Main Influencing Factors of Interest Rates in China and Empirical Research

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Abstract:

This study aims to investigate the influencing factors of interest rates in China, analyzing inflation, liquidity demand, and economic growth as representative variables. Initially, Grey Relational Analysis and Spearman Correlation Analysis were employed to verify the association between these variables and interest rates, revealing a significant impact of the social financing growth rate on interest rates. Furthermore, the Granger Causality Test was utilized to validate the influence of the social financing growth rate on interest rates and distinguish the impact of different economic phases on interest rates. The study also delves into the economic rationale behind interest rates through logical analysis, highlighting that the supply and demand of money are the true determinants of interest rates, with varying sensitivities across different sectors. Finally, the conclusion emphasizes the necessity of considering the financing behaviors of various economic sectors comprehensively when formulating monetary policies and predicting interest rate trends.

Keywords: Chinese interest rates, economic growth, inflation, financing demand

1. Introduction

The volatility of interest rates in China is influenced by both market dynamics and policy interventions. In the long term, fluctuations in interest rates are driven by factors such as economic growth trends and returns on capital investment, whereas in the short term, they are shaped by regulatory measures implemented by the central bank. This study aims to conduct an in-depth analysis of the determinants of China's interest rates by examining key variables including inflation, demand for capital, and economic growth. Initially, the relationship between these variables and interest rates is assessed using Grey Correlation Analysis and Spearman Correlation Analysis, revealing a notable impact of the social financing growth rate on interest rates. Furthermore, the Granger causality test confirms the significant influence of the growth rate of social financing on interest rates.

Moreover, a logical analysis is undertaken to elucidate the economic rationale underpinning interest rate dynamics, emphasizing that the supply and demand dynamics of money are the principal drivers of interest rate movements. Lastly, the study underscores the importance of comprehensively considering the financing behavior of each economic sector when formulating monetary policies and forecasting interest rate trends, particularly noting that the sensitivity to interest rates may vary across different stages of the economic cycle.

Dai and Li Liangsong (2010) underscored the foundational role of interest rates in financial product pricing and macroeconomic management, highlighting the macroeconomic insights embedded in changes to the interest rate term structure, which are crucial for guiding central bank interest rate policies. Litterman and Scheinkman (1991) employed principal component analysis to investigate bond yields and systematic versus non-systematic risk factors, shedding light on their influence on changes in the interest rate term structure. Yang Yulin (2022) examined the impact of structural monetary policies on interbank market interest rates from the perspective of interbank operations, revealing a significant negative correlation between the medium-term lending facility (MLF) and the pledge repo rate across all maturities in the interbank market.

In summary, this paper analyzes the dominant factors of interest rate changes in different periods, aiming to provide theoretical and empirical support for understanding the evolution of China's interest rate policy and decision-making in the financial market.

2. Selection of Representative Variables

To thoroughly investigate the factors influencing interest rates in China, we initially selected three key variables

representing common determinants within the market: inflation (measured by CPI), demand for funds (quantified by loan volume), and economic growth (measured by nominal GDP growth). We posit that these variables effectively capture fluctuations in supply and demand dynamics, as well as expectations regarding interest rate movements. Inflation, as gauged by CPI, serves as the primary target for the central bank in interest rate regulation. When prices escalate, the central bank intervenes by tightening monetary policy to counteract inflationary pressures, consequently driving interest rates upwards. The demand for funds, as indicated by loan volume, directly influences interest rates. Interest rates themselves mirror the scarcity of available funds and the return on investment, representing the equilibrium price balancing supply and demand for funds. Economic conditions, represented by nominal GDP growth, indirectly shape interest rates. During periods of economic deceleration, the profitability and propensity of businesses to invest diminish, leading to reduced borrowing at higher interest rates to finance endeavors, thereby dampening the demand for interest rates.

