

Measures of Portfolio Credit Risk by Applying Asymptotic Single-risk Factor Model

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The Asymptotic Single-Risk Factor (ASRF) model underpins the capital calculations of the internal ratings-based (IRB) approaches of the Basel II framework (Basel Committee on Banking Supervision 2005). It turned out that portfolio invariance of the ASRF model is a property with strong influence on its application on credit portfolio models. The ASRF models are derived from ordinary credit portfolio models by the law of large numbers and known to be portfolio invariant. When a portfolio consists of a large number of relatively small exposures, idiosyncratic risks associated with individual exposures tend to cancel out one-another and only systematic risks that affect many exposures have a material effect on portfolio losses. In the ASRF model, all systematic risks, which affect all borrowers to a certain degree, are modeled with only one systematic risk factor. In this paper, we describe the modeling framework of the ASRF model and carry out an implementation of the ASRF model by means of a standard programming tool, namely the Microsoft Visual Basic for Applications, for measuring the portfolio credit risk of a sample portfolio.

Keywords: probability of default, loss given default, credit Value-at-Risk, expected shortfall, internal ratings-based approach, multi-state model