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RESEARCH ON CORRELATION BETWEEN THE TERM STRUCTURE OF INTEREST RATE AND CHINESE STOCK RETURNS

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ABSTRACT

The paper first use the dynamic Nelson-Siegel model to estimate the level, slope and curvature factor of the term structure of Chinese inter-bank bond interest rate, and then construct a time-varying vector autoregressive model between the three factors and the stock market return rate to find the influence mechanism in them. Finally, we analyze the response function results and find that the impact of Chinese stock market returns on the term structure of interest rates is greater than the impact of term structure of interest rate on stock market returns, that the response direction and degree of the level, slope, curvature factor on the stock market returns are different, that the impact of the term structure of interest rates on the stock market returns is mainly generated by the slope factor. Therefore there is a relatively unstable liquidity premium between the long-term and short-term interest rates of Chinese national debt.

Keywords: Term Structure of Interest Rate, Yield of Stock Market; Dynamic; DNS Model

1. INTRODUCTION

With the gradual improvement of interest rate marketization, interest rates have gradually become the main monetary policy tools of the central bank. The interest rate is divided into the risk structure and the term structure. The term structure of interest rate, also known as the bond yield curve, refers to the relationship between the yield and the maturity of funds of different maturities at a certain point in time. Since the term structure of interest rates contains a lot of information about important macroeconomic variables such as interest rates, money supply, economic growth and inflation. The academic community has not stopped discussing and studying the term structure of interest rates. Expectation theory, market segmentation theory, and liquidity preference theory are all very classic and widely recognized by future generations. In general, these theories explain the reasons and methods of the formation of term structure of

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interest rate from different angles.

Over the past few decades, the study of the term structure of interest rates has undergone major changes, and a number of theoretical models, represented by the Nelson-Siegel model (1987), the Svensson model (1995), and its developmental forms have been developed. This makes the study of the term structure of interest rates develop from qualitative to quantitative. At present, the research on the term structure of interest rates mostly focuses on the construction of theoretical models and explores its impact on various aspects of macroeconomics. However, the theoretical results of research combined with stock markets are not so many. It is generally believed that the term structure of interest rates reflects bond market information in terms of levels, slopes, curvatures, etc., combined with the theory of term structure of interest rates. It is often found that investors tend to hold short-term bonds in order to maintain liquidity and avoid risks, while long-term bonds investor holders must pay certain liquidity compensation, whose changes in the term structure of interest rates can greatly affect investors' expectations and adjust capital allocation. Therefore, this paper chooses another important asset allocation market as the research object, and carries out the research in this paper to discover the relationship between the term structure of interest rates and the stock market returns.

China began to establish a national inter-bank bond market in June 1997, since then the interest rate of government bond transactions has basically achieved marketization. Stock market and bond market are the two most important asset allocation markets. The relationship between the two markets has a significant impact on the outcome of asset allocation in the context of marketization. The conclusions of domestic and foreign scholars on the relationship between stock market returns and bond yield to maturity are different. Campbell et al. (2013) studied the relationship between US nominal bond yields and stock returns in 1960-2009 and found that stock returns and bond yields were positively correlated between 1960 and 1965, but during the period 2000-2009, they are Negative correlated. Based on the study of Canadian stock market yields and interest rate maturity structures, Chamberlain (2014) found that Canada's nominal interest rate has no predictive power on its stock market yield. Smirlock (2010) obtained a study of quarterly data, and in the bear market, the actual interest rate level is most effective for predicting stock prices. When Ilmanen (2003) studied the correlation between US bond and stock returns, it was found that the correlation between the two was different in different periods, and there was a negative correlation between the early 1930s and the late 1950s.

Domestically, Yang Jiping and Feng Yijun (2013) selected the Markov structural transformation model to study the impact and volatility of the Shanghai Composite Index on the impact of interest rates on the volatility of Chinese stock market under different volatility conditions, and found interest rate adjustment in 2012. The interest rate cuts in the last two years have

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significantly increased the Shanghai stock market's yield and volatility, while the 2006 interest rate adjustment has not had a significant impact on the Shanghai stock market volatility in the next two years. Ba Shusong, Yuan Jia, and Liao Hui (2017) selected the January 2007-June 2016 DNS model to find a long-term cointegration relationship between the inflation rate, the stock market value, and the maturity level of the national debt interest rate structure and the slope factor. Zheng Zhenlong and Chen Zhiying (2011) used the DCC model to analyze the dynamic correlation between Chinese stock market and bond market yields based on the A-share composite market yield and the CITIC full-benefit index yield data. They found that the correlation coefficient between stocks and bonds is time-varying. And most of the periods are positively correlated. Domestic and foreign scholars have different research methods on the mutual influence of stock market yield and bond market yield. The research on the term structure of interest rates mostly focuses on the term structure of interest rates and the impact of macroeconomics. Most scholars have proved that Chinese term structure of interest rate have a certain predictive effect on economic variables.

