

Bond prices in a debt priority structure with absolute priority rule deviation

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Abstract

We study the value of senior and junior bonds with random default and absolute priority rule violation and propose a simple approach to value risky bonds with varying parameters for the violation. Recognizing the sources of violation from equity contribution and value loss from challenges by junior bonds, we specify sharing rules among various claimants to the firm value and obtain the credit spreads of both senior and junior bonds from simulation. We find that the impact of one parameter on credit spreads depends on other parameters and those other parameters have to be considered simultaneously to price corporate bonds.

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1. Introduction

Research in valuing corporate bonds with default risk has been fruitful. However, there are few papers devoted to valuation of debt within a priority structure. Once the priority structure is introduced, issues arise as to the recovery amounts of various claims in that structure and the modeling of violations of the absolute priority rule (APR) become paramount. In an effort to improve modeling random default, Riddiough and Thompson (1996) suggest a Poisson process for the timing of a credit event, where the parameter of a Poisson process depends on the

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financial strength of a firm. We extend their approach and apply it to a firm with a simple priority structure—the senior and junior debt.

We model the probability of the credit event using Merton's (1974) quasi-debt-to-firm market value as the representative measure of the firm's financial strength following Riddiough and Thompson. Thus, the formulation is neither structural with default modeled as an endogenous event as pioneered by Merton (1974) nor is it one where the event is a surprise as modeled by Duffie and Singleton (1999). As the quasi-debt-to-market value ratio increases the probability of default increases. As the ratio falls the probability decreases. Our approach captures both the firm's "rational" and somewhat predictable reason for, and the specific timing uncertainty in, exercising the default option.

Our extension is to examine the impacts on the value of senior and junior debt in a complex capital structure of the Riddiough–Thompson study. We do this both for cases where APR is strictly followed and cases where it is violated. In examining both senior and junior debt we also depart from the traditional ways of treating recovery rates. The recovery rates are not fixed values or measured by probability density functions but depend on the value of the firm, which is assumed to follow an Ito process. The randomness of the recovery rate depends completely on the randomness of the value of the firm.

In the case of following strict APR we first assign the distribution of value to the senior debt according to its book value and then to junior debt if any distributable value remains. If value still remains after satisfying the junior debt it is then assigned to equity. Since default and filing for Chapter 11 reorganization can occur while the firm has value above and beyond the book value of its aggregate debt in our model, equity can receive value (and, in fact, has value¹) even when APR is not violated.

Dealing with violations of APR is more difficult to model because of the potential for various reasons on the part of the debtor and the creditors for allowing it. Anderson and Sundaresan (1996) model some of these reasons in a game theoretic framework. In their framework, liquidation costs play a significant role. These costs are one of the factors which cause debt holders to allow equity to recover some value at their expense. We recognize these costs in a way that junior creditors receive some value even before senior creditors fully recover their face value. Another factor that plays a role in violations of APR is the possibility that the firm will regain its profitability under existing management.² That possibility is recognized as a contribution from equity in our model and plays a central role in deviations from APR between debt and equity.

The possibility and even the probability of financial distress is certainly a factor in the debt issuance process. However, the many potential forms that violations of APR can take will always be difficult if not impossible to specify at that time. Therefore, for modeling purposes, it is reasonable to express the deviations from APR in a probabilistic sense. We do this by modifying the approach taken by Unal, Madan, and Guntay (2003). Their approach parameterizes the division between junior and senior debt as a function of the recovery rate to the entire debt.

However, we depart from the approach of Unal et al. We rather consider a sharing rule between two creditors and shareholders. With a proportional debt and contribution from equity as a proxy of bargaining power, we illustrate how to compute credit spreads of a senior and junior bond. The

¹ In Merton's (1974) and Leland's (1994) models the value of equity is necessarily zero and triggers bankruptcy. In Merton's model, the value of the firm falls below the book value of the debt triggering bankruptcy. In Leland's model, the firm must finance debt payments with equity issues and therefore bankruptcy is triggered when equity has zero value.

² Pre-packaged bankruptcies are consistent with both of these explanations.

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