, in the short, medium and short term Non-neutral, unanticipated changes in the money supply will have an impact on stock prices.

The empirical analysis of Hu Yuancheng and Cheng Jianwei (2003) shows that the transmission mechanism from China's monetary policy tools to the stock market is smooth, but the transmission mechanism from the stock market to the monetary policy goal is not smooth. The stock market changes through the wealth effect during the transmission process. The transmission effect of Tobin Q and other factors affecting consumption and investment and thus affecting total output is not obvious.

Philip Turner, Steven Kamin, and Jozef Van't Dack (1998) compare and analyze the monetary policy transmission mechanism of emerging market countries, and believe that if the financial market model is added to the stock market, it will complicate the transmission channel of asset prices, and the empirical results It does not support the efficiency of asset price transmission channels.

3. The impact of monetary policy on the stock market

3.1 The impact of interest rates on the stock market

The general theory holds that when interest rates fall, stock prices rise; when interest rates rise, stock prices fall. Therefore, the level of interest rates and the relationship between interest rates and the stock market have become an important basis for investors to buy and sell stocks.

There are two ways in which interest rates affect stock prices, as follows.

(1) As interest rates rise, some funds may be transferred from the stock market to bank savings or bonds. The supply of funds in the market will decrease, so that stock demand will also decrease, and stock prices will fall. Conversely, interest rates will fall and stock market capital supply will increase. The stock price has risen.

(2) Interest rates have an impact on the operations of listed companies, which in turn affects the company's future valuation. The increase in loan interest rate will increase the interest burden of enterprises, thereby reducing the profitability of enterprises, thereby reducing the dividend payout of enterprises. Due to the double interest of interest rate increase and dividend payout, the stock price will inevitably fall. On the contrary, the interest rate cut will be alleviated. The interest burden of enterprises, reducing the production and operation costs of enterprises, improving the profitability of enterprises, and thus increasing the dividend payout of enterprises, will be affected by the lowering of interest rates and the increase in dividends.

Investors should understand that in the medium and long term, the rise and fall of interest rates and the rise and fall of the stock market are not simply negative correlations. Because the mid- and long-term trend of the stock market is not only affected by the interest rate trend, it is also sensitive to the economic growth factors and non-market macro policy factors. If the impact of economic growth factors and non-market macro-policy factors is greater than the impact of interest rates on the stock market, the trend of the stock market will deviate from the trend of interest rates.

For example, from April 2006 to September 2007, the central bank raised interest rates seven times in a row, which did not change the bull market trend. This is because the economy has grown steadily, and the gradually tightening monetary policy has not caused the economy to decline. The company's earnings and stock prices also Keep up the good momentum. After the interest rate hike, the stock market went higher. The fundamental reason was that the impact of economic growth was greater than the impact of interest rate hikes. Until the 8th rate hike, the stock market began to reverse the bear, as shown in Figure 1 for the Shanghai Composite Index.

Figure 1. Trend of Shanghai Stock Exchange

Data source；National Bureau of Statistics.

3.2 The influence of adjusting the money supply on the Stock Market

The impact of the stock market on the structure of the money supply The stock price movement will have a huge impact on the level of money supply. When the stock price rises sharply, the liquidity of the currency will increase. Specifically, the sharp rise in stock prices will transform some of the real non-circulating currencies into real-trading currencies, leading to an increase in M1/M2, that is, the liquidity of money. In the long run, the price of a stock is determined by its intrinsic value, but in terms of short- and medium-term price analysis, the stock price is determined by the relationship between supply and demand. Whether it is a mature stock market or an emerging stock market, the changes in the supply curve and the demand curve can be used to determine the trajectory of the stock price. But the difference is that the supply and demand relationship in the mature stock market is the supply-demand relationship guided by the capital return rate, that is, the level of capital return rate has a decisive influence on the stock price.

With the development of the stock market, the influence of the stock market on all levels of China's social and economic life is increasing. The money supply has an important impact on the stock market. The stock market also has a certain impact on the money supply and monetary policy. Monetary policy should focus on stock price volatility and reduce the impact of stock price volatility on the effectiveness of monetary policy. Since China is an emerging stock market, its stock price is largely determined by the supply and demand relationship of stocks, which is determined by the total amount of stocks and the total amount of funds in a certain period of time. The money supply has a great impact on the stock market. The new M0 (M1) increase and decrease direction is basically in line with the stock market's ups and downs. Investors' expectations of stock prices, that is, investor confidence, when the macroeconomic trend is good, stock market investors expect the company's efficiency and its own income level will rise, the stock market is naturally popular, thus pushing the market average price higher; It will cause stock market investors to lose confidence in the stock market.

