Additional Terms and Issuance Pricing for Convertible Bonds

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Abstract. In order to meet the capital requirements of investment projects, enterprises usually need a steady stream of funds, and issuing convertible bonds is a method often used by enterprises. Redemption clauses and resale clauses are additional terms of convertible bonds. In order to prevent over-investment, issuers can recover the bonds according to the redemption clauses. Investors can use the resale clauses to resell low-efficiency convertible bonds to enterprises To avoid capital loss. Therefore, this article will explore the relationship between additional terms and the pricing of convertible bond issuance to understand the effect of additional terms on the pricing of convertible bond issuance.

Introduction

A convertible bond is a bond in which the holder of the bond can convert it into company stock under certain conditions in accordance with relevant regulations. It is a financial instrument that is both bond and equity. In terms of investment value, the bond nature allows investors to have basic interest income as a guaranteed income, while the equity nature gives investors the opportunity to obtain higher returns. Because convertible bonds can stabilize returns and avoid risks, they have been favored by most investors. In the long run, convertible bonds will certainly become a powerful investment and financing tool in the financial market. Therefore, how to price convertible bonds has become an issue worthy of attention of all stakeholders. Then this article will proceed from the additional terms of convertible bonds and study the impact of additional options on the issue pricing of convertible bonds.

The Main Variables and Descriptive Statistics

The basic sample of this article is the corporate bonds (including corporate bonds) that were listed and circulated from 2016 to 2018. In the study, the observations with missing data were eliminated, and 1345 sample observations were finally obtained. The data in this article are all from the RISE database.

The explained variable in this article is the coupon rate of the bond (Intrate). Investors are susceptible to a variety of factors when buying bonds, and this intermediate coupon rate is often one of the important factors, because the level of the coupon rate determines the amount of income obtained during the bond holding period. Therefore, corporate bond issuers will comprehensively consider all aspects of financing projects, so as to set the appropriate coupon rate in order to obtain the desired financing amount. The key explanatory variable of this article is the bond additional clauses (CE). A total of four dummy variables of bond additional clauses are set as proxy variables for bond additional clauses. CE1 indicates whether the bond has a redemption and resale clause. When CE1 is set to 1, it indicates that the bond has a redemption and resale clause. Otherwise, CE1 is set to 0; CE2 indicates whether the bond has only redemption clauses. It means that the bond only has a redemption clause and no resale clause, otherwise the value is 0; CE3 indicates whether the bond has only resale clauses. When CE3 is set to 1, it indicates that the bond has only resale clauses, otherwise it is set to 0; CE4 indicates the number of clauses with bonds. 0, the value is 1 when only the redemption or resale clause is attached, and the value is 2 when the redemption and resale clause is adopted.
The main variables of this paper are the measurement variables of the characteristics of the bonds issued. (1) Bond credit rating: a dummy variable, calculated as follows: if the bond credit rating is A+, the value is 1; if the bond credit rating is AA-, the value is 2; if the bond credit rating is AA, the value is 3; If the bond credit rating is AA+, the value is 4; if the bond credit rating is AAA, the value is 5. (2) Bond issuance. This paper uses the natural logarithm of bond issuance. (3) Bond issuance period.

In order to examine whether the bond has redemption and resale clauses that have an effect on bond pricing, this paper first performs a descriptive statistical analysis on the entire sample. The results are shown in Table 1. From the overall situation, the average bond coupon rate (Intrate) is 5.7489%, and the value ranges from 2.89% to 10.00%. In the full sample, 59% of corporate bonds have redemption and redemption clauses, of which 4% of corporate bonds have only redemption clauses when issuing bonds, and 58% of corporate bonds have only redemption clauses when issuing bonds. The average issue life of the sample bonds is 3.86 years, and the average credit rating of the sample bonds is AA+, indicating that the average credit rating of the sample bonds is relatively high.