Changes in interest rates in China are driven by a combination of market dynamics and policy interventions. Interest rates serve as a tool wielded by the central bank for short-term economic regulation, while also being influenced by the long-term trajectory of economic growth. Over the long term, interest rates are determined by the inherent growth potential of the economy and the returns on capital investment, rather than being unilaterally dictated by the central bank. In the short-term economic cycle, the central bank possesses the capacity to modulate the economy's temperature by adjusting interest rates, causing a certain deviation between the actual level of interest rates and their ideal equilibrium level. Fluctuations in anticipated market interest rates impact both the demand and pricing of bonds, consequently affecting bond yields to maturity. Changes in yields to maturity align with shifts in expected market interest rates, rendering them a valuable gauge of prevailing market interest rate levels. As a proxy variable for interest rates, we have selected the 10-year Treasury bond yield to facilitate our analysis.

3. Analysis of Interest Rate Determinants

3.1 gray correlation analysis

To verify the extent to which the above explanatory variables are associated with interest rates, we first conducted a gray correlation analysis.
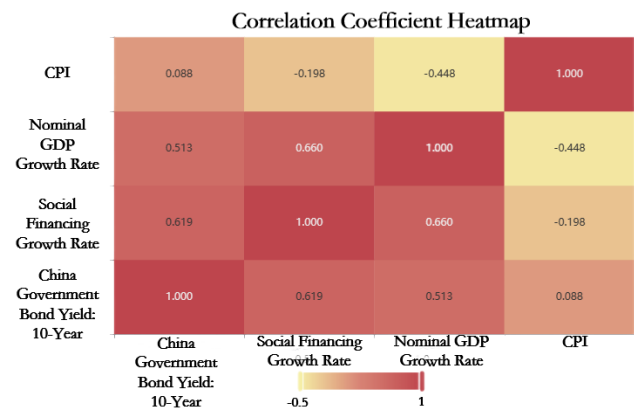
Table 1: Grey Correlation Coefficients

Criterion	Relevance
Social Financing Growth Rate	0.921
Nominal GDP Growth Rate	0.798
CPI	0.773

The correlation between three key economic indicators (social financing growth rate, nominal GDP growth rate, and CPI) and the benchmark value (10-year Treasury bond yield) was examined. Results reveal that the social financing growth rate exhibits the highest correlation at 0.921, signifying a strong association with the benchmark value and suggesting its pivotal role within the evaluation framework. Following closely, the nominal GDP growth rate demonstrates a correlation of 0.798, indicating a robust relationship with the benchmark value albeit slightly lower than the social financing growth rate. In comparison, the CPI exhibits a correlation of 0.773, implying a relatively weaker association with the benchmark value. All three explanatory variables exhibit correlations exceeding 0.7, indicating the rationality of selecting these variables for analysis.

3.2 Spearman correlation analysis

To further analyze their degree of correlation, we conducted a Spearman correlation analysis. To mitigate endogeneity issues with the core explanatory variables, we implemented a one-period lag in the treatment of control variables.

Figure 1: Correlation Coefficient Heatmap

From the heatmap depicted in the above figure, several key observations emerge:

l The robust positive correlation observed between the social financing growth rate and the benchmark value suggests a potential linkage between heightened demand for capital and elevated long-term borrowing costs. Concurrently, the strong positive correlation between the social financing growth rate and the nominal GDP growth rate indicates a synchronized or interactive relationship between the nominal economic growth rate and the expansion rate of monetary supply.

l The positive correlation observed between the nominal GDP growth rate and the benchmark value underscores the potential association between the nation's economic growth rate and long-term interest rates. Additionally, the correlation between the benchmark value and the nominal GDP growth rate may be attributed to their interconnection with the social financing growth rate. In essence, fluctuations in the supply and demand of funds could serve as a pivotal factor influencing this relationship.

l The weak correlation between CPI and the benchmark value suggests that its influence on long-term interest rates is not significant.

3.3 Granger causality tests

However, individual correlations alone are insufficient to infer causal relationships between the data. Therefore, finally, we conducted Granger causality tests.

