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Li Zhu* (david8229@gmail.com), 1630 NE Valley Rd. X106, Pullman, WA 99163, and **Haijun Li**. *Sharp Bounds for Multivariate Coherent Risk Measures*.

A central topic in financial and insurance mathematics is the search for new methods to estimate accurately extreme risk (or tail risk) for multivariate financial portfolios. Empirical data show that tail risk is often fueled by extreme dependence among assets, but their quantitative relations are largely unknown. This research analyzes tail risk for multivariate financial portfolios in terms of extreme dependence, using tail conditional expectation (TCE). The vector-valued TCE, as a multivariate coherent risk measure, corresponds to a set of deterministic vectors which represent portfolios of extra capitals needed so that the resulting positions are acceptable to regulator/supervisor. While TCE is preferable than the popular risk measure Value-at-Risk, the vector-valued TCE lacks tractable expressions for statistical analysis. In this talk, we present tractable sharp lower and upper bounds for vector-valued TCEs, and discuss the asymptotic properties of these bounds using the theory of multivariate regular variation. Several simulation results for various multivariate distributions are also provided to illustrate our bounds and their monotonicity properties. Our results can be applied for accurate estimates and analysis of extremal risks in quantitative risk management. (Received September 20, 2010)