|                  | N    | Minimum | Maximum | Mean   | Standard deviation |
|------------------|------|---------|---------|--------|--------------------|
| Intrate          | 1345 | 2.89    | 10.00   | 5.7489 | 1.35831            |
| CE1              | 1345 | 0       | 1       | 0.59   | 0.492              |
| CE2              | 1345 | 0       | 1       | 0.04   | 0.205              |
| CE3              | 1345 | 0       | 1       | 0.58   | 0.493              |
| CE4              | 1345 | 0       | 2       | 0.63   | 0.55               |
| rating           | 1345 | 1       | 5       | 3.86   | 1.051              |
| In(amount)       | 1345 | 0.09531018 | 6.214608 | 2.42860210 | 1.027962237 |
| maturity         | 1345 | 0.25    | 30.00   | 1.00   | 2.17559            |

**Pearson Correlation Analysis**

This paper conducts a Pearson correlation analysis on the entire sample to confirm whether there is any correlation between the additional terms of the bond and the coupon rate, and pave the way for regression analysis. The correlation test results are shown in Table 2. From the correlation test of the overall sample, it can be obtained that CE1, CE3, and CE4 are significantly positively correlated with the coupon rate at the level of 1%, and the correlation coefficients are 0.533, 0.542, and 0.468, which means whether there are additional terms and bonds Whether only the resale clause is attached and the amount of the clause attached to the bond has a positive correlation with the coupon rate; as for CE2, it has a negative correlation with the coupon rate with a correlation coefficient of -0.049, which indicates whether the bond has only redemption clauses and coupon Interest rates are inversely related, but the results are not significant.

From the correlation test, we can also conclude that the credit rating is significantly negatively correlated with the coupon rate at the level of 1%, and the correlation coefficient is -0.0268, which means that the higher the credit rating of the bond issuer, the safer the investor The higher the perception, the issuer can lower the coupon rate of the bond to a certain extent; the bond issue amount (In (amount)) is significantly negatively correlated with the coupon rate at the level of 1%. The larger the bond issue amount, the higher the coupon rate low.
### Table 2. Pearson Correlation Analysis.

|                | Intrrate | CE1   | CE2   | CE3   | CE4   | rating | In(amount) | maturity |
|----------------|----------|-------|-------|-------|-------|--------|------------|----------|
| **Intrrate**   | 1        | 0.533*| -0.049| 0.542*| 0.468*| -0.268*| -0.538*    | -0.056*  |
| **Correlation**|          | 0.000 | 0.071 | 0.000 | 0.000 | 0.000  | 0.000      | 0.000    |
| **Significance**|         | 1345  | 1343  | 1345  | 1345  | 1345   | 1345       | 1345     |
| **CE1**        | -0.049   | 0.178*| 0.086*| 0.449**| 0.074**| 0.005  | 0.004      | 0.004    |
| **Correlation**|          | 0.071 | 0.000 | 0.002 | 0.000 | 0.007  | 0.866      | 0.895    |
| **Significance**|         | 1345  | 1343  | 1345  | 1345  | 1345   | 1345       | 1345     |
| **CE2**        | 0.542*   | 0.980*| 0.086*| 0.929**| 0.139**| -0.435**| 0.163**    | 0.147**  |
| **Correlation**|          | 0.000 | 0.000 | 0.000 | 0.000 | 0.000  | 0.000      | 0.000    |
| **Significance**|         | 1345  | 1343  | 1345  | 1345  | 1345   | 1345       | 1345     |
| **CE3**        | 0.468*   | 0.945*| 0.449**| 0.929**| 1      | -0.097**| -0.389**   | 0.147**  |
| **Correlation**|          | 0.000 | 0.000 | 0.000 | 0.000 | 0.000  | 0.000      | 0.000    |
| **Significance**|         | 1345  | 1343  | 1345  | 1345  | 1345   | 1345       | 1345     |
| **CE4**        | -0.268*  | -0.127**| 0.074**| -0.139**| -0.097**| 1      | 0.376**    | 0.187**  |
| **Correlation**|          | 0.000 | 0.000 | 0.007 | 0.000 | 0.000  | 0.000      | 0.000    |
| **Significance**|         | 1345  | 1343  | 1345  | 1345  | 1345   | 1345       | 1345     |
| **Rating**     | -0.538** | -0.427**| 0.005 | -0.435**| -0.389**| 0.376**| 1         | 0.093**  |
| **Correlation**|          | 0.000 | 0.000 | 0.866 | 0.000 | 0.000  | 0.000      | 0.001    |
| **Significance**|         | 1345  | 1343  | 1345  | 1345  | 1345   | 1345       | 1345     |
| **In(amount)** | -0.056*  | 0.160**| 0.004 | 0.163**| 0.147**| 0.187**| 0.093**    | 1        |
| **Correlation**|          | 0.041 | 0.000 | 0.895 | 0.000 | 0.000  | 0.000      | 0.001    |
| **Significance**|         | 1345  | 1343  | 1345  | 1345  | 1345   | 1345       | 1345     |

