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Extended Abstract

Credit Risk Premium of Corporate Bonds: Return vs Yield

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Abstract

This paper studies credit risk premium (CRP) of corporate bonds and compares with the yield to maturity of the bond and shows that the yield of a bond is not the correct measure of its return.

Keywords: expected bond returns, corporate bonds, credit risk premium, yield to maturity

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Introduction

I calculate the yield spread and the duration-adjusted Credit Risk Premium (CRP) of corporate bonds for the structural models for pricing corporate bonds given by Merton [1974], Merton [1976], Black and Cox [1976], and Longstaff and Schwartz [1995]. The duration-adjusted CRP differs from the way CRP is calculated conventionally in that the duration of the bond is taken into account which gives the correct value of the CRP for the bond. I plot the yield spread and the duration-adjusted CRP against time-to-maturity T , and show that the latter peaks at a different value of T which shows that yield of a bond is not a correct measure of the return of the bond.

It has traditionally been the practice, to take yield-to-maturity of a bond as a rough indicator of the return of the bond. In particular, it has been the convention to assume that bonds with higher yield also had higher return. This lacks theoretical justification. In case of corporate bonds, the water gets even more muddled by the possibility of default by the issuer. It has been shown by Beliaeva et al. [2018] that there is no positive relationship between the expected return, calculated by using specific structural models for corporate bonds, and yield. However, the calculation of Beliaeva et al. [2018] does not take into account duration of the bond which must be included in order to get the correct value for the credit risk premium (CRP) as has been shown by Asvanunt et al. [2017] from empirical considerations. In this work, I calculate the CRP of corporate bonds with duration included and compare it with yield of the bond. I also calculate the CRP and yield of callable and convertible bonds in the framework of the binomial model.

Literature Review

As mentioned above, it has been shown by Beliaeva et al. [2018] that there does not exist a positive relationship between the expected return of corporate bonds and its yield. Specifically, it has been shown that, in the Merton [1974] model, when both the yield-to-maturity (YTM) and the expected return are plotted with time to maturity, the term structure of YTM, which is humped, reaches its maximum when the term structure of expected returns is still rising. Thus, the bond yields are actually inversely related to expected returns for a range of maturities. Beliaeva et al. [2018] have investigated this by comparing the term structure of credit risk premiums with the term structure of credit spreads by using various structural models of corporate bonds.

It has been shown by Kozhemiakin [2007] that when considered over the entire spectrum of credit ratings, the risk premium is positive and high relative to actual spreads for investment grade bonds; it rises in absolute terms as the rating goes down, reaches a peak at BB and then falls to become negative for CCC. Since the lower rating directly translates into higher yield spread, this non-monotonic behaviour clearly shows that the credit risk premium and yield spreads do not convey the same information.

This area of investigation is important because the following have long been research questions: What portion of corporate yield spreads is directly attributable to default risk? How much of the spread stems from other factors such as liquidity and taxes? A number of research articles have appeared on this topic. Longstaff et al. have shown that the default component represents 51% of the spread for AAA/AA-rated bonds, 56% for A-rated bonds, 71% for BBB-rated bonds and 83% for BB-rated bonds. This shows that there is substantial presence of both default and non-default components in corporate spreads.

The most important result for this work is from the work of Asvanunt et al. [2017] in which it has been shown, from empirical considerations, that a simple difference between corporate bond and government bond returns will “over-hedge” the interest exposure for computing credit excess returns. This is based on the observation that long-term corporate bonds have a shorter cash flow maturity profile than long-term government bonds, as indicated by a lower interest rate duration. Making the correction by including duration results in a modified formula for credit risk premium which is not only higher but also has a different dependence on the time to maturity of the bond.

Methodology

In this work I calculate mathematically the expected return of corporate bond both with real-world probability and the risk-neutral probability. I also calculate the duration of the bond, and the duration-adjusted credit risk premium (CRP).

I carry out this calculation, for reasonable values of parameters, for the structural models for corporate bonds given by Merton [1974], Merton [1976], Black and Cox [1976], and Longstaff and Schwartz [1995]. I also consider callable and convertible bonds for which there is no expression for price is available in closed form. For these, I carry out the calculation in the framework of the binomial model and constant interest rate.

Results

The result, which is a plot of the credit spread and credit risk premium with time to maturity of the corporate bond confirms the results obtained by Beliaeva et al. [2018]. However, for the structural models which use stochastic interest rates the result shows that while the conclusion of Beliaeva et al. [2018] is right at a high level, the details such as exact variation of the CRP is different. It also opens the

research question of whether the duration-adjusted credit risk premium, which is the correct one, is non-monotonic with yield spread for bonds only within a risk class or across risk classes.

Conclusion and Discussion

The results establish the inadequacy of yield-to-maturity as a measure of return. It also establishes that while comparing the returns of corporate bonds and risk-free bonds it is essential to take into account duration of the bonds. Furthermore, this work contributes to the area on which more research is needed which was initiated in the work of Asvanunt et al. [2017].

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