Analyzing the Effectiveness of China's Monetary Policy Transmission Channels through Financial Asset Prices Based on the VAR Model

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Abstract

The effective transmission of monetary policy is critical to a country's economic development. This study empirically examines the transmission mechanism of monetary policy via financial asset prices by employing a Vector Autoregression (VAR) model. The findings reveal that the current relationship between China's stock market and economic fundamentals is weak, hindering the stock market's potential to serve as a robust transmission channel for monetary policy. Consequently, it is imperative to further advance interest rate liberalization and to foster the continued development and improvement of the capital market. Additionally, the study identifies a time lag in the transmission of monetary policy, highlighting the importance of expectation management by the central bank in the formulation of economic policy.

Keywords: monetary policy, financial asset prices, transmission mechanism, VAR model

1. Introduction

With the progressive liberalization of interest rates, China has gradually relaxed controls over the capital market, enabling the stock market to evolve toward greater efficiency. This shift allows the market to respond more swiftly to information and adjust asset prices in a more timely and accurate manner. At present, China's stock market plays a pivotal role as a primary channel for entrepreneurial financing and investor wealth management, with both market activity and its contribution to the broader economy steadily increasing. As an essential mechanism for direct corporate financing, the stock market is closely tied to corporate financing costs. The ability of monetary policy to influence corporate investment through financial asset prices is thus a critical consideration in the formulation of monetary policy. Taking the securities market as an example, changes in monetary policy can induce significant and pronounced fluctuations in market prices. Specifically, shifts in monetary policy affect the yield on securities, which in turn alters the intrinsic value of stocks. These fluctuations in stock values impact investor returns, thereby influencing the volume of investment assets held by investors and subsequently affecting their investment enthusiasm. Monetary policy influences these fluctuations through intermediary factors such as money supply and directly impacts securities market dynamics by altering stock returns. Monetary policy, as it moves from operating targets to intermediate and ultimate targets, requires careful study of the transmission mechanisms and the associated time lags between these stages. Understanding these dynamics is crucial for the effective design and implementation of monetary policy. Currently, extensive research by scholars in China has focused on the effectiveness of monetary policy transmission through financial asset prices, further advancing the understanding of this complex relationship. Sheng and Wu (2018)[1] argue that, as indirect financing primarily mediated by commercial banks dominates in China, the transmission of monetary policy is mainly through credit channels. Sun and Ma (2003)[2] believe that there is an incoherent weak correlation between stock market value and gross domestic product (GDP). Yi and Wang (2002) [3] found that monetary policy has an impact on stock prices. Investments with economies of scale and improved labor productivity will reduce price levels and increase total output in the long run. He (2016)[4] found through research that there is a negative correlation between the number of investments by listed companies and their capital costs. Zhang (2015)[5] suggests that capital market channels are supplementary to monetary policy transmission and that the size of the capital market has a certain impact on the transmission effect. China's stock market is a typical policy-driven market. When macroeconomic policies change slightly, the stock market actively responds to new information. Empirical research verifies that the effect of asset price transmission on monetary policy is worth studying. Zhang (2010)[6] used the VAR model to analyze the impulse response of stock price indices to M2 under different economic cycles. Zhang (2021)[7] employed the VAR model to conduct an empirical analysis of China's monetary policy credit transmission mechanism.

2. Model Selection

Tobin's Q theory posits that under a loose monetary policy, a reduction in interest rates alleviates the debt servicing burden on firms, thereby enhancing corporate profit margins and improving overall financial health. These improvements, in turn, are likely to lead to an increase in corporate stock prices. The theory is based on the concept of Q, which is defined as the ratio of a company's market value to the replacement cost of its assets (Q = market value of the company/replacement cost of assets). When Q exceeds 1, the market value of the company is greater than the replacement cost of its assets, signaling favorable conditions for investment. As a result, firms are more inclined to expand their investments, thereby stimulating economic growth.

If changes in monetary policy are correlated with fluctuations in the stock market, and macroeconomic indicators consistently influence stock prices, then investors can leverage macroeconomic information to optimize their returns in the market. Similarly, policymakers can anticipate stock market reactions prior to the implementation of macroeconomic policies. By effectively utilizing monetary policy, they can regulate the frequency and magnitude of securities market fluctuations, thereby mitigating market instability and fostering sustainable economic development.

In an economic system comprising money supply, interest rates, stock market capitalization, industrial value added, and GDP, endogenous variables can function as both dependent and independent variables. For instance, during a bull market, increased demand for stock market investments can drive up interest rates, which subsequently raises corporate financing costs and reduces corporate value. This illustrates the dynamic and interdependent causal relationships among these variables. This paper employs time series data to examine the dynamic interactions among these five variables within the framework of Tobin's Q theory transmission channel. It conducts a dynamic structural analysis and long-term forecasting to explore the relationships and fluctuations among the variables. A p-order VAR model is constructed for empirical analysis to investigate the underlying patterns and interdependencies. Based on the empirical findings, the paper offers insights and policy recommendations aimed at guiding effective economic policymaking.