**"****"represents significant correlation at 0.01 level (bilateral); "***"represents significant correlation at 0.05 level (bilateral)**

### Regression Analysis and Results

From the previous descriptive statistics and correlation analysis, it can be seen that whether the bond issue has additional clauses, what clauses are attached, and the degree of the clauses, they can all affect the coupon rate. In order to further confirm these rules, Existence, this section further performs statistical analysis.

This article focuses on the impact of bond attachment clauses on the bond coupon rate. The explanatory variable is the bond's coupon rate (Intrrate). The explanatory variable is the proxy variable with bond clauses (including CE1, CE2, CE3, CE4). The control variable selects the bond. The factors affecting pricing are: bond credit rating, total bond issuance, and bond issuance term. The specific model form is shown in (1).

\[
\text{Intrrate} = \alpha + \beta_1 \times CE + \beta_2 \times \text{rating} + \beta_3 \times \text{In(amount)} + \beta_4 \times \text{maturity} + \varepsilon
\]  

(1)

Table 3 reports the regression results using CE1, CE2, CE3, and CE4 as explanatory variables, respectively. From the data in the table, it can be seen that the estimated values of the proxy variable coefficients of the three bonds with terms in the regression model are significant at the statistical level of 1%, and only the estimated value of the CE2 coefficient is significant at the statistical level of 10%, indicating that the bonds The attached clause does have a pricing effect.
In column (1) of Table 3, the coefficient of CE1 is 1.081, which means that excluding the influence of other factors, the coupon rate of bonds with terms has an average increase of 1.081% compared with the coupon rate of bonds without terms, that is, common terms can change the investment. The risk and return of investors are matched to reduce the risk of default. Further looking at the different types of attached clauses, the redemption clause (CE2) has a coefficient of -0.276 and the redemption clause (CE3) has a coefficient of 1.105, which means that the bond has only redemption clauses and only resale clauses. The impact of interest rates is opposite. At the same time, the absolute value of the coefficient of only the resale clause is greater than the coefficient of the redemption clause only, which indicates that the existence of only the resale clause of the bond has a greater impact on its pricing. This can be explained by the basic conditions of the bond redemption clause and the resale clause. There are the following reasons for companies to implement the redemption clause: First, a major feature of redeeming bonds is that it is conducive to the company's debt settlement, and at the same time, it can help companies avoid fulfilling the protective clauses in the contract that are not beneficial to them; The coupon rate is negatively related to the corporate credit rating, which means that when the company improves its credit status, the company can replace it with a low coupon bond to redeem the previously issued high coupon bond. Third, the reason for redeeming the bond is still May be refinancing. Enterprises usually replace the difference between low-coupon bonds and high-coupon bonds due to the above-mentioned reasons to cover part of the cost of refinancing, but at the same time, they also lose the opportunity to redeem the bonds more favorably when interest rates fall further in the future. Investors expect higher interest rates to compensate for risks that may be redeemed in the future. However, the regression results in this paper show that the coupon rate of bonds with redemption clauses is reduced by an average of 0.276% compared to the coupon rate of non-redeemable bonds, which may be a problem of data screening. Bond resale often occurs in the following two cases. When the stock price continues to fall below the conversion price for several days or the stock of an unlisted company fails to be issued and listed within the prescribed period, then the issuer promises to recover the amount higher than the par value. Holders hold bonds, and resaleable bonds often carry coupon rates. The repurchase bond often has a coupon rate adjustment clause because the increase in coupon rate can increase the attractiveness to investors and reduce the proportion of investors' resale. The regression results in this article show that the coupon rate of bonds with resale terms has increased by an average of 1.105% compared to the coupon rate of non-resale bonds, which is consistent with the above analysis. At the same time, the results in Table 3 show that from the analysis of the amount of clauses attached to bonds, the more clauses attached to bonds, the stronger the effect on the coupon rate of bonds.