Chinese stock market opened in 1990, and the national debt market resumed its issuance since 1981. At present, it is at a stage of great development. There are both consistency and differentiation. In order to promote the unified development of the two markets of exchanges and banks, This paper deeply studies the relationship between the term structure of interest rates (level, slope, curvature factor) and stock market returns. Based on the Nelson-Siegel model, the term structure of interest rate in the inter-bank bond market is extracted. This model is less flexible than the increase. Although The Svensson model has two parameters, the NS model well fitted the Chinese data that the financial market depth is not enough, and also has the re-expansion of the no-arbitrage affine model that the Svensson model does not have.

2. THE PRINCIPLE AND MODEL SELECTION

2.1 The Relationship between the Term Structure of Interest Rates and Stock Market Returns

It is generally believed that the change in the rate of return is the result of multiple effects of the market economy. The bond yield to maturity and the stock market rate of return can interact with each other in many different ways. On the micro level, changes in bond yields with different maturities can affect investor sentiment and change the investor portfolio strategy, which in turn affects the overall capital flow in the bond market and the stock market. On the macro level, the monetary policy is partly transmitted through the bond market. We all know that the entire economy can affect stock market returns. At the same time, fluctuations in stock market returns will adversely affect bond yields by affecting investor sentiment and changing financing costs.

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It can be seen that market participants will make rational strategies in buying and selling securities based on their expectations and judgments about the market. Theoratically, the stock market and the bond market are all important components of the financial capital market. Under the condition of a certain amount of economic aggregate, there is often a "squatting effect" between the two markets, and this effect is inconsistent in different periods, and sometimes changes in the opposite direction to the change. If there is a negative correlation between the two, investors will choose optimistic asset allocation by investing in another market when a market is in a downturn; when there is a positive correlation or no correlation between the two, the diversification will not be able to arise. To diversify risks, especially systemic risks, it is of great practical significance to study the relationship between the two. In general, the current research on the relationship between stock market returns and interest rate maturity structure is not perfect. This paper will deeply study the mutual influence relationship between the two factor.

2.2 Dynamic Nelson-Siegel Model

The term structure of interest rates is an important basis for people to judge the economic situation and financial decision-making. In recent years, many domestic and foreign economists have conducted a lot of research on them. Many scholars have studied the characteristics of the term structure of interest rates by constructing models. Among them, Nelson and Siegel (1987) created the NS model, which is one of the most widely used models. The model uses a parametric statistical model to linearly fit the market data. And got very good results. Diebold and Li (2006) made a significant contribution to the development of NS. The dynamic Nelson-Siegel model was proposed. The factor model framework was combined with the model framework to establish a three-factor latent variable model. As we confirm, the NS model is more concise, and the research results also show that the calculation and estimation are more convenient, the prediction effect is better, and the application of the industry is very extensive.

The earliest static term structure of interest rate model was proposed by Nelson and Siegel (1987). The model constructs a function using the attenuation properties of the exponential function, which contains four parameters, referred to as the NS model:

$$R(m) = \beta_1 + \beta_2\left(1 - e^{-\lambda m}\right)/\lambda m + \beta_3\left[\left(1 - e^{-\lambda m}\right)/\lambda m - e^{-\lambda m}\right] \qquad (1)$$

In formula (1), m is the term of the bond, R(m) is the spot rate of the bond, λ is the decay rate, and β_1, β_2, β_3 are parameters to be estimated. The NS model can construct curves of various shapes and is currently being widely used by central banks to fit the term structure of interest rates. Based on these parameters to be estimated, we can construct a different interest rate term

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structure curve, as shown in Table 1.

Table 1: The shape of the interest rate term structure curve determined by β_1, β_2, and β_3

Parameter symbol	$\beta_1>0$		$\beta_1<0$	
Interest rate term structure curve shape	Above the horizontal axis		Located below the horizontal axis	
Parameter symbol	$\beta_2>0$, $\beta_3>0$	$\beta_2>0$, $\beta_3<0$	$\beta_2<0$, $\beta_3<0$	$\beta_2<0$, $\beta_3>0$
Interest rate term structure curve shape	Negative slope	Negative slope, positive U	Positive slope	Positive slope, inverted U

