

An Empirical Study on the Relationship between Monetary Policy and the Term Structure of Interest Rates

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ABSTRACT. *At present, China is in the critical stage of transforming from a quantitative monetary policy to a price-based monetary policy. The implementation of a quantitative-price mixed monetary policy can further improve the effect of monetary policy and interest rate regulation and maintain the stable operation of the macro economy. Based on the current economic situation, this article conducts experiments to prove the relationship between its monetary policy and the term structure of interest rates. To this end, this article first analyzes and compares the final effects of monetary policy on regional economies with the aid of an analysis framework that can simultaneously take into account the individuality of regional economies, the spillover effects between regional economies and the overall nature of monetary policy. Then, this article further combines the current background of interest rate marketization and monetary policy from quantity-oriented price-oriented changes. Focusing on the interest rate channel, it deeply analyzes the regional effects and formation of China's monetary policy under the new situation. First of all, on the basis of combing and summarizing relevant literature, find the expansion space for evaluating the regional effect of China's monetary policy. Experimental research results show that the term structure of interest rates is playing an increasingly important role in monetary policy. Combining the study of the term structure of interest rates with monetary policy and examining the relationship between them can not only promote the role of interest rates in macro-control, but also have important implications for improving the forward-looking and effectiveness of monetary policy.*

KEYWORDS: *Monetary policy, Economy effects, Term structure of interest rates, Policy development*

1. Introduction

Interest rate is the main control target of monetary policy. It will affect various medium and long-term interest rates by adjusting short-term interest rates. , And ultimately affect the real economy [1]. The term structure of interest rates has become the link between monetary policy and the real economy, and it plays an increasingly important role in the formulation of monetary policy [2]. In recent years,

extensive research has been conducted on the dynamic dependence between monetary policy and the term structure of interest rates [3]. On the one hand, the term structure of interest rates contains a wealth of monetary policy information, which can provide decision-making references for monetary policy formulation. The long-term and short-term interest rate differentials in China's interest rates better reflect the state of monetary policy. The term structure of China's short-term interest rates contains information about future inflation changes, which can be used as a predictor variable for judging future inflation trends. On the other hand, the pricing of treasury bonds makes full use of monetary policy information. When the monetary policy changes, the transaction price of treasury bonds will also change accordingly, which will affect the term structure curve of the interest rate of treasury bonds. Strict (expansionary) monetary policy will result in smaller (larger) term spreads [4].

Monetary policy has obvious regional effects in my country. The difference in the transmission mechanism is the main cause of the difference in the regional effect of the unified monetary policy control effect. Compared with the credit channel and the exchange rate channel, the interest rate channel has a stronger ability to explain the problem [5]. Generally speaking, the effective implementation of monetary policy can produce both regional effects and industrial structure changes. The use of different monetary policy tools in different economic regions due to the differences in transmission channels, the control effect and dynamic change process also have obvious differences. Therefore, it is necessary to guide industrial upgrading while coordinating inter-regional economic development, correctly understand the inter-regional differences in the effect of monetary policy implementation, and implement different economic policies in accordance with local characteristics in different economic regions to promote regional coordinated and healthy development. At the same time, banks need to further improve the transmission mechanism of interest rates. Monetary policy authorities can improve the characteristic "interest rate corridor" model on the basis of traditional monetary policy tools, using excess deposit reserves as the lower limit of market interest rates [6].

The term structure of interest rates is the relationship between interest rates of different maturities with the same risk, liquidity and tax nature at a specific point in time. More strictly speaking, this is the relationship between the yield and the maturity date of zero-coupon bonds with different maturities and no risk of default. Its image is the yield curve on the coordinate plane, the remaining maturity is the horizontal axis, and the yield is the vertical axis [7-8]. In relatively developed financial markets, the important role of the term structure of interest rates is mainly reflected in two aspects. From the perspective of microfinance, the term structure of interest rates is the basic tool for interest rate derivatives, bond pricing, interest rate risk management and asset portfolio management [9]. With the help of the term structure of interest rates, formulate more reasonable economic policies, stabilize macroeconomic fluctuations, and maintain financial market stability [10].

