

基于变位置参数贝叶斯预测银行内部欺诈研究

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The Bayesian Inference Research on the Internal Fraud of Chinese Commercial Banks Based on Varying Location Parameter

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摘要 内部欺诈事件类型是中国商业银行最严重的操作风险类型。但由于操作风险本质特征和中国商业银行内部欺诈损失数据收集年度较短,数据匮乏,为了在小样本数据下进行更准确的度量,本文采用贝叶斯后验预测分布方法,其中,假设损失频率服从泊松-伽马分布,而损失强度服从广义帕累托-混合伽马分布,分析后验分布的形式。由于在广义帕累托分布的参数估计中,位置参数的确定对估计结果的影响很大,因此,本文采用变位置参数线性趋势的贝叶斯分析以增强参数预测稳定性,降低位置参数选择对结果产生的影响,获得中国商业银行内部欺诈损失频率和损失强度的后验预测分布和边际分布,进而采用蒙特卡罗模拟,联合损失频率分布和损失强度的预测分布获得内部欺诈的风险联合分布。与传统Poisson-GPD极值分析法相比,在险值和预期超额损失明显降低,有利于银行降低内部欺诈操作风险资本。利用贝叶斯分析获得的后验分布可以作为未来的先验分布,有利于在较小样本下获得较真实的参数估计。

关键词: 操作风险 内部欺诈 贝叶斯后验预测分布 广义帕累托分布 线性位置参数趋势

Abstract: Internal fraud is the most important loss type of Chinese commercial banks and has caused a lot of losses. Since the nature of operational risk, loss data is deficiency, in order to do more accurate and robust calculation with little data, this paper uses the Bayesian posterior forecasting distribution to calculate the parameters. Since the chosen of location parameter is important to the evaluation, we set the location varying with linear trend to get more robust parameters estimation. The loss frequency is Poisson distribution, and we set the prior Gamma distribution, while the loss severity is Generalized Pareto distribution, and we set the prior distribution mixture Gamma distribution, then we get the posterior predictive distributions of loss frequency and loss severity, with Monte Carlo simulation we get the combined distributions. Compared to the classical method of Poisson-GPD, The results are better and we get much stable parameters and much lower capital charge for internal fraud. And Bayesian analysis is helpful to calculate accurately the parameters with small sample.

收稿日期: 2011-03-14;

基金资助: 山东省自然科学基金高校、科研单位专项资助项目(ZR2010GL011); 国家自然科学基金资助项目(70701033)

引用本文:

高丽君, 丰吉闯. 基于变位置参数贝叶斯预测银行内部欺诈研究 [J]. 中国管理科学, 2012, V(2): 20-25


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