It can be seen from Table 1 that the position and shape of the interest rate term structure curve change with the changes of β_1, β_2, β_3, and the influence of the three parameters is different, and the β_1 change quadrant β_2 changes the slope direction, and β_3 changes the curvature. These variables can almost describe all the characteristics of the curve change. Therefore, changes in β_1, β_2, and β_3 can be used to measure changes in the structural curve of almost all interest rate maturities. However, since the NS model is only a static fitting parameterization method, four of the parameters are changed vary time to time, the stability of the parameters cannot be guaranteed. In response to this problem, Diebold and Li (2006) introduced the state space model into the research framework of the NS model, so β_1, β_2, and β_3 in the static NS model regarded as the three parameters. The potential factor of dynamic change, fixed λ value, constructed a dynamic Nelson-Siegel model (DNS model), which can characterize the time-varying characteristics of the bond term structure, so the spot interest rate of the bond can be expressed as:

$$R(m) = L_t + S_t\frac{(1-e^{-\lambda m})}{\lambda m} + C_t\left[\frac{(1-e^{-\lambda m})}{\lambda m} - e^{-\lambda m}\right] \qquad (2)$$

In formula (2), L_t, S_t, C_t can be understood as the level, inclination and curvature of the time-varying yield curve, respectively. Since the λ value is fixed, L_t, S_t, C_t jointly determine the different shapes of the term structure of interest rates, which is an important variable in this paper.

Since the three variables of the DNS model are represented by the level, slope and curvature of the term structure, the observation of state variables is more intuitive than the multi-factor affine model, CIR model and Vasicek model. In other aspect, compared to the static NS model, the

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dynamic NS model use the way of losing the partial goodness of fit to ensure the stability of other parameters, so that other parameters are comparable in timing.

3. THE INTEREST RATE TERM STRUCTURE SAMPLE SELECTION AND MODEL CONSTRUCTION

3.1 Sample and Data Description

All data in this article are based on month-end data. Considered that if the average monthly interest rate is taken, the interest rate is smoothed, which may cause some interference to the observation experiment results, this paper selects the transaction data of the Chinese inter-bank bond market as the proxy variable of the Chinese government bond market. Because the transaction volume of the government bond market in recent years mainly comes from the inter-bank bond market, this paper selects the end-of-month interest rate of inter-bank government bonds from January 2010 to January 2018 as a sample, in which the interest rate period is divided into 1 month, 2 months, 3 months, 6 months, 9 months, 12 Months, 24 months, 36 months, 48 months, 60 months, 72 months, 84 months, 96 months, 108 months, 120 months. The stock market data is selected to partially study the stock market. The previous literature adopts the stock market index return rate as the proxy variable of the stock market return, and the closing price of Shanghai Composite Index from January 2010 to January 2018 is the stock market yield. The data in this article are all from Wind database.

It can be seen from Figure 1 that the interest rates of different maturity periods are basically the same as the fluctuation trend of the date. The interest rate increases with the increase of the term, and the long-term and short-term interest rates at each time node are often inclined due to the liquidity premium. Tilting up, there is no double peak during the sample. Specifically, during the sample period, we experienced two rounds of bear bull market. The first time was 2010. After experienced the impact of the 2008 financial crisis, the yield of government bonds began to gradually warm up. After the interest rate reached a peak in mid-11, it began to fall back. It fluctuates continuously until the 13-year yield is almost 5%, reaching the second peak. During 2014-2015, the interest rate of the national debt continued to fluctuate. It was not until 2016 that the stock market began to pick up slowly. It can be seen that the fluctuation of the yield curve of Chinese bond during the sample period fluctuated greatly. This is related to the single bond variety, the scale of issuance and the limited trading volume of China. For other reasons, and the investment transactions in Chinese national debt market have great speculative components, which has aggravated the fluctuation of the yield curve of government bonds. In addition, each slope node of the curve changes continuously, which indicates that the liquidity premium level of Chinese national debt interest rate is not stable.

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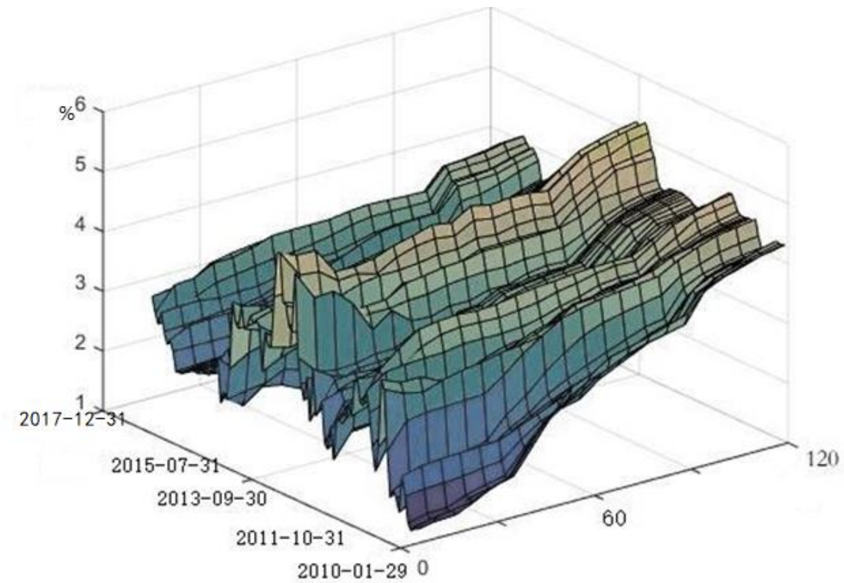