Table2: Granger Causality Test Results

Paired Samples		F	P
China: Consumer Price Index (Year-on-Year)	China Government Bond Yield: 10-Year	1.533	0.219
China Government Bond Yield: 10-Year	China: CPI (Year-on-Year)	1.18	0.28
Social Financing Growth Rate	China Government Bond Yield: 10-Year	25.499	0.000***
China Government Bond Yield: 10-Year	Social Financing Growth Rate	4.184	0.044**
Social Financing Growth Rate	China: CPI (Year-on-Year)	0.847	0.36
China: CPI (Year-on-Year)	Social Financing Growth Rate	4.495	0.037**

Based on the variable of social financing growth rate and the benchmark value, the significance p-value is 0.000***, demonstrating the statistical significance and rejecting the null hypothesis, indicating that the social financing growth rate can cause changes in the benchmark value. The results of the tests for the remaining explanatory variables are not statistically significant, suggesting they cannot cause changes in the dependent variable. The social financing growth rate significantly influences the benchmark value, as evidenced by an F-value of 25.499 and a p-value of 0.000***, indicating that the social financing growth rate is a significant predictive factor for the benchmark value. Conversely, the benchmark value also has some influence on the social financing growth rate, albeit relatively weak, with an F-value of 4.184 and a p-value of 0.044**. In terms of the impact of CPI, the p-values for the benchmark value are 0.219 and 0.28, indicating that CPI is not a significant influencing factor. However, the p-values for the social financing growth rate are 0.36 and 0.037**, indicating a significant impact of CPI on the social financing growth rate when considering a one-period lag.

Overall, the social financing growth rate emerges as a significant predictor for the benchmark value, whereas the influence of CPI on these two variables is more nuanced, being significant only under specific conditions.

4. Theoretical and Logical Analysis Based on Data Analysis Results

In the aforementioned Spearman correlation analysis, we observed a relatively strong correlation between the nominal GDP growth rate and CPI with the social financing growth rate. Therefore, to delve deeper into the logical consistency of the aforementioned data analysis results, we conducted the following logical analysis.

A further discussion on the essence of interest rates reveals that they reflect investment returns. In capital markets, investors anticipate returns exceeding the risk-free rate. However, viewing CPI growth as representative of investment returns is a common misconception. In reality, high inflation within the CPI does not necessarily imply high investment returns, especially when inflation primarily stems from rising labor costs rather than increased product demand. In such scenarios, inflation may predominantly reflect increased business costs rather than product demand growth, potentially leading to a decrease in expected returns.

During the economic recovery following the 2008 financial crisis, policymakers and market participants faced a dual pressure of economic growth and inflation, leading to a more intricate response regarding interest rates. The 10-year Treasury bond yield partially reflects the market's comprehensive expectations regarding future inflation and growth. However, despite the general consistency in the direction of changes between the yield and nominal GDP growth rate, their magnitudes do not always synchronize. This discrepancy may stem from differing market expectations regarding future economic conditions or considerations of other factors such as liquidity conditions and policy expectations when evaluating risks.

In our investigation of the correlation between nominal GDP growth and 10-year Treasury yields within the post-2009 macroeconomic landscape, we observe that interest rate trends have been predominantly shaped by economic growth rather than inflation during this timeframe. This phenomenon signifies a structural alteration in the market's responsiveness to interest rates, prioritizing expectations regarding economic growth over purely inflationary concerns. Conventionally, interest rate dynamics in bond markets have been perceived as leading indicators of economic growth, with inflationary pressures trailing as a consequence. Consequently, fluctuations in nominal GDP growth during this period exhibit a more direct impact on bond yields.

Following the 2013 liquidity crunch in China, short-term repo rates saw a significant surge due to market liquidity constraints, reflecting heightened market tension. Subsequently, nominal GDP growth exhibited an overall downward trend over a significant period. During this period, despite a minor rebound in nominal GDP growth in 2013, interest rates notably surged to levels reminiscent of those observed in 2008. However, nominal GDP growth remained substantially lower than the levels seen in 2008.

Upon further examination, the economic rebound in 2016 led to an increase in interest rates, although this upward trend lagged behind the pace of economic growth. Concurrently, we observed that, since 2013, the trend in 10-year Treasury yields has closely mirrored that of the social financing growth rate. As a core function of monetary

pricing, interest rates inherently reflect the supply and demand dynamics of capital. Other explanatory variables also hold explanatory power over the dependent variable, as the level of interest rates should reflect the scarcity of funds, determined jointly by the intensity of fund demand and the abundance of supply. While there exists a correlation between economic growth and fund demand, this correlation is not always proportional. Consequently, their correlation coefficients do not exhibit exceptional levels of magnitude.

