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The Impact of Liquidity Risk on Corporate Bond Pricing in China

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Abstract: This paper investigates the impact of liquidity risk on bond pricing in the bond market after the end of COVID-19. The paper hypothesizes a significant impact of liquidity risk on bond pricing in the bond market and introduces several variables such as liquidity ratio, coupon rate, issuance cycle, return on equity (ROE), and issuance volume for testing. The paper analyses and compares the impact of liquidity risk on corporate bond pricing through least squares (OLS) regression analysis (data from the iFinD database). The study shows that the liquidity risk of bonds has a significant impact on the market interest rate of corporate bonds, which directly proves that the impact of liquidity risk on corporate bond pricing in the bond market is highly significant. This paper reveals that liquidity risk is crucial to bond pricing in the bond market that liquidity risk is a key factor in determining the degree of stability of bond prices, and that illiquidity leads to increased uncertainty in bond pricing and market volatility. Investors need to have a more comprehensive perspective to rationally price bonds under the disturbance of liquidity risk and pay attention to the impact of liquidity risk on the bond market.

Keywords: Bond Pricing, corporate bond, Liquidity Risk

1. Introduction

China's bond market has seen a lot of turbulence due to the epidemic that began in 2019. The epidemic is over, the economy has begun to recover, and investors have devoted more attention to the bond market. Among them, the market scale of corporate bonds is gradually expanding and has the potential for development, and the system is relatively perfect. To better control the potential risks, investors will focus on the liquidity risk of the market. Previously, many scholars have studied the liquidity link between bond markets, the existence of liquidity spillovers between China's stock and bond markets and tested the impact of liquidity risk on different aspects of bonds using various models (e.g., Capital Asset Pricing Model (CAPM), Equilibrium Asset Pricing Model (EAPM))[1]. These studies are statistically and economically significant and have multiple asset pricing applications. However, previous studies have not specifically explored the impact of bond market liquidity risk on corporate bond pricing. Accurate pricing of the underlying corporate bonds is a crucial part for both buyers and sellers. Therefore, this paper focuses on the impact of bond market liquidity risk on corporate bond pricing through regression analyses and can give investors a clear perspective and an accurate understanding of the performance and impact of liquidity risk [2].

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2. Bond Market Analysis

2.1. Overview of China's Corporate Bond Market

Bonds are a kind of securities and a financial instrument that can provide financing channels for governments and companies and low-risk returns for investors. According to the competent institutions, the competent institutions for bonds in China are mainly the Securities and Futures Commission (SFC), the Ministry of Finance (MOF), the Dealers Association (DA), the Development and Reform Commission (DRC), and the People's Bank of China (PBOC). Among them, the SEC started issuing corporate bonds in 2007 and was mainly responsible for approving corporate bonds issued by listed companies until 2015, when it reformed the corporate bond issuance system to expand corporate bond issuers to unlisted companies. Corporate bonds on the Exchange can be categorized into three main types, namely large public, small public, and private bonds [3]. Among them, large public offerings have the highest qualification requirements for issuers, and public investors can participate in spot bond trading through the exchange's bidding and aggregation platform. Small public offerings have lower qualification requirements for issuers and higher requirements for investors. Private placements are open to corporate issuers and are limited to 200 investors.