In the long run, the money supply mainly affects the stock price changes in the short term, and this effect is mainly caused by M0 and M1. Therefore, in the short term, the monetary authorities can adjust the money supply of consumption and terminal markets. The changes control the stock price.
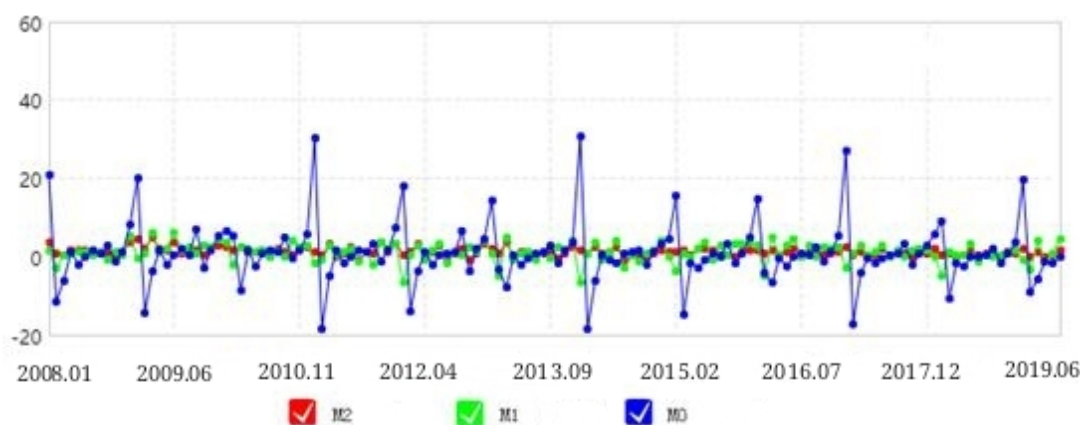

Figure 2. Currencies of Money Supply

Data source; National Bureau of Statistics.

4. An empirical study on the influence of Monetary Policy on China's Stock Market

4.1 Unit root test

Establishing a vector autoregressive model (VAR) requires that the sequence be a stationary sequence, and pseudo-regression will not occur using a stationary time series. Therefore, before constructing the vector autoregressive model (VAR), the unit root test is performed on each variable.

This paper uses the ADF test to test the stability of the Shanghai Stock Exchange Index (SZZS), interbank offered rate (TYCJLL) and GDP growth rate (GDPZZL) to avoid the problem of pseudo-regression. The test results are shown in Table 1.

Table 1 .ADF unit root test

variable	Inspection property	Inspection type	ADF statistical quantity	critical value（1%，5%，10%）
SZZS	Horizontal first difference	(c,t,0) (c,t,1)	-3.723382 -5.001739	(-4.004425,-3.098896,-2.690439) (-4.057910,-3.119910,-2.701103)
TYCJLL	Horizontal first difference	(c,t,0) (c,t,2)	-3.311152 -4.913710	(-4.057910,-3.119910,-2.701103) (-4.121990,-3.144920,-2.713751)
GDPZZL	Horizontal first difference	(c,t,0) (c,t,1)	-1.392443 -4.793311	(-4.121990,-3.144920,-2.713751) (-4.121990,-3.144920,-2.713751)
M2	Horizontal first difference	(c,t,0) (c,t,1)	-2.363814 -5.033889	(-4.057910,-3.119910,-2.701103) (-4.992279,-3.875302,-3.388330)

The results of Table 1 show that the three variables SZZS, TYCJLL, and GDPZZL cannot reject the null hypothesis at the 5% significant level. The variable has a unit root, indicating that the original sequence is not stable. Therefore, the first-order difference is made to the variables SZZS, TYCJLL and GDPZZL. It is seen in the results of the stationarity test that the three variables are first-order and single-order at the 5% significance level, and the covariance test conditions are satisfied.

4.2 Johansen co-integration test

This paper selects the Johansen cointegration test to test the above-mentioned same-order stationary sequence. The test method is based on the VAR model, so it is necessary to first determine the lag order of the vector autoregressive model (VAR), and then determine the SSE index, the interbank offered rate (TYCJLL) based on the determined lag order. The GDP growth rate (GDPZZL) is co-integrated. The selection criteria for the VAR model lag period are shown in Table 2. Combined with the data results of Table 2, and based on the minimum principle of AIC and SC, the lag order of the VAR model should be chosen to be 2 lags, that is, the VAR(1) model is established. Then, based on the lag order of 2, the Johansen cointegration test results of each variable show that there is a cointegration relationship between SZZS, TYCJLL and GDPZZL at the 5% significance level, that is, there is a significant long-term equilibrium relationship.

