

# Measuring Credit Risk of Individual Corporate Bonds and Deriving Term Structures of Default Probabilities

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## Abstract

No doubt, the importance of empirical credit risk analysis has ever been increasing not only in financial industries but also in business and even in government under increasing world-wide uncertainties. In this paper, basing our arguments on the model of pricing government bonds (GBs) in Kariya et,al (2012) and using corporate bond (CB) prices as our data source on credit, we first propose a measure of credit risk price spread (CRPS) for each CB relative to a GB-equivalent CB price. To choose an empirically effective CRPS measure, we test a hypothesis of no attribute preference with respect to investors' behaviors forming prices in the market of GBs. The results strongly reject the hypothesis against maturity preference as well as coupon preference. Secondly using the CRPS measure, a specific agency credit rating is shown to be ineffective for making credit-homogeneous groups of corporate bonds, where industry category is also used. To get our credit-homogeneous grouping, the CRPS measure is standardized by adjusting the differences of maturities and a three-stage cluster analysis is applied to the observed standardized CRPSs for Japanese CBs to get 14 groups, where 1545 CB prices as of 2010.8 are included. Since the grouping by the cluster analysis is a posterior grouping which is based on stochastically realized CBs and GBs, we propose Fixed Interval Rating (FIR) Method based on the standardized CRPS, and form 10 credit homogeneous groups. Thirdly, we derive the term structures of default probabilities (TSDPs) for some cluster groups and FIR groups and some individual firms via Kariya (2012) model, where industry factor is also considered. Naturally the TSDPs reflect the investors' future perspective on defaults of individual firms or groups.

10-year TSDPs of Tokyo Electric Power Co over 2006.9-2010.8