2. Method

2.1 Research on the Law of the Term Structure of Interest Rates

Research on the law of the term structure of interest rates. Domestic and foreign scholars have conducted a lot of research on the term structure of interest rates. In addition to the Nelson-Siegel and its extended model, other methods such as principal component analysis have also been widely used by scholars. N uses parameter fitting technology to estimate the term structure of interest rates, and establishes a parameter model with three factors to describe the short-term, medium-term and long-term characteristics of interest rates. After fitting the term structure of interest rates in the US market, it is found that this method is not only simple and flexible, but also has a good fitting effect. On the basis of the NS model, factors describing mid-term characteristics are added, which makes the model more flexible in fitting the term structure of interest rates. It can describe U-shaped, inverted U-shaped, hump, inverted hump and other characteristics of the term structure of interest rates. Based on this, we can predict the expected value of short-term interest rates and directly test the term structure of interest rates.

2.2 Prediction Methods for Different Cut-Off Points

Although the improved genetic algorithm is superior to the polynomial spline function based on the simple genetic algorithm in terms of sample determination coefficient and absolute value of the price error, the gap is very small, and it cannot be simply considered that the excellent model in static estimation must also have good economic performance , To ensure the rationality of the term structure of interest rates. Since a model with good mathematical performance may include bond price information in the model, it may lead to overfitting of the model. For the interest rate term structure model, a good model not only needs to reflect the current transaction information of government bonds, but also cannot reflect the impact of non-interest rate factors on the interest rate term structure. Therefore, in order to evaluate the term structure model of interest rates, it is necessary to make out-of-sample forecasts to test whether the term structure model obtained can accurately reflect the term structure of interest rates without participating in parameter estimation.

2.3 Strengthen the Coordination of Open Monetary Policy

For this research experiment, this article re-examines the regional effects of China's monetary policy. Mainly selected the North China coastal area and the eastern coastal area of my country for investigation. For this reason, this article first uses the analysis framework of the regional economic individuality, the effect of the regional economy and the overall monetary policy to carry out the final effect of the monetary policy on the regional economy. Analysis and comparison. Taking the interest rate pricing behavior of banks in my country's northern and eastern coastal

regions as the starting point, with the aid of an analysis framework that can simultaneously take into account the individuality of the regional economy, regional effects and monetary policy, analyze and compare the relationship between monetary policy and interest rates from an overall perspective. The relationship between the term structure affects.

3. Experiment

3.1 Design of Experimental Research

First, on the basis of combing and summarizing the relevant literature, find the expansion space to evaluate the regional effects of China's monetary policy. Secondly, after having a certain initial understanding of the regional effects of China's monetary policy, further consider starting from the interest rate channel. It analyzes the formation mechanism of the regional effect of China's monetary policy under the new situation. On this basis, through a comparative analysis of the quantitative and price-based monetary policy frameworks, the traditional interest rate channels of the monetary policy transmission mechanism are sorted and summarized, and the conditions of interest rate marketization and price-based monetary policy are determined. When monetary policy is transmitted through interest rate channels, there may be specific links of regional heterogeneity, which will be verified and analyzed.

3.2 Experimental Research Objects

In order to have a deeper understanding of the relationship between current monetary policy and the term structure of interest rates, this article uses quantitative models to study the relationship between the term structure of interest rates and monetary policy in China, which has certain practical significance for empirical research. By studying the relationship between the term structure of interest rates and monetary policy, it can help investors obtain effective interest rate risk information, affect the investment behavior and risk control capabilities of financial institutions, and enhance the ability of financial institutions to resist financial risks. From a broader perspective, studying the relationship between the term structure of interest rates and monetary policy to enhance the ability of micro-units to resist risks will inevitably improve the stability and anti-risk ability of the entire financial system, and the capital market will develop significantly.

4. Results

4.1 Macroeconomic Variables of the Term Structure of Interest Rates

Table 1 the Term Structure of Interest Rates and the Correlation Coefficients of Macroeconomic Variables

	HS	Level	Slope	CPI	PPI	IP	CPI-IP	M2
HS	-0.522	-0.531	-0.042	-0.612	-0.037	-0.216	-0.479	-0.631
Future		-0.362	-0.237	-0.179	-0.436	-0.585	-0.379	-0.601

The final results are shown in Table 1. Considering that there is a certain leading-lag relationship between economic variables and the term structure of interest rates, a lag term is introduced into the established model to examine the leading effects of the term structure of interest rates and macroeconomic variables. In the current interest rate market-oriented economy in my country, the term structure of interest rates has become the main target of monetary policy. At present, banks in various countries affect interest rates through monetary policy adjustments and ultimately affect the country's real economy.