2.2. Corporate Bond Risk Factors - Liquidity Risk

There are five more significant risks associated with corporate bonds, which are credit risk, liquidity risk, interest rate risk, recovery risk, and inflation risk. When investors are ready to invest in corporate bonds, the risk factors that cannot be ignored are liquidity risk and credit risk. In the current market environment, scholars generally agree that liquidity risk is one of the most important segments to be considered in the pricing process of corporate bonds. Liquidity risk is defined as the risk that a company, although solvent, is unable to obtain sufficient funds promptly or to obtain sufficient funds promptly at a reasonable cost to meet the growth of its assets or to pay its debts as they fall due. As early as 2005, Acharya and Pedersen argued that market liquidity shocks affect asset prices and that the effect of liquidity on asset pricing can be expressed as a correlation between market and individual investor returns [4]. Amihud and Mendelson have put forward the theory that "liquidity is everything in the market" [5]. Adequate liquidity plays a crucial role in maximizing the benefits of investment and allocating resources appropriately. On the contrary, if the market lacks liquidity, it will directly lead to an increase in transaction costs and a decrease in transaction efficiency. In this globalization and the development environment of cooperation and win-win cooperation among enterprises, the uncertain liquidity will cause a drastic impact on the market, which will bring turbulence and panic to China's economy [6]. Investors also need to recognize that liquidity risk is insidious and explosive, and difficult to accurately quantify and calculate, making it more important for investors to be observant to help companies react promptly to the emergence of a strong liquidity risk.

Liquidity risk can make the bond market fall into a vicious circle and may even trigger a subprime crisis. On the one hand, the regulatory system is still in the process of continuous optimization and some parts are difficult to regulate, so how to accurately control the liquidity risk to set a reasonable price has become the most important thing for investors to think about. On the other hand, the uncontrollable liquidity risk will make the bond market less attractive [7]. In addition to the risk of the market itself, investors will be worried about political risk, and economic cycle risk, and more afraid to get involved in the risky bond market, which requires investors to have excellent pricing ability and seize the opportunity of vision. At a time of poor free flow of funds, a rush to the top and a rush to the bottom may lead to a market crash, how to make decisions and use effective information to get the maximum return are all key issues. However, the difficulty is that liquidity risk is a secondary risk, which is difficult to measure accurately, and liquidity risk is hidden and explosive.

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Next, this paper will use a model to verify the impact of bond market liquidity risk on bond pricing [8].

2.3. Data Analysis

Based on the hypothesis that bond market liquidity risk has an impact on bond pricing, this paper designs a relevant model for verification.

2.3.1. Variable Description

The explanatory variable chosen in this paper is the market interest rate of the bond in the current year, which is denoted by bond return. The core explanatory variable, liquidity risk, is measured by the current ratio. To control the influence of the bond's attributes, the model introduces bond characteristic variables, i.e., term duration, coupon rate, circulation, ROE, etc. The term duration is the term of the bond issue, the coupon rate is the term of the bond issue, circulation is the number of bonds issued, and ROE is the ratio of net profit to average net worth.

2.3.2. Descriptive Statistics

Table 1 is a descriptive analysis of the relevant data, which provides a visual explanation of the degree of data variation and dispersion. With Table 1 we can see that the standard deviation of CURRENT RATIO is particularly large, and the standard deviation of BOND RETURN is particularly small.

Table 1: Descriptive Statistic

Variable	Obs	Mean	Std. Dev.	Min	Max
bond return	3577	0.097	0.186	-2.117	1.793
current ratio	3577	6.977	176.863	0.000	9259.73
term duration	3577	4.25	1.811	0.738	18
coupon	3577	4.59	1.376	2.59	8.2
circulation	3577	8.291	7.856	0.000	150
ROE	3577	0.238	2.64	-0.473	57.723

2.3.3. Correlation Analysis

There is no significant correlation between the variables, there is no multicollinearity, and the variables chosen are reasonable. With Table 2 we can see that the correlation between the data is still relatively significant. This is especially true for the correlation between ROE and bond return.

Table 2: Matrix of correlations

Variables	(1)	(2)	(3)	(4)	(5)	(6)
(1) bond return	1.000					
(2) current ratio	-0.015	1.000				
(3) term duration	0.029	0.010	1.000			
(4) coupon	-0.252	-0.009	-0.018	1.000		
(5) circulation	-0.034	-0.002	0.121	-0.032	1.000	
(6) ROE	-0.369	-0.003	0.074	0.079	0.098	1.000

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2.3.4. Panel Data Non-stationary Test (HT test)

In the non-stationary test for panel data, the time dimension T of the short panel data is small, and the HT test is required to test for non-stationarity. From the code below, z = -37.9399 and the corresponding p-value is 0.000 0, so the original hypothesis of a panel unit root is strongly rejected and the claim that the panel data is smooth is supported.