Table 2. Lag selection criteria for VAR model

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-149.6721	NA	3189236.	23.48801	23.61838	23.46121
1	-129.3048	28.20078*	589709.8*	21.73920	22.26070*	21.63201
2	-119.6567	8.905985	734545.4	21.63949*	22.55210	21.45191*

The test method is based on the VAR model, so we must first determine the lag order of the vector autoregressive model (VAR), and then determine the Shanghai Composite Index (SZZS), M2 (M2), and GDP growth based on the determined lag order. The rate (GDPZZL) is co-integrated. The selection criteria for the VAR model lag period are shown in Table 2. Combined with the data results of Table 2, and based on the minimum principle of AIC and SC, the lag order of the VAR model should be chosen to be 2 lags, that is, the VAR(2) model is established. Then, based on the lag order of 2, the Johansen cointegration test results of each variable show that there is a cointegration relationship between SZZS, M2 and GDPZZL at the 5% significance level, that is, there is a significant long-term equilibrium relationship.

Table 3. Lag selection criteria for VAR model

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-309.5130	NA	1.53e+17	48.07892	48.20930	48.05212
1	-261.2490	66.82704*	3.86e+14*	42.03831*	42.55980*	41.93112*
2	-254.7008	6.044525	7.74e+14	42.41551	43.32812	42.22792

4.3 Pulse response analysis

In this paper, the three variables of SZZS, TYCJLL and GDPZZL are used as endogenous variables to establish a VAR model. This paper empirically analyzes how monetary policy affects the stock market, and uses impulse response analysis and variance decomposition to further explore the impact of monetary policy on the stock market. Effect direction and strength. According to the above ADF test and cointegration test results, it can be concluded that the variables SZZS, TYCJLL, and GDPZZL are cointegration relations. On this basis, the VAR model can be established. According to the SC criterion and the minimum principle of the AIC criterion, the optimal lag order of the model can be determined to be 2. Before performing the analysis, the VAR model should be tested for stationarity. The results are shown in Figure 3 on the following page. The results show that the five roots in the VAR model are all less than 1 and are all within the unit circle. Therefore, the VAR model established in this paper is a stable system that can perform impulse response analysis and variance decomposition. The impulse response function describes the response (response) of an endogenous variable to the residual shock in the VAR model. Specifically, it describes the dynamic effects of the impact of the standard deviation magnitude on the current and future values of the endogenous variable after being applied to the random error term, and shows the response of the endogenous variable to the magnitude of the error.
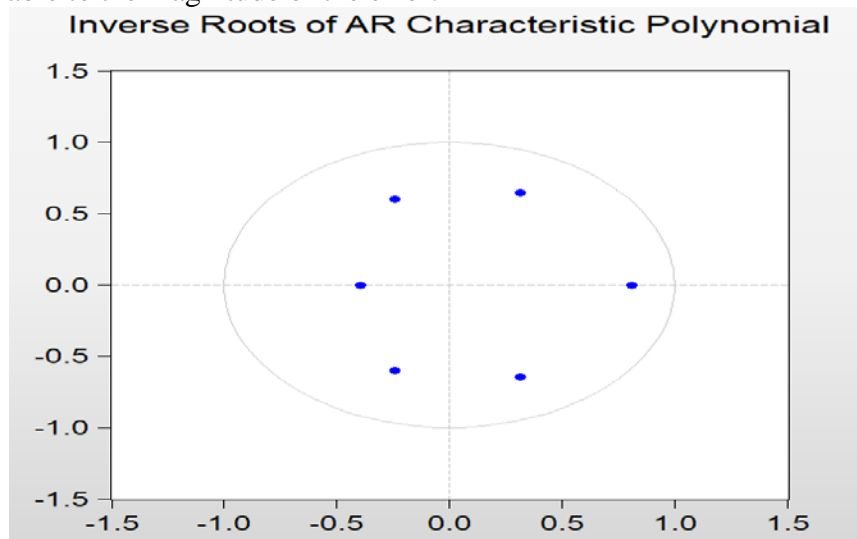