Fig. 1: Chinese inter-bank bond market interest rate term structure curve

3.2 Construction of the Term Structure Model of Inter-bank Government Bond Interest Rate

When λ is unknown, L_t, S_t, C_t, λ and $R_t(m)$ compose a nonlinear relationship. The nonlinear relationship is constructed, wherein the parameters L_t, S_t, C_t are time-varying parameters, and λ is a fixed parameter. At present, there are two main methods for dynamic estimation of NS model in academia. One is to use state space method to estimate, and the other is to use dynamic estimation method based on the range of values of measured attenuation rate. In this paper, the latter is selected. Since the determination of λ value is a complicated process, this paper selects the research results of Diebold, Luo and so on, and finally selects the attenuation rate of the term structure of Chinese inter-bank bond market measured by He Xiaoqun, ie, the value of λ. Is 0.07472.

After a close fitting calculation, the fitting values of L_t, S_t and C_t under the DNS model are obtained, as shown in Table 1 below. The results in Table 1 show that the residual values of the coefficients under each interest rate period are very small. It can be preliminarily considered that the model fits well the changes in the interest rate structure of the Chinese government bond market during the sample period.

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Table 2: Descriptive statistics of residuals for each period under the DNS model

Spot interest rate	Minimum	Maximum	Average	Standard deviation
1 month	-0.41915	0.3294	-0.05392	0.165267
2 months	-0.14209	0.199523	0.005856	0.07045
3 months	-0.14172	0.231495	0.019367	0.076607
6 months	-0.2355	0.247534	0.027945	0.087996
9 months	-0.31579	0.193252	0.014426	0.079785
12 months	-0.23326	0.148162	0.013307	0.064865
24 months	-0.13553	0.161189	0.008553	0.04877
36 months	-0.17419	0.212493	-0.01847	0.069249
48 months	-0.16688	0.239764	-0.027	0.071012
60 months	-0.19803	0.04613	-0.05681	0.049831
72 months	-0.11914	0.162063	0.012291	0.04997
84 months	-0.07147	0.089409	0.009783	0.035574
96 months	-0.06284	0.117459	0.02176	0.030936
108 months	-0.0853	0.129425	0.017251	0.045381
120 months	-0.14138	0.183171	0.005661	0.065104

In addition, in the study of the traditional interest rate term structure, the combination of interest rates of 3 months, 36 months and 120 months is often used as a proxy variable for research. The paper assume that these proxy variables are L_{t0}, S_{t0}, C_{t0}. L_{t0}=(R(3)+R(36)+R(120))/3 is used to measure the level of the term structure of interest rates. The average level of slope is measured by S_{t0}=R(3)-R(120). The curvature of the interest rate is measured by C_{t0}=2*R(36)-R(3)-R(120). Based on the time series obtained above, the empirical value and the fitting result are compared and plotted in Fig. 2. The graph shows that the fitted value of the slope factor and the proxy variable value curve basically coincide, while there are some differences between the two values of the horizontal factor and the curvature factor. The fluctuation of the proxy variable is generally smaller than the fitted value, but from the general There is a clear consistency in the volatility between the two.

