

Final Report for First Year Funding

Collaborative Research: Statistical Interference Based on
Jackknife Empirical Likelihood Methods

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Other Collaborators or Contacts

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Project Activities and Findings:

The main research activities have been related to jackknife empirical likelihood methods for copula, tail copula, ROC curves, Gini index, empirical likelihood method and bootstrap methods for endpoint estimation, reduce computation in profile empirical likelihood methods, goodness-of-fit tests via empirical likelihood methods. Our main findings are as follows.

- i) We propose jackknife empirical likelihood methods to construct the confidence intervals for a copula, a tail copula, and also derive the Wilks theorems. The new methods are easy to implement and have applications in risk management.
- ii) We propose a jackknife empirical likelihood method to do interval estimation for a ROC curve which plays an important role in diagnostic tests in medicine. The new method has a chi-squared limit and is easy to implement by using R packages.
- iii) Endpoint estimation has been important in the study of product efficiency. We investigate the bootstrap method and empirical likelihood method for conducting interval estimation. Simulation study shows that empirical likelihood method with calibration results in very accurate confidence intervals.
- iv) We propose empirical likelihood methods for Gini index and show the advantage via a simulation study. Then we apply the proposed method to a real data set in social science.
- v) We propose jackknife empirical likelihood method and approximate jackknife empirical likelihood method to reduce the computation in profile empirical likelihood method. We also apply the new methods to test diffusion models in finance.

- vi) We propose a novel way to conduct hypothesis tests by combining empirical likelihood method with estimating equations. This new method is easy to apply and has a good power.

Project Training and Development:

Some of these results have been applied to financial data sets and a data set in social science.

Research Training:

This grant supports the student Allen Hoffemyer.

Outreach Activities:

This grant supports the PI's travel to organize an invited session and present a talk in the 2011 WuXi international statistics conference.

Journal Publications:

1. D. Li, L. Peng and Y. Qi (2010). Empirical likelihood confidence intervals for the endpoint of a distribution function. *Test*. Accepted.
2. L. Peng and Y. Qi (2010). Smoothed jackknife empirical likelihood method for tail copulas. *Test* **19**, 514–536.
3. Yun Gong, Liang Peng and Yongcheng Qi (2010). Jackknife empirical likelihood method for ROC curve. *JMVA* **101**, 1520–1531.
4. Liang Peng (2010). Empirical likelihood methods for Gini index. *Australian and New Zealand Journal of Statistics*. Accepted.
5. M. Li, L. Peng and Y. Qi (2011). Reduce computation in profile empirical likelihood method. *Canadian Journal of Statistics*. Accepted.
6. L. Peng, Y. Qi and I. Van Keilegom (2011). Jackknife empirical likelihood method for copulas. *Test*. Accepted.
7. M. Li and L. Peng (2011). Empirical likelihood test via estimating equations. *Journal of Statistical Planning and Inference*. Accepted.

Contributions to Science and Technology Development:

The results have led to the following technical reports:

1. L. Peng (2011). Approximate jackknife empirical likelihood method for estimating equations. Technical report.
2. Z. Li and L. Peng (2011). Bootstrapping endpoint. *Sankya*. Under revision.