A Reduced Form Approach for the Simultaneous Estimation of Hazard Term Structure and LGD using Rating and Financial Information

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Abstract

After the recognition of importance of credit risk measurement, lenders realized the necessity of the evaluation of various types of credit risk factors such as the hazard term structure, loss given default (LGD) on the credit exposure, default correlations, and fluctuation of exposure. In this paper, we propose a statistical method for the simultaneous estimation of the hazard term structure and the LGD on credit exposure from a cross-section of coupon bonds. These two credit risk factors are inferred adding the information on bond issuer's financial ratios, bond rating and date of maturity in the context of reduced form approach. We propose the term structure model of hazard rate using a smoothing spline with cubic B-spline bases. Then, we estimate the model parameter based on a maximum penalized likelihood approach and evaluate the goodness of fit from a Bayesian point of view.

Monte Carlo experiments are conducted to show the merits of a penalized likelihood approach. We also applied the proposed method to Japanese bond market data. This study finds that the proposed method provides meaningful findings to calculate the term structure of interest rates, hazard rates and the loss given default.

Key words: Bayes approach, B–splines, Hazard term structure, Maximum penalized likelihood method, Loss given default.

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