Figure 3. Results of stationary test of VAR model

In this paper, the three variables SZZS, M2 and GDPZZL are used as endogenous variables to establish a VAR model. This paper empirically analyzes how monetary policy affects the stock market, and uses impulse response analysis and variance decomposition to further explore the impact of monetary policy on the stock market. Effect direction and strength. According to the above ADF test and cointegration test results, it can be concluded that the variables SZZS, M2, and GDPZZL are cointegration relations. On this basis, the VAR model can be established. According to the SC criterion and the minimum principle of the AIC criterion, the optimal lag order of the model can be determined to be 2. Before performing the analysis, the VAR model should be tested for stationarity. The results are shown in Figure 4 on the following page. The results show that the five roots in the VAR model are all less than 1 and are all within the unit circle. Therefore, the VAR model

established in this paper is a stable system that can perform impulse response analysis and variance decomposition. The impulse response function describes the response (response) of an endogenous variable to the residual shock in the VAR model. Specifically, it describes the dynamic effects of the impact of the standard deviation magnitude on the current and future values of the endogenous variable after being applied to the random error term, and shows the response of the endogenous variable to the magnitude of the error.
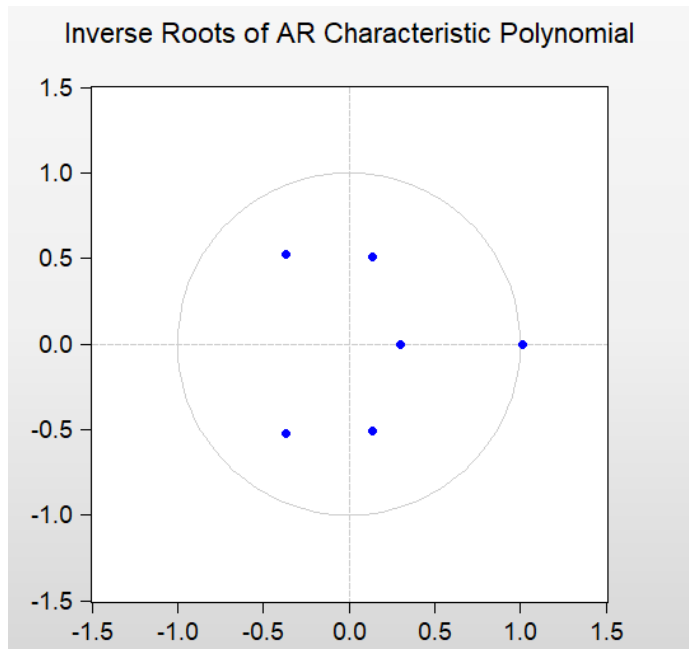

Figure 4. Results of stationarity test of VAR model

4.4 The impulse response analysis of the stock market to the inter-bank interest rate (TYCJLL)

Firstly, the three variables VAR regression equations are constructed by using SZZS and TYCJLL and GDP as the endogenous variables, and then the impulse response analysis is performed on these three variables. The obtained impulse response is shown in Fig. 5. In Figure 5, the horizontal axis represents the period of response; the vertical axis represents the response of the Shanghai Composite Index; the solid line represents the impulse response curve, which includes the positive (or negative) effect of the money supply on the stock price and its effect. Size, response period is 10 periods.
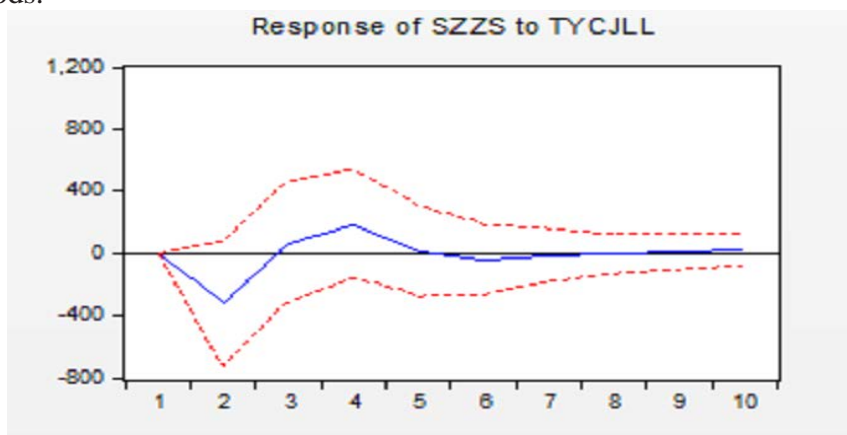

Figure 5. Impulse response of inter-bank interest rate to money stock market.

As can be seen from Figure 5, if the monetary policy interbank dismantling rate implemented by the central bank brings a negative impact, then the stock price will begin to decline in the first period. Moreover, the monetary policy has made the negative reaction effect of the stock market strengthen

gradually, and lasted until the second period. At this time, the instantaneous effect reached the maximum, and then the effect of this negative effect will show an upward trend.