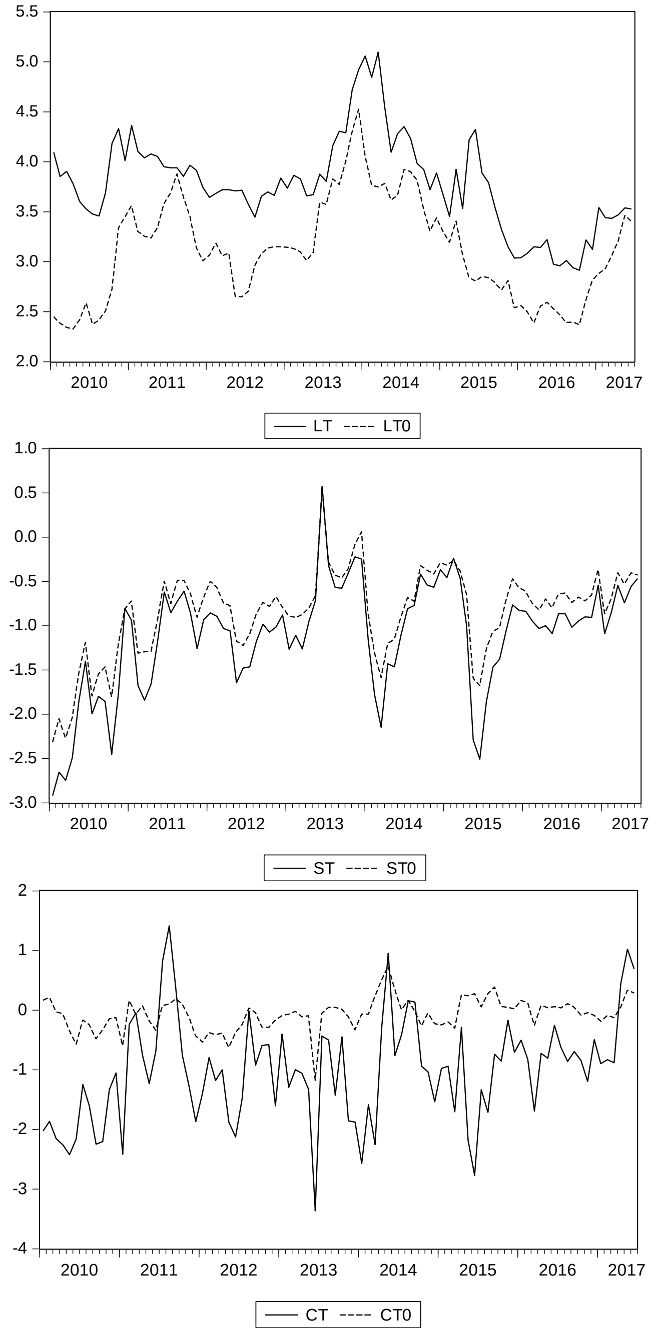

Fig. 2: Chart of the three potential factors and corresponding proxy variable values

Comparing the two methods, the traditional proxy variable can also use limited information to roughly describe the term structure of the interest rate. However, it is obvious that only the specific three interest rate combinations are used to indicate that the overall interest rate term structure change is unreasonable. Ignoring the other use, the term interest rate makes the

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traditional agent variable inevitably unreasonable. However, it also has its significance. In this paper, the fitting variable is used to further verify the fitting of the three potential factors obtained in this paper. The result is ideal. This laid a good foundation for the fourth part of the study. Because the image of the term structure of interest rate is more complicated, the three potential factors fitted in this paper are used as proxy variables of interest rate term structure to study their empirical relationship with stock market returns.

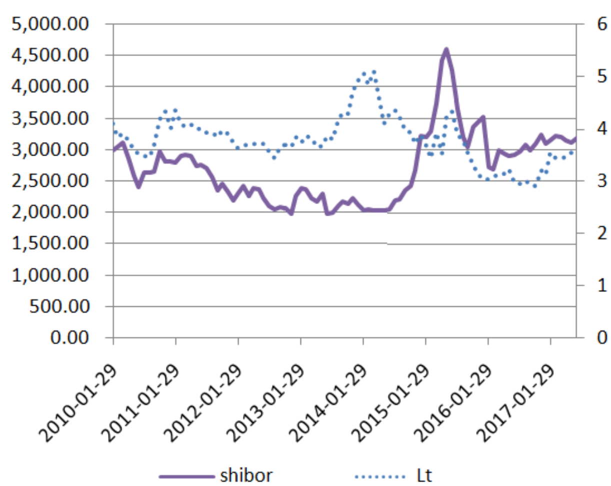
4. EMPIRICAL ANALYSIS OF THE RELATIONSHIP BETWEEN TERM STRUCTURE OF INTEREST RATES AND STOCK MARKET RETURNS

4.1 Data Description

The stock market yield in this paper is calculated from the closing price of the original Shanghai Composite Index at the end of the month. The specific formula is:

$$SH=\log(shibor_t)-\log(shibor_{t-1}) \tag{3}$$

SH is the stock market return rate. $Shibor_t$ stands for the lag t of Shanghai Composite Index. $Shibor_{t-1}$ stands for the lag t-1 of Shanghai Composite Index. Since the stock market yield is calculated from the logarithm of the Shanghai Composite Index, this makes the stock market yield lose the trend of the original data. In order to compare the empirical relationship between the three potential factors and the stock market returns, we make a plot of the fitted value of Shanghai Composite Index and each potential factor, as shown in Figure 3.