At the same time, changes in the term structure of interest rates have become a bridge between monetary policy and the real economy. The term structure of interest rates is one of the important manifestations of current monetary policy, so the impact of monetary policy can be analyzed through the term structure of interest rates and their changes, and interest rate expectations can be changed through adjustments to or monetary policy, which guides and affects the term structure of interest rates. For the group containing multiple variables, the regression method and the screening method are used to analyze and test the influence of each variable. In summary, after testing, we found that each level factor does contain information on monetary policy, economic performance, and inflation levels. Combining the correlation coefficient matrix, we can explain the level factor to a certain extent based on the above three macroeconomic variables: when my country's banks tighten monetary policy and the economy is stable and good, the overall interest rate curve will rise. In terms of the size of the coefficient, the horizontal factor has the greatest effect, followed by M2, CPI, IP, and M2 has a small effect. Therefore, it can be seen that for the market, the currency factor has the greatest effect, and when the interest rate rises, it will cause the currency market to fall.

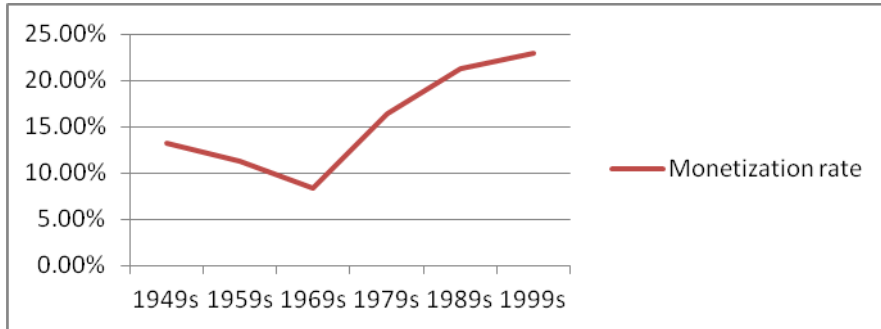


Fig.1 1949-1999 My Country's Monetization Degree Curve

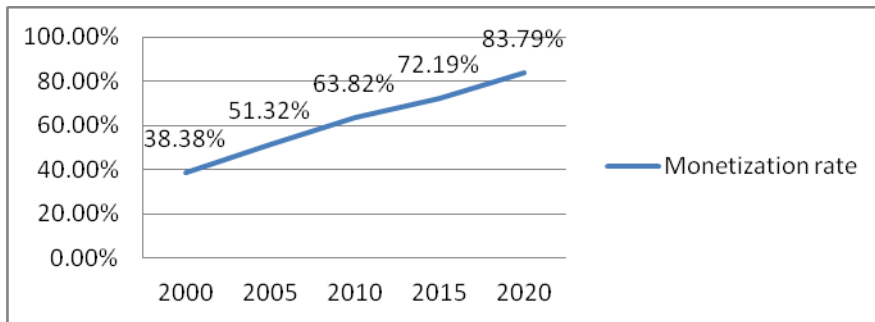


Fig.2 My Country's Monetization Degree Curve from 2000 to 2020

As can be seen from Figure 1, before 1979, in the early days of the founding of the People's Republic of my country, the rest of our country remained at a relatively low level. This period is a difficult period for my country's economic development since the founding of the People's Republic of China. At the same time, it experienced a major sweep of the financial crisis in 1997, which led to a sharp drop in the monetization rate during this period, and it was stagnant.

It can be seen from Figure 2 that from 2000 to 2010, my country's monetization rate experienced a decade-long increase, and reached a historical peak of 63.82% in the past 50 years in 2010. This period It is also a period of better economic development in China. After a long wait, I finally joined the World Trade Organization (WTO) with disdainful efforts. This is also the reason why my country's monetization rate increased rapidly from 2000 to 2010. It increased directly from 38.38% at the beginning to 2010. 63.82% of the year, setting a historical record for the largest increase in nearly 40 years. Therefore, compared

with the degree of monetization of the world's major economies, my country's monetization rate is still at an upper middle level, and there is still a lot of room for development from the maximum. From the perspective of the formula of monetization rate, the degree of monetization is mainly affected by broad money and GDP.