3. Selection of Variable Indicators

3.1 Money Supply

The indirect impact of money supply on stock prices is primarily manifested through its effect on corporate profits. An increase in money supply stimulates social investment, enhancing investment enthusiasm. This heightened investment activity encourages firms to expand their production capacity, leading to increased demand. As a result, corporate profit margins expand, improving overall corporate fundamentals, which, in turn, contributes to the appreciation of corporate stock prices. Thus, there exists a strong relationship between money supply and stock prices, with the amount of money circulating in the stock market being a key determinant of stock price fluctuations. M2, representing broad money, includes cash, demand deposits, time deposits, and residents' savings deposits, providing a comprehensive measure of current and potential purchasing power. Compared to M1, M2 is more closely correlated with investment and offers more detailed insights than social financing, making it a more robust indicator for analyzing the impact of money supply on investment and, by extension, on stock prices.

3.2 Interest Rate Level

The People's Bank of China regulates commercial banks' reserves through various monetary policies, including open market operations and adjustments to the reserve requirement ratio. In response, commercial banks enhance the financing environment for enterprises by lowering loan interest rates and expanding credit supply, thereby stimulating investment and fostering economic growth. The long-term real interest rate is most closely associated with corporate investment decisions. The Loan Prime Rate (LPR), which represents the interest rate quoted by commercial banks to their most creditworthy borrowers, plays a pivotal role in this context. However, due to the phenomenon of credit rationing, the LPR, as a benchmark rate, exhibits limited volatility and does not accurately reflect the true cost of financing for enterprises. Consequently, interbank lending rates and the actual one-year loan interest rates provide a more precise indication of the real financing conditions faced by businesses.

3.3 Financial Asset Prices

Fluctuations in interest rates influence investors' preferences across three main types of financial assets: bank deposits, bonds, and stocks, prompting adjustments in capital allocation among these options. When interest rates decline, the yields on bank deposits and government bonds decrease, driving investors to seek higher returns in the securities market. This shift results in increased demand for stocks, leading to a rise in stock prices as capital flows into the market. Conversely, when interest rates increase, investors tend to favor safer, income-generating assets, resulting in a shift of funds towards fixed-income products. This, in turn, leads to a withdrawal of capital

from the stock market, contributing to a decline in stock prices. Therefore, research should focus on data related to the total market capitalization of domestically listed companies, as it more closely aligns with the transmission mechanism of interest rate changes.

3.4 Investment Changes

When corporate market value increases, compared to issuing additional shares, companies are more willing to invest in the real economy. Industrial value added reflects industrial production, which is closely related to the real economy. Therefore, chain-linked industrial value added (seasonally adjusted) data can be used as a proxy variable for investment changes.

3.5 GDP

An increase in GDP signifies robust national economic development, fostering positive expectations among investors regarding future economic growth. This optimistic outlook bolsters market investment enthusiasm and prompts corporations to expand their production scales. As a pivotal indicator mirroring national economic development, fluctuations in GDP bear a certain correlation with stock price movements.

4. Empirical Study Based on VAR Model

4.1 Data Description and Model Construction

This study selects monthly data from February 2011 to March 2022, totaling 131 sample points. Since GDP is only published quarterly, quarterly data needs to be converted into monthly data. In addition, due to inconsistent variable dimensions, to ensure regression effectiveness, logarithmic growth rates are taken for economic variables except for chain-linked industrial value added and interest rates.

Firstly, a cointegration test is conducted on the five variables, with the specific test results shown in Table 1.

Table 1. Results of the Cointegration Test for Five Variables

Hypothesized Number of CEs	Eigenvalue	Trace Statistic	0.05Critical Value	Probability
None*	0.524910	234.902300	69.818890	0.0000
At most 1*	0.351927	137.405400	47.856130	0.0000
At most 2*	0.294485	80.583940	29.797070	0.0000
At most 3*	0.187131	34.887610	15.494710	0.0000
At most 4*	0.057418	7.746394	3.841466	0.0054

*Note: * indicates rejection of the hypothesis at the 0.05 level.

As presented in Table 1, the five variables exhibit a cointegration relationship, suggesting the existence of a long-term equilibrium among them. This implies that these variables can be integrated into a coherent economic system suitable for the construction of a VAR model. Consequently, the final variables selected for this study are: the log growth rate of the money supply, the log growth rate of market capitalization of domestically listed companies, the log growth rate of GDP, the one-year real loan interest rate, and quarter-on-quarter economic value added. Next, a VAR model is constructed and tested for stationarity. The results show that all unit roots of the model are less than 1, allowing for impulse response analysis.