Harris-Tzavalis unit-root test for bond_return
Ho: Panels contain unit roots — Number of panels = 511
Ha: Panels are stationary — Number of periods = 7

AR parameter: Common — Asymptotics: N -> Infinity
Panel means: Included — T Fixed
Time trend: Not included — Cross-sectional means removed

	Statistic	z	p-value
rho	0.0000	-378.9399	0.0000

2.3.5. Regression Analysis

The specific model is as follows:

$$bond\_return_{it} = \alpha_{it} + \beta_1 current\_ratio_{it} + \beta_2 term\_duration_{it} + \beta_3 coupon_{it} + \beta_4 circulation_{it} + \beta_4 circulation_{it} + \beta_5 roe_{it} + \varepsilon_{it} \quad (1)$$

Table 3: Linear regression

bond return	Coef.	St. Err.	t-value	p-value	[95% Conf	Interval]	Sig
current ratio	-0.196	0.034	-5.83	0.000	-0.262	-0.13	***
term duration	0.546	0.638	0.86	0.393	-0.707	1.799	
coupon	-0.03	0.005	-5.78	0.000	-0.041	-0.02	***
circulation	-0.29	0.749	-0.39	0.699	-1.762	1.181	
ROE	-0.025	0.013	-1.86	0.064	-0.051	0.001	*
Constant	0.221	0.036	6.09	0.000	0.15	0.292	***

Mean dependent var	0.097	SD dependent var	0.186
R-squared	0.190	Number of obs	3577
F-test	14.691	Prob > F	0.000
Akaike crit. (AIC)	-2628.725	Bayesian crit. (BIC)	-2591.631

*** p<0.01, ** p<0.05, * p<0.1

Through regression data and analyses(see Table 3), we can find that the role of liquidity risk on bond pricing is very significant.

Liquidity risk is represented by the current ratio, which is the ratio of current assets and current liabilities, indicating the company's solvency, the larger the current ratio is, the stronger its solvency, and the smaller its liquidity risk. The smaller the liquidity risk, the smaller the overall risk of corporate bonds, theoretically speaking, the liquidity ratio is negatively correlated with bond yields. The regression coefficient of the current ratio in the regression result is -0.196, and the significance level is 1%, which indicates that the effect of the current ratio on bond pricing is very significant and in line with the theoretical assumptions.

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The regression coefficients of term duration and circulation are not significant, indicating that term duration and circulation do not have a significant effect on bond pricing.

The regression coefficient of coupon is significantly negative, indicating that the coupon rate significantly suppresses the bond yield. This may be because the higher the coupon rate, the better the company's cash flow, and the better the market's expectation of its solvency, so the risk-return requirement for it will be lower.

The regression coefficient of ROE is significantly negative, indicating that corporate profitability suppresses bond yields. This may be because as corporate profitability increases, the market's credit rating on it rises and the risk-return requirement on it decreases, ultimately suppressing bond yields.

3. Conclusion

This paper explores the impact of bond market liquidity risk on the pricing of corporate bonds and concludes that liquidity risk has a significant impact on corporate bond pricing, which is mainly reflected in the significant impact of liquidity ratio, coupon rate, and ROE on bond pricing. However, when designing the model in this thesis, the research on how to accurately quantify bond liquidity is not deep enough, and a more reasonable experimental model can be further explored. In future research, researchers can further explore the cross-market liquidity risk spillover between the bond market and other markets and use different thinking and perspectives to explore how to consider the full range of factors to make the most accurate pricing. The validation and analysis of the model provide an understanding of the need to strengthen liquidity risk management. Financial marketization and technological advances have put forward higher requirements for liquidity risk management, not only for the supervision of institutions, but also for investors, and only through continuous analysis and optimization can we accurately price returns under the interference of liquidity risk.

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