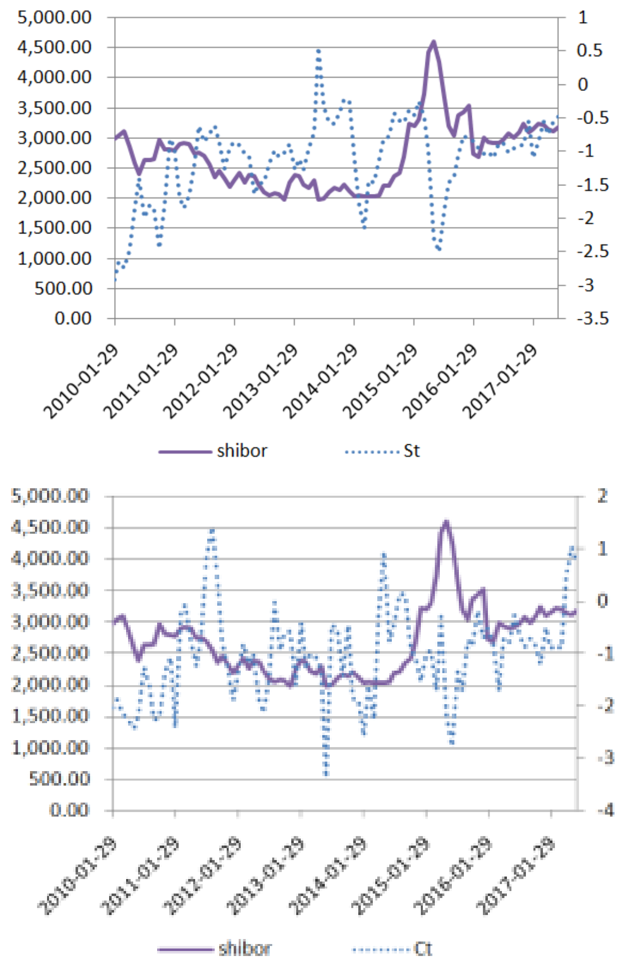


Fig. 3: Shanghai Composite Index and potential factor chart

Obviously, from the figure we can initially judge that there is a certain correlation between the three potential factors and the trend of the Shanghai Composite Index. Except for the excessive use of leveraged funds and poor supervision, from 2014 to 2015, when there is the short-term reverse volatility of the Shanghai Composite Index and L_t, the horizontal factor of the interest rate term structure and the stock index have obvious trends of the same direction. In light of the actual situation of the year, we believe that the stock market has experienced short-term abnormal fluctuations. Similarly, we can find that when Shanghai Composite Index reached its highest point in 2015, C_t and S_t were at the lowest position. When Shanghai Composite Index was in a lower position adjustment in 2013-2014, the value of S_t reached the peak level. These phenomena all indicate that there is a certain quantitative relationship between Shanghai Composite Index and the three factors of the term structure of interest rates. Regardless of whether there is abnormal fluctuation in the stock market, the three factors of the term structure

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of interest rates have a good correlation with them.

4.2 VAR Model Construction and Cointegration Test

The second part of the article has analyzed the relationship between the term structure of interest rate and the stock market return from the perspective of principle. The following is an example of constructing an unstructured vector autoregressive model to analyze the potential factors in the DNS model and the stock market income variables. The empirical relationship between the two, and then the empirical relationship between the maturity structure of Chinese national debt interest rate and stock market returns.

Table 3: Descriptive statistics of cointegration test

No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.26663	68.70834	47.85613	0.0002
At most 1 *	0.238709	41.72922	29.79707	0.0014
At most 2 *	0.146537	18.00092	15.49471	0.0205
At most 3 *	0.047299	4.215483	3.841466	0.0400

After Johansen's cointegration test, Table 2 is made. From the test results, it is found that there are three groups of cointegration relations between the stock market yield and the three factors of the interest rate term structure fitted in Chapter 2 at a significant level of 5%. That is to say, there is a long-term stable relationship between variables. Further through the stability test of the variables, cointegration test, Granger causality test, the paper finally selects the second-order VAR model and obtains the following relationship:

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Table 4: Estimates of VAR model coefficients for each factor of stock market return rate and theoretical term structure

project	Stock market return	Level factor	Slope factor	Curvature factor
Level factor lag phase I	-0.0278	0.8592	0.3187	1.4283
Level factor lag phase II	0.0266	0.0657	-0.3313	-1.3643
Slope factor lag phase I	0.0145	-0.0102	0.9520	0.6573
Slope factor lag phase II	0.0012	0.0780	-0.2862	-0.5132
Curvature factor lag phase I	-0.0030	0.0295	0.1526	0.6846
Curvature factor lag phase II	0.0015	-0.0319	-0.0030	-0.1919
Stock market yield lags in the first period	0.0464	0.5959	-2.3603	0.7590
Stock market yield lags in the second period	-0.1019	0.5989	-0.0946	-0.7841
intercept	0.0207	0.3531	-0.1466	-0.5894

