On the Valuation and Analysis of Risky Debt:

A Theoretical Approach Using a Multivariate

Extension of the Merton Model

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Abstract

This paper is concerned with the valuation and analysis of default-risky debt instruments with arbitrary interest and principal payments. For the valuation, we use three nested multivariate extensions of the standard Merton (1974) model for pricing risky zero-coupon bonds. First, we present a valuation framework for pricing single risky debt instruments with arbitrary interest and principal payments. We then extend this framework to enable the valuation of multiple debt instruments issued by the same firm. Finally, we further extend the model to additionally take continuous dividend payments to the equity holders into account. Based on these debt valuation frameworks, we calculate various key figures for the analysis of risky debt from the point of view of risk-neutral and risk-averse investors (e.g., promised and expected yields, default probabilities, recovery rates, distance to default, and expected payments).

Keywords: risky debt valuation, Merton Model
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