4.2 The Regional Effect and Formation of China's Monetary Policy under the New Situation

The current monetary policy under the new situation in my country has a smaller impact on the added value of industries in different regions than the price-based monetary policy. For the coastal areas of North China, the magnitude of the regional effects of monetary policy on the added value of the primary, secondary, and tertiary industries is very low, indicating that the added value of the three industries in the coastal areas of North China is not very sensitive to monetary policy. The positive response of industrial added value has increased after the economy has entered the new normal, which means that in the period of the new normal, the quantitative monetary policy has shown more positive effects in guiding industrial upgrading in the coastal areas of North China. The response of the primary industry to the quantitative monetary policy in the eastern coastal comprehensive economic zone has different effects, and there is no obvious trend in the time dimension; the added value of the secondary industry shows a trend of upward and downward fluctuations; the tertiary industry responds to quantitative currencies. The policy has the largest response range. Perhaps in the context of the current new normal, the formation of the regional effect of monetary policy is not limited to the traditional way of formation. Because of my country's vast territory, the development level of various regions varies greatly, and different monetary policies will have different effects in different economic zones, which is not conducive to all aspects of monitoring.

4.3 Analysis of the Effect of the Term Structure of Interest Rates on Monetary Policy Tending to Regional Economies

Regional disparity is a universal problem in the economic development of various countries. It is widely regarded as a temporary phenomenon. Market forces will balance it. However, reality ruthlessly crushed the superstition of the market. A far-reaching theory put forward by the Swedish economist Myrdal holds that when there is a regional gap, there is an echo effect, that is, the transfer of labor, capital, and resources from underdeveloped areas to developed areas and increases effective demand in developed areas. Thereby it is conducive to the further development of developed areas; there is also a diffusion effect, that is, the spread of technology from developed areas to underdeveloped areas, the purchase of raw materials and other forces that are beneficial to the development of underdeveloped areas. But under the power of the market, the echo effect is always greater than the diffusion effect, that is to say, it is more likely to cause the further expansion of the regional gap, rather than narrow the regional gap. Judging from the development experience

of various countries, in reducing the gap between the regions of the country, it is through conscious adjustment to promote the coordinated development of the regional economy, and does not adopt a differentiated regional monetary policy.

Therefore, the choice of monetary policy tools and the effective management of regional liquidity are particularly important. This will, to a certain extent, focus the intermediary reference target of monetary policy on the state factor representing the short-term term in the term structure of interest rates. However, multiple monetary policy tools will have different degrees or even opposite impacts on spread factors. How to construct a monetary policy tool with higher control precision and stronger control independence is a topic worthy of research in the future.

4.4 The Relationship between Monetary Policy and the Term Structure of Interest Rates

Combining research results and theoretical analysis, we have reason to believe that interest rate marketization and interest rate term structure show the following relationship: deposit and loan spreads are closely related to bank income. With the progress of interest rate marketization, short-term and long-term bank deposit and loan spreads All have suffered a significant negative impact, but compared to the significant impact of short-term deposit-loan spreads on short-term credit scale, long-term deposit-loan spreads and long-term credit scale do not have a significant long-term equilibrium relationship. This result may be due to the impact of small and medium-sized enterprises. Compared with medium and long-term financing, small and medium-sized enterprises are more likely to obtain short-term financing through formal channels. In addition, small and medium-sized enterprises are more sensitive to interest rates. Loan desire and the bank's loan evaluation, thereby affecting the bank's interest rate term structure. Combining with the development status of my country's economic new normal in recent years, as well as the actual situation of increasing openness of the financial economy, how to promote steady economic development under the interest rate marketization.

5. Conclusion

The formulation of exchange rate policies should take macroeconomic stability and financial stability as the main goals, strengthen the coordination and cooperation of exchange rate policies with monetary policies, macroprudential policies, and opening-up policies, and strictly adhere to the bottom line of preventing substantial economic growth and currency crises. In order to serve the comprehensive deepening of reforms, the impact of monetary policy on the term structure of short-term interest rates is greater than that on the term structure of long-term interest rates. The interest rate channel is an important reason for explaining the regional effects of China's monetary policy. Therefore, under the premise of taking into account industrial upgrading and regional differences, interest rate tools must be used carefully, and methods such as re-lending, rediscounting, and mortgage supplementary loans can be used to assist the traditional Monetary policy tools

achieve control goals. Promoting the optimization of the industrial structure and minimizing the imbalance of regional development are the choices to maximize the effect of monetary policy implementation. It is worth noting that the current issuance maturity in my country is still concentrated in three-year and five-year periods, and the liquidity of the transaction market is not sufficient, which makes the degree of marketization of the term structure curve of China's bond interest rate low. In the future, with the enrichment of my country's term structure and the expansion of market size, theoretical and empirical research on the relationship between the term structure of interest rates and monetary policy will provide more comprehensive and effective conclusions.

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