Research based on the Term Structure of China's Bond Interest Rate

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Keywords: Chinese debenture; Term structure of interest rates; Bond portfolio management strategy;

Abstract: The term structure of interest rate refers to the curve formed by the interest rate of a certain time node in different time periods. It can represent the yield to maturity of zero-coupon bonds in different time periods, and objectively presents the future development characteristics of bond interest rates. In fact, the market interest rates are on the rise, that is, long-term interest rates exceed short-term interest rates. Therefore, MATLAB statically estimates the term structure of interest rates, as the trend of interest rate development in China's bond market, which grasps the bond market investment strategy, and provides rationalization recommendations for some specific application of bond portfolios.

1. The term structure of rate interest

Strictly speaking, the term structure of interest rate refers to the relationship and characteristics change formed by the spot interest rate and the maturity rate at different time points [1]. The zero-yield bond yield to maturity is the same as the market spot rate for the same period, so the term structure of interest rates at any time is a function related to the term of the interest rate. Therefore, the curve shows the yield to maturity and term relationship of zero-coupon bonds, such as horizontal lines, up and down slopes, and so on. Correspondingly increase the complexity level of the yield curve, and the bond yield curve is a combination of some or all of the yield curves.

2. Bond portfolio management strategy

The bond portfolio management strategy includes both negative and positive aspects. Negative strategies refer to replication and immunization, while positive strategies refer to yield rides, level analysis, amplification leverage, and bond adjustments. Negative strategies expect the risk of target returns to be minimal, while aggressive strategies use the ability to change interest rate forecasts, optimize portfolios, and frequently trade to increase the possible benefits.

Index replication is highly linked to the overall return on the portfolio and the combined return of an index. If the 1% index is raised, it will theoretically increase the return on the portfolio by 1%.The immunization strategy is to prevent interest rate fluctuations from affecting the value of the bond portfolio. It highlights the long-term and bullish structural mix to adjust the investment ratio, minimizing the impact of interest rate changes on the portfolio, and highly matching the cash flows of assets and liabilities.

Yield Ride uses the falling characteristics of the yield curve for a part of the period to purchase the debt variety that is about to expire until the yield is lowered, resulting in the optimal bid-ask spread. The horizontal analysis method uses the interest rate change in the future to estimate the price at the end of the period, thereby inferring whether the current price is misidentified, thereby clarifying whether or not to purchase.

The bond consists of four parts, namely the time value, the impact of the change in the yield, the coupon interest and the interest generated by the reinvestment.

Expanding leverage is a strategy that uses borrowing to continuously increase portfolio returns, and investors build an inch of excess of free capital investment. In the bond market, the core example of amplifying leverage is a bond repurchase. Bond swap refers to low-priced bonds exchange high-priced bonds, or high-yield bonds in exchange for low-yield bonds.

  DOI: 10.25236/ermbfe.2019.026

3. Static Estimation of Term Structure of Interest Rates in China's Bond Market

The term structure of interest rates comprehensively shows the correlation between the return on financial assets and the maturity date. Assuming that investors want to invest in long-term investment in N years, there are two ways to choose. One is to purchase long-term bonds that are due at the end of the year, and hold the maturity, and the other is to hold one-year bonds, and then purchase one-year bonds after the expiration, until the end of N years.

This paper takes a static estimate of the term structure of interest rates to assess the future development of interest rates, and takes interest rate targets to provide a reference for active bond portfolio management.

In fact, any bond can be considered a zero bond portfolio, representing a series of combinations of cash flows, which are the present value of the bond price. A discount is applied to each cash flow based on the discount rate. The coupon date generally selected is the same as the cash flow. This rate of return is the spot exchange rate. Zero coupons are short-term bonds that usually require a bond yield curve. First, it is reasonable to determine which country's bond yield curve. Among them, newly issued government bonds and some non-newly issued government bonds are available government bonds, and all medium and long-term government bonds, short-term government bonds and zero-coupon bonds. Most of the Chinese government bond market is coupon bonds. Since it is impossible to obtain the yield to maturity with sufficient data, the coupon deduction method can be used to statically estimate the term structure of interest rates. This method separates the total value of coupons and interest-bearing bonds and obtains zero-coupon bonds. Based on this premise, zero-coupon bonds are used to estimate the term structure of interest rates [2].

The sample data is selected from the national debt listed on May 9, 2008. The term structure of the government bond interest rate is calculated by MATLAB: the government bond prices of codes 10709 and 10508 are too high, so the interest rate level is negative, which has a certain effect on the interest rate curve structure. Impact. The two negative interest rate levels are removed, and the interest rate curve structure is shown in Figure 1.

The term structure of interest rates in the Chinese bond market on May 9, 2008 is shown in Figure 2. It can be seen that the long-term interest rate of government bond transaction data clearly exceeds the short-term interest rate. The medium and short-term interest rates have undergone major changes in three years, and the medium and long-term interest rates over three years have been relatively stable. There is a low point in a year and a half to two years, and a high point occurs in the remaining two and a half years of the year, and the interest rate varies from 1% to 5% and continues to rise. It can be seen from Figure 1 that when the maturity date is approached, the interest rate of the national debt is lowered, and finally reduced to -2%, mainly because the financial management institution investors continue to supplement the national debt, effectively maintaining the state of the portfolio.