For example, prior to 2008, China's economic growth relied on an export-oriented development model. During this period, although economic growth was robust, financing demand did not grow concurrently, leading to relatively low-interest rate levels. Since the 2008 financial crisis, there has been a shift in China's economic growth model towards increasing reliance on domestic investment, particularly in the real estate market. This transition has led to a significant increase in financing demand, driving up interest rates, even in the absence of significant overall economic growth. During the period from 2002 to 2008, China's economic growth matched financing demand, starting from 2009, with the structural adjustment of the economy, especially the development of the real estate market, financing demand began to outpace economic growth. In this context, debt growth typically exceeded the pace of economic growth, even as economic growth slowed down, with funding demand, particularly driven by the real estate market, continuing to expand.
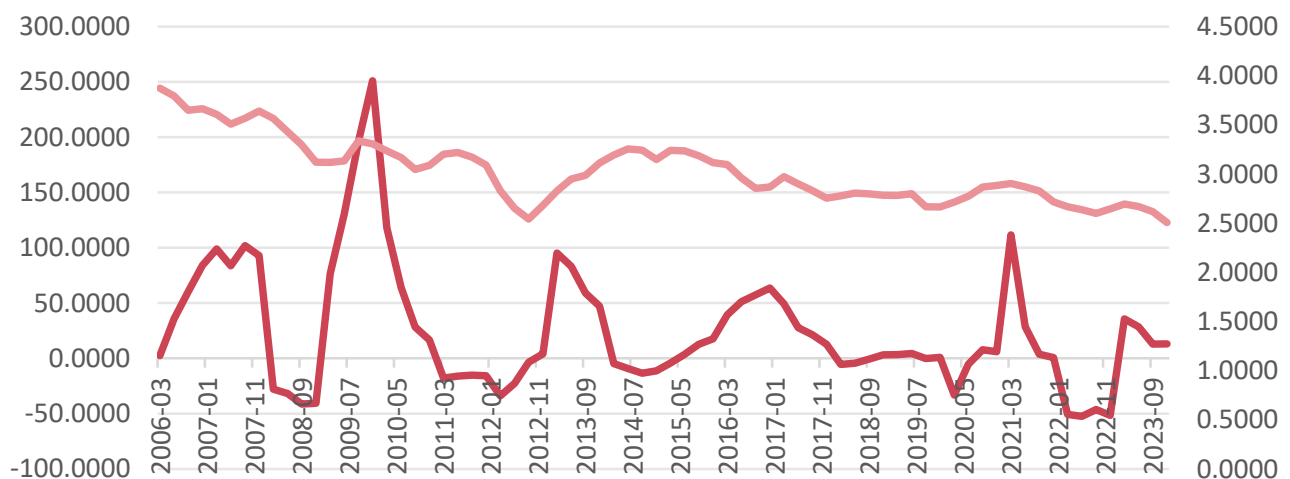
Figure 2: China Government Bond Yield: 10-Year&Household Sector Financing Growth Rate

Government financing exerts relatively little pressure on interest rate increases, while the private sector, driven by leveraged investment demand such as in the real estate market, experiences rapid capital inflows into the market. Given its heightened sensitivity, the private sector is more capable of driving interest rate increases. After 2016,

interest rate hikes were accompanied by an increase in residential growth. By 2019, there was a rise in corporate financing growth, while the growth rate of loans to households declined, leading to a downward trend in interest rates.Therefore, in this view, while paying attention to the growth rate of social finance, we should also take into ac-

count the growth rate of financing in the resident sector.

5. Conclusion

Therefore, based on the comprehensive analysis above, the true determinant of interest rates in China lies in the level of monetary supply and demand. Moreover, the impact of funding demand from different sources varies on interest rates. Within this framework, those sectors that are least sensitive to changes in interest rates exert the greatest influence on interest rates. When formulating monetary policies and forecasting interest rate trends, simply observing the growth of social financing is insufficient to fully comprehend the relationship between funding demand and interest rates. It is imperative to consider the financing behaviors of various economic sectors comprehensively, particularly noting the changes in sensitivity to funding demand across different economic cycles.

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