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A Limit Distribution of Credit Portfolio Losses with Low Default Probabilities

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Abstract

This paper employs a multivariate extreme value theory (EVT) approach to study the limit distribution of the loss of a general credit portfolio with low default probabilities. A latent variable model is employed to quantify the credit portfolio loss, where both heavy tails and tail dependence of the latent variables are realized via a multivariate regular variation (MRV) structure. An approximation formula to implement our main result numerically is obtained. Intensive simulation experiments are conducted, showing that this approximation formula is accurate for relatively small default probabilities, and that our approach is superior to a copula-based approach in reducing model risk.

JEL classification: G210; G320

Keywords: Credit portfolio loss; Extreme risk; Limit distribution; Loss given default; Model risk; Multivariate regular variation; Tail dependence

1 Introduction

Credit risk management, although long residing in the finance literature, has attracted much research attention in the insurance/actuarial community; some recent papers include Vandendorpe et al. (2008), Donnelly and Embrechts (2010), Tang and Yuan (2013), Bernardi et

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