Table 3. Impact of Bond Attachment Clauses and Methods on Coupon Rate.

| Explanatory variables | (1) | (2) | (3) | (4) |
|-----------------------|-----|-----|-----|-----|
| Explanatory variables | Bonds have terms | Redemption clause only | Resale Terms Only | Number of clauses attached |
| CE1                   | 1.080974* (16.47146) | - | - | - |
| CE2                   | -0.275543*** (-1.808085) | - | - | - |
| CE3                   | 1.104718* (16.88765) | - | - | - |
| CE4                   | -0.100755* (-3.402503) | -0.109970* (-3.611355) | -0.095671* (-3.24901) | 0.791809* (13.43971) |
| rating                | 0.094835* (-3.24901) | -0.095671* (-3.24901) | -0.094835* (-3.402503) | -0.094835* (-3.24901) |
| Int(amount)           | 0.003479 (0.238849) | -0.497629 (-14.90245) | -0.047860 (-3.521445) | -0.047860 (-3.521445) |
| maturity              | -0.045316 (-3.322607) | -0.0433989 (-13.18012) | -0.045316 (-3.322607) | -0.045316 (-3.322607) |

**"***, "**", "*" they are significant at the levels of 10%, 5%, and 1%, respectively. The values in parentheses are the t values of the regression estimation coefficients.
Conclusion

The main purpose of this article is to test whether the additional terms of bonds have an impact on the coupon rate and whether the effects of different additional terms are different. Our research results using corporate bond data listed and circulated from 2016 to 2018 show that: (1) the existence of additional clauses on bonds can significantly increase the cost of issuing bonds. (2) Compared with only the redemption clause, the repurchase clause alone has a greater impact on the coupon rate of the bond, which significantly increases the issuer's issue cost. (3) The more clauses attached to a bond, the greater the pricing effect on bond issuance.

References

[1] Lin Jianxiu, Motivation and Consequences of Issuing Convertible Bonds: A Case Study Based on "Fuji's Food" [J]. Financial Development Research, 2019, (03).

[2] Wang Dingxiao, China's convertible bond investment strategy [J]. Cooperative Economy and Science and Technology, 2018, (15).

[3] Huang Binhua, Research on convertible bond arbitrage strategies: an example of the Chinese market [J]. Management Review, 2017, (11).

[4] Gong Pu, Redemption strategy of convertible bonds under investors' heterogeneous beliefs [J]. Systems Engineering Theory and Practice, 2012, (03).

[5] Wang Dongnian, Research on Redemption Strategy of Convertible Bonds [J]. Economic and Management Research, 2006, (09).

[6] Zhu Dan, Pricing of convertible bonds with resale clauses [J]. Journal of Natural Science of Hunan Normal University, 2005, (04).

[7] Zhang Ye, Issuance Motivation and Market Response of Resaleable Corporate Bonds—Based on the Perspective of Information Asymmetry [J]. Exploration in Financial Theory, 2018, (05).

[8] Bai Manying, Analysis of convertible bond redemption right and conversion price adjustment right [J]. Journal of Guangdong University of Economics and Management, 2005, (06).

[9] Chen Yihong, The Reform of Interest Rate Marketization and the Risks of Urban Commercial Banks—Empirical Evidence from Panel Data Models of 42 Urban Commercial Banks [J]. Research on Financial Regulation, 2015, (12): 1-15.