Risk Factor Contributions in Portfolio Credit Risk Models

Dan Rosen
David Saunders

"Risk factor contributions in portfolio credit risk models," Dan Rosen and David Saunders, *Journal of Banking & Finance*, Volume 34, Issue 2, February 2010, Pages 336-349.
See *http://www.sciencedirect.com/science/journal/03784266*.

Abstract

Determining contributions to overall portfolio risk is an important topic in financial risk management. At the level of positions (instruments and subportfolios), this problem has been well studied, and a significant theory has been built, in particular around the calculation of marginal contributions. We consider the problem of determining the contributions to portfolio risk of risk factors, rather than positions. This problem cannot be addressed through an immediate extension of the techniques employed for position contributions, since, in general, the portfolio loss is not a linear function of the risk factors. We employ the Hoeffding decomposition of the loss random variable into a sum of terms depending on the factors. This decomposition restores linearity, at the cost of including terms that arise from the joint effect of more than one factor. The resulting cross-factor terms provide useful information to risk managers, since the terms in the Hoeffding decomposition can be viewed as best quadratic hedges of the portfolio loss involving instruments of increasing complexity. We illustrate the technique on multi-factor models of portfolio credit risk, where systematic factors may represent different industries, geographical sectors, etc.

First version April 23, 2008. Previous title: Risk Contributions of Systematic Factors in Portfolio Credit Risk Models. Thanks to Dirk Tasche for helpful comments. D. Saunders is partially supported by an NSERC Discovery Grant. The authors are grateful to Fitch Solutions for financial support and data provided for this research.

Dan Rosen, Fields Institute for Research in Mathematical Sciences and R2 Financial Technologies, *drosen@_elds.utoronto.ca*

David Saunders, Department of Statistics and Actuarial Science, University of Waterloo, *dsaunders@uwaterloo.ca*.