NONPARAMETRIC ESTIMATION OF EXPECTED SHORTFALL

by

Song Xi Chen
Department of Statistics, Iowa State University

This version: April 2004

ABSTRACT

The paper evaluates the properties of nonparametric estimators of the expected shortfall, an increasingly popular risk measure in financial risk management. It is found that the existing kernel estimator based on a single bandwidth does not offer variance reduction, which is surprising considering that kernel smoothing reduces the variance of estimators for the value at risk and the distribution function. We reformulate the kernel estimator such that two different bandwidths are employed in the kernel smoothing for the value at risk and the shortfall itself. We demonstrate by both theoretical analysis and simulation studies that the new kernel estimator achieves a variance reduction. The paper also covers the practical issues of bandwidth selection and standard error estimation.

Key Words: Kernel estimator; Risk Measures; Smoothing bandwidth; Value at Risk; Weak dependence.