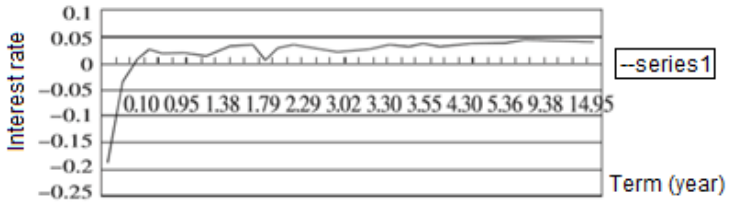

Figure 1 interest rate curve structure

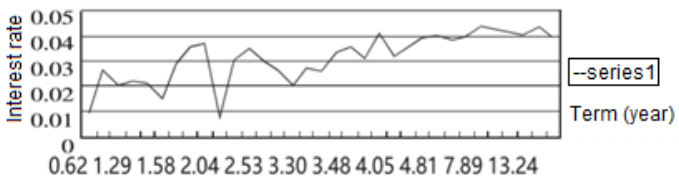

Figure 2 interest rate curve structure

4. Analysis of China's bond portfolio management strategy

The negative bond portfolio management strategy includes immunization and indexation investments. These strategies are less relevant to the term structure of interest rates because the indexed replication effectively tracks the trajectory of the index immunization, including dynamic and static immunization, combined with interest rate behavior to determine whether it is predictable, which is a strategy for negatively managing the bond portfolios. So this paper focuses on the role of active bond portfolio management and static estimation in the structure of interest rate maturity. Combining the connotation of the yield strategy, the bond interest rate and the price direction, which is the interest rate curve structure that is also designed according to Figure 2 can be used for two years and a half year around the two interest rate of the low investment arbitrage years, buying two-year bonds, and then thrown before the time, get the highest bid-ask spread. In order to increase short-term investment profit, we need to rely on the upward slope yield curve, but we cannot obtain stable profits. If bond market investors master this arbitrage method, they must reduce the demand for short-term bonds and increase the demand for medium- and long-term bonds. The resulting yield curve may be “flat” and reduce the chance of arbitrage. The passenger yield curve contains the trading behavior of buying and selling bonds, which invisibly increases the transaction cost. Therefore, only by accurately grasping the future development trend of interest rates, and adding that most investors in the market are not aware of this investment opportunity, they can get high returns, so they are only used in short-term operations.

The horizontal analysis method is a bond ending price determined by the manager to estimate the future interest rate, and is bought in conjunction with the market change law. According to the interest rate curve of the interest rate trend structure, the current bond value is discounted to help manage the bond portfolio personnel to make the correct decisions and accurately grasp the market revenue opportunities. The factors affecting the leverage are the borrowing rate and the expected future interest rate trend, when there is no obvious change in long-term interest rates, it is possible to obtain a relatively stable returns by amplifying leverage.

Bond swaps include the replacement swaps, which involve the different exchange of the internal market price, interest rate expectations and net income that any exchange bonds must follow the principle of buying at low rate and selling at high rate because the bond yields and prices are negatively correlated. When choosing low-priced or high-yield bonds, it successfully replaced high-priced, low-yield bonds. Combined with the interest rate curve structure, Figure 2 shows that the two interest rate highs occurred within one to two and a half years, and during this period, the remaining period of bond purchases will successfully replaced the bonds with the low interest rates. In bond portfolio management, when the management is about to avoid buying negative-interest bonds when it is about to expire, because investors have unusual investment behaviors, and based on the competitiveness of buying or selling of the same rate the maturing bonds has caused the market to shrink.

The bond portfolio management strategy analysis is based on the statically estimated interest rate term structure which is more sensitive to the interest rate response, yield ride, level analysis and bond swap. These management strategies are beneficial to reduce the interest rate risk, a risk premium that is obtained in conjunction with the market volatility. To grasp the market development trend and further gain capital which is the first goal based on assumptions made by the market. This can be done with a negative management strategy. However, when the market environment is seriously lacking in effectiveness, then it can only be accomplished through an active management strategy. The second goal is an effective management strategy, to obtain an important risk returns on the premise of comprehensive analysis of future interest rate risks, although many factors have an impact on the risk return but they are all reflected in the interest rate index. Therefore, the analysis of the term structure of interest rates has profoundly affected China's bond investment strategy.

5. Summary

In the course of 20 years of China's development, its security market has become more reliable

and rational based on the policy guidance of the stable development of the bond market and the market management has also been gradually strengthened by statically estimating the maturity structure of the bond interest rate, that the risk can be minimized and the steady growth of the securities system can be promoted, this article is aimed at the term structure of China's bond interest rate, to promotes and have a more stable development of the bond market in order to obtain a relatively reasonable yield curve.

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