It can be seen from Table 3 that among the variables, the horizontal factor has the greatest impact on the stock return, and the lag one and the second lag of the horizontal factor have different influences on the stock return, and its first period changes in the same direction with the stock market return, the second phase of the lag is reversed and its impact is relatively small; the lag factor of the slope factor and the second phase of the lag factor have positive effects on the stock market yield; the lag factor of the lag factor is the stock market return The impact of the rate is negative, and the second period of the lag is positive for the stock market's return rate. The opposite direction is similar to the effect of the horizontal factor, but less than the influence of the horizontal factor. Since this paper discusses the relationship between the term structure of inter-bank government bond interest rates and stock market returns, the relationship between the term structure factors of interest rates is not the focus of this paper, so there is not much analysis. The combination shows that stock returns have a greater impact on each factor. This result fully demonstrates that there is an interaction between the stock returns and the term structure of interest rates.

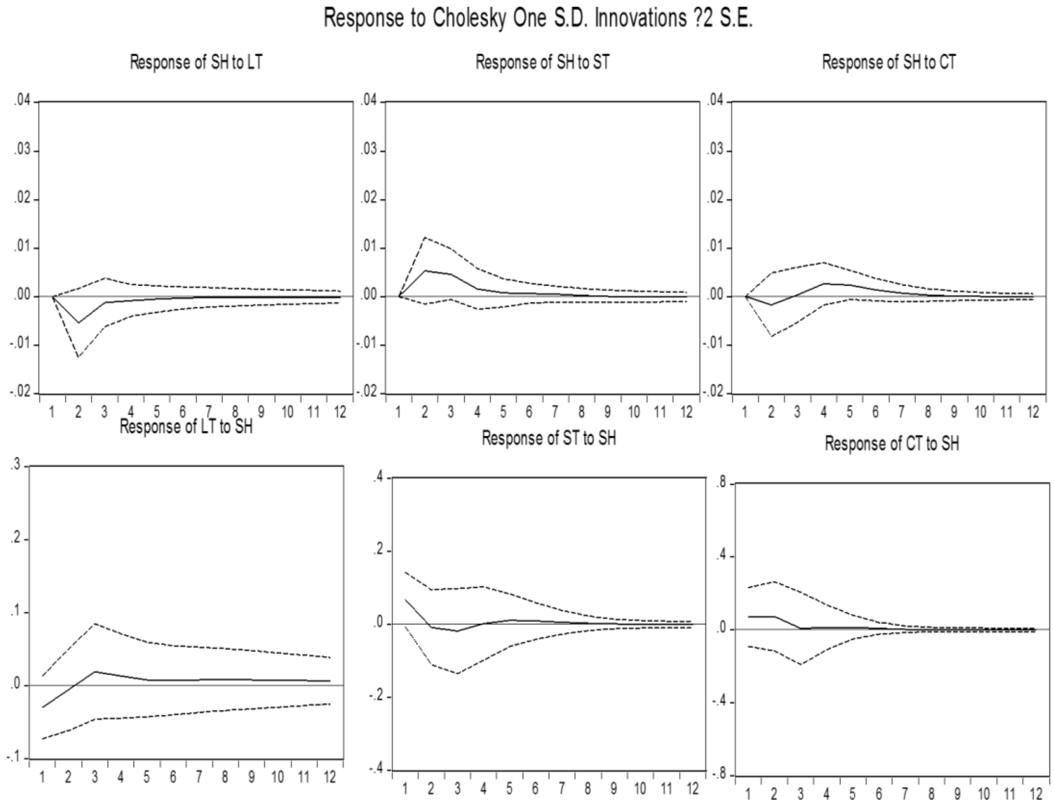

Fig. 4: Impulse response analysis

Figure 4 shows the time-varying impulse response path by constructing the VAR model. The influence of the three factors of the interest rate term structure is omitted. Only the two response relationship between the level factor, the slope factor, the curvature factor and the stock market return is analyzed. In the figure, the horizontal axis represents the lag order, and the lag period is 12 periods, which is equivalent to the one-year impulse response trend. The vertical axis represents the response degree of each index to the explanatory variable unit shock. The analysis in Figure 4 shows that:

1. The stock returns are subject to different impact directions of L_t, C_t, and S_t. The impact of the horizontal factor L_t and the curvature factor C_t on a Cholesky standard deviation will produce a negative impact on the lag 1 stock market return rate SH, while giving the slope factor S_t a Cholesky standard deviation. The impact will have a positive impact on the SH of the lag 1. The stock market's return rate will be peaked in the lag 2 by the impact of L_t, and will gradually return to zero in the future period; the stock market's return rate will also be positive in the lag phase 2 due to the impact of S_t. The peak value gradually converges then, and the stock market yield experiences a negative to positive process in the direction of C_t impact, which shows that

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the impact of the curvature factor on the stock market earnings is more complicated.