4.2 Impulse Response Test

The impulse response function method is employed to analyze the response of the entire economic system to a shock, rather than examining the impact between two variables in isolation. By applying a one-unit positive standard deviation shock to the growth rate of the money supply, the real interest rate initially increases slightly, reaching its peak within 2 to 3 periods. It then fluctuates before returning to pre-shock levels at the beginning of the 7th period, eventually stabilizing below its pre-shock level. This suggests that while a prudent monetary policy by the central bank may not significantly reduce the real interest rate in the short term, it proves effective in the long term. As for GDP, it shows a gradual decline within the first 1 to 3 periods, rises to a peak between periods 3 and 5, and then begins to decline again. Ultimately, GDP stabilizes above pre-shock levels after the 9th period, indicating that a prudent monetary policy can fulfill its long-term objective of promoting sustained economic growth.

When a one-unit positive standard deviation shock is applied to the real interest rate, stock market capitalization initially experiences a slight increase in the first period, followed by a sharp decline to its lowest point in the second period. It then rises to its peak in the third period, after which it exhibits a fluctuating downward trend. The

impact of increased real interest rates on stock market capitalization is observed with a one-period lag, but this effect dissipates after the third period. This suggests that while higher interest rates may lead to a decline in stock market capitalization in the short term, they could cause an increase in stock market capitalization in the medium term, with no significant long-term impact. GDP, on the other hand, rises to its highest value in the first period, followed by a downward trend over the subsequent three periods, fluctuating around pre-shock levels. In the short term, the fluctuations in GDP are contrary to expectations. However, in the medium to long term, rising interest rates do not appear to result in a decline in GDP." This version improves the clarity, coherence, and precision of the original text while maintaining its academic tone and logical flow.

When a one-unit positive standard deviation shock is applied to the market capitalization of domestically listed companies, economic value added experiences a slight increase in the first period, followed by a rising trend in the second to third periods before declining back to its initial level. In the fourth period, it returns to pre-shock levels and remains relatively stable thereafter. This indicates that changes in market capitalization introduce investment volatility in the medium to short term, but do not have a substantial impact in the long term. As for GDP, it initially declines slightly in the first period, rises to its peak in the second to third periods, and then fluctuates around pre-shock levels. The changes in market capitalization lead to a temporary increase in GDP in the medium to short term, but they do not exert a significant long-term effect.

When a one-unit positive standard deviation shock is applied to economic value added, GDP experiences a slight decline in the first period, followed by an increase to its peak in the second period. It then falls in the third period before returning to pre-shock levels in the fourth period, with no significant fluctuations thereafter. This pattern suggests that changes in economic value added increase investment volatility in the medium to short term, but do not have a substantial impact in the long term.

5. Conclusion

The impact of an increase in money supply on real interest rates is most pronounced with a 3 to 4-period lag, and in the earlier periods, it even exhibits a counteracting effect. This empirical result contradicts theoretical expectations. In the medium to long term, however, real interest rates decline as the money supply increases. In the short term, the market capitalization of domestically listed companies declines due to rising real interest rates, but there is no significant long-term impact on corporate market capitalization. Two possible explanations for this phenomenon are as follows: First, in the short term, the decline in corporate market capitalization can be attributed to the flow of funds from the stock market to the bond market as interest rates rise, leading to an undervaluation of stock market capitalization. After a one-period lag, investors recognize the overreaction resulting from undervalued stocks, driving stock prices to their peak. Over time, price-sensitive investors identify overvaluation and begin to sell, causing corporate market capitalization to fluctuate around pre-shock levels. Second, China's stock market is not fully efficient, meaning that changes in corporate value induced by shifts in real interest rates may not be accurately reflected in market capitalization. This inefficiency results in a weak long-term correlation between market capitalization and real interest rates.

Increases in market capitalization lead to fluctuations in industrial value-added, with a rising trend observed in quarter-on-quarter industrial value-added within 3 to 4 periods. The impact of market capitalization on GDP manifests as an increase in GDP within 2 to 3 periods, though it does not have a significant long-term effect. This suggests that China's stock market is not strongly correlated with economic fundamentals. However, it is important to note that the interest rate data utilized in this study is based on one-year actual rates, whereas medium to long-term real interest rates are more pertinent to corporate investment decisions. Consequently, further investigation into the relationship between long-term interest rates and macroeconomic variables, such as money supply and industrial value added, is warranted.

Asset price fluctuations are influenced by real interest rate movements, albeit to a lesser extent. This finding supports the view that China's stock market is currently unable to effectively and promptly incorporate new information into asset prices. The securities market in China is not closely tied to the macro economy, with changes in the securities market significantly decoupled from broader economic trends. Moreover, the macro economy does not exhibit a strong correlation with China's stock market, and a long-term, stable interaction or transmission mechanism has yet to be established. Despite more than 30 years of development, China's stock market has begun to assume the role of a "barometer" for the national economy, though this function remains imperfect. Although abnormal fluctuations in the macroeconomy do not exhibit a clear or consistent pattern in their impact on the stock market, it cannot be ruled out that significant macroeconomic disruptions could provoke drastic reactions in the stock market. To ensure stable economic operations and foster a conducive financial environment for China's development, it is crucial to establish a balance between the macroeconomy and the stock market.

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