4.5 Impulse response Analysis of Stock Market to M2

In Figure 6, the horizontal axis represents the period of response; the vertical axis represents the response of the Shanghai Composite Index; the solid line represents the impulse response curve, which includes the positive (or negative) effect of the money supply on the stock price and its effect. Size, response period is 10 periods.
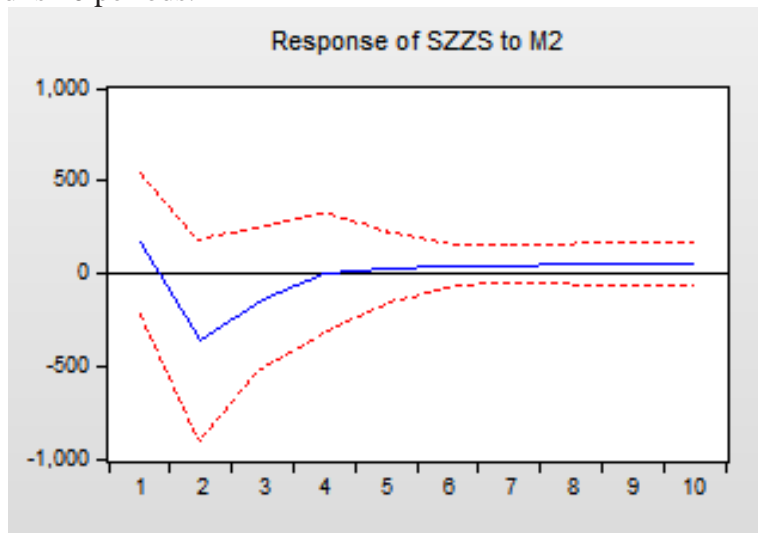

Figure 6. M2 impulse response to money stock markets

As can be seen from Figure 6, if the monetary policy M2 implemented by the central bank first brings a positive impact and then becomes negative, then the stock price begins to decline in the first period. Moreover, the monetary policy has made the negative reaction effect of the stock market strengthen gradually, and lasted until the second period. At this time, the instantaneous effect reached the maximum, and then the effect of this negative effect will show an upward trend.

4.6 Variance decomposition

Table 4. Variance decomposition of SZZS

Period	S.E.	SZZS	M2	GDPZZL	TYCJLL
1	636.1941	100.0000	0.000000	0.000000	0.000000
2	982.9808	49.27145	28.09909	22.57486	0.054603
3	1029.781	46.47507	32.75613	20.71832	0.050481
4	1033.333	46.31963	32.56408	21.06509	0.051190
5	1048.055	45.43417	32.02362	22.48716	0.055042
6	1053.731	45.46790	31.79080	22.68571	0.055598
7	1055.767	45.59171	31.74334	22.60956	0.055396
8	1057.018	45.48380	31.68892	22.77140	0.055873
9	1059.582	45.27148	31.86760	22.80499	0.055930
10	1064.142	44.95658	32.37145	22.61651	0.055461

Cholesky Ordering: SZZS M2 GDPZZL TYCJLL

And the impulse response function can characterize the impact of one variable on the dynamic influence path of another variable. The variance decomposition can decompose the variance of the

variable in the VAR system to each random disturbance term, so that the structure affecting the endogenous variable can be analyzed. The contribution of the impact. Therefore, this paper will use the method of variance decomposition to further study the model. The results of variance decomposition are shown in Table 4.

From the results shown in Table 4, it can be seen that the biggest factor affecting the Shanghai Composite Index is itself. Its contribution to the impact of the Shanghai Composite Index has been around 45%; the contribution of M2 to the Shanghai Composite Index has remained at 32%; The contribution of the growth rate to the impact of the Shanghai Composite Index remained at 22%. At the same time, the contribution of the interbank dismantling rate to the Shanghai Composite Index remained at 0.05%.

5. Conclusion

From the results of the ADF test, it can be concluded that the variables SZZS, TYCJLL, and GDPZZL are all first-order single-time series. The Johansen cointegration test is used to obtain the long-term cointegration relationship between monetary policy and stock price. In addition, the impulse response The results of analysis and variance decomposition show that China's monetary policy does have a certain impact on the stock market. There is a positive relationship between GDP growth rate and stock price, and there is a negative relationship between interbank dismantling interest rate and stock price; However, there are time lags in these effects. The main reason is that China has not realized interest rate liberalization. The change of interest rates cannot accurately reflect the supply and demand of funds in China's market. The stock price is not flexible enough for interest rate changes. All in all, changes in monetary policy have a very important and direct impact on the stock market and stock prices. It is necessary to strengthen the understanding and application of market economy development and financial market rules to ensure the stability and role of the stock market.

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