2. The three factors of interest rate term structure are also affected by the impact of stock market returns. The horizontal factor L_t begins to suffer from a small reverse shock of the stock market return rate SH, after which the effect is gradually reduced. By the third period, the negative shock gradually turns positive and continues for a longer period of time. The slope factor S_t has just started to respond positively to the stock market yield SH shock. The effect quickly drops to zero in the second period, and will be negative in the third period, and begins to slowly rise. After the fourth period, the effects back to positive but the positive impact is minimal and gradually disappears in the future. The curvature factor C_t is slightly positively impacted by the stock market yield SH from the first period, and this positive effect will be zero in the third period. Among the three factors, stock market returns are most affected by the slope factor S_t, which indicates that stock market returns are most affected by long and short spreads. This shock is most obvious at the beginning, but the impact period is not the longest. The ability of Chinese stock market to adjust itself is stronger and faster.

3. The mechanism of influence between the three factors and stock market returns is different. The impact of stock yield on the three factors of interest rate term structure is greater than the impact of three factors of interest rate term structure on stock market returns. The peak of the latter does not exceed ±0.01, and the impact of stock market returns on the term structure of interest rates is obviously much higher. This shows that the impact of stock market returns on the term structure of interest rates is more significant. At the same time, it can be seen from Fig. 4 that several impulse response curves show convergence and the convergence speed is relatively fast, which indicates that the impact duration between the indexes studied in this paper is within 8 months. It means there is self-regulating recovery mechanism in the market.

5. CONCLUSIONS AND RECOMMENDATIONS

This paper takes the end-of-month term structure and stock market income data from January 2010 to January 2018 as the research object, constructs a dynamic Nelson-Siegel model to estimate the term structure of Chinese national debt interest rate, and constructs a vector autoregressive model and an impulse response function. The time-varying relationship between the two results is:

1. Fama's market hypothesis suggests that under semi-strong market conditions, stock prices will respond quickly and accurately according to fluctuations in interest rates, and the two will change in the opposite direction. Based on the development of Chinese stock market and the reform of interest rate marketization, this paper finds that the level factor of Chinese national debt interest rate structure and the fluctuation of stock price have changed in the same direction

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many times, which is contrary to the theory of Fama. It is proves that Chinese market effectiveness is not enough.

2. Whether the stock market is in normal or abnormal fluctuations, bear market or bull market stage, the dynamic NS model can well fit the term structure of Chinese interbank bond interest rate, and term structure of interest rate and stock market returns are very good throughout the sample interval. The relevance and effect of the two are different. This paper demonstrates that stock market income volatility has a relatively greater impact on the term structure of interest rate, while the impact of interest rate term structure on stock market returns is small. Combining the status quo, we find that the central bank wants to influence the stock market by adjusting interest rates, and the effect is not satisfactory. The main reason is that Chinese current secondary market is not well constructed, and its liquidity is low, which weakens the transmission of the term structure effect of interest rates.

3. The stock market returns mainly affect the interest rate term structure through the slope factor of different term interest rates, that is, the spread between long and short interest rates, and the impact of horizontal movement is relatively weak. This conclusion also fully confirms the term structure of interest rate contains a lot of macroeconomic information, which can only be covered by the horizontal fluctuation of spot interest rate. It shows that the impact of stock market returns on different term rates has a greater impact than spot interest rates. The unstable liquidity premium, the stock market shock lasted for a short time, and the impact was generally weak.

4. Although Chinese interest rate marketization reform has achieved initial achievements, the current policy transmission effect among various markets is still not very satisfactory. The central bank should attach importance to further adjustment to enhance market initiative and effectiveness, give full space to the resource allocation function of interest rates, pay close attention to the changes in the bond market and the stock market, prevent the abnormal fluctuation of the stock market from impacting the bond market, and gradually expand the bond structure and expand the bond structure. The scale of the secondary market, combined with the empirical results, guides the formulation of interest rate policies at various stages, so that the interest rate term in the bond market is truly matched with the risks and expectations. Thereby the governnment gradually promote the diversification of market entities and increase the sensitivity of market participants to interest rates.

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