

How Good Are Studentized Statistics?

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School of Physical and Mathematical Sciences

Studentized statistics are commonly used in statistical inference since non-studentized statistics usually involve some unknown nuisance parameters. Suppose that a non-studentized and the studentized statistic have the same asymptotic limiting distribution. To use the limiting distribution in statistical inference, it is necessary to study the error of approximation. For a non-studentized statistic, one may adopt some limit theorems in probability to study the absolute error via Berry-Esseen type bounds or the relative error through a large deviation type result. It is well understood that moment conditions are necessary for these limit theorems. Many efforts have been put to obtain similar results for the studentized statistic under similar moment conditions. In this talk, we shall show that many studentized statistics preserve much better properties than the non-studentized statistics and that many limit theorems remain true for the studentized statistics under much weaker moment conditions than those necessary for the non-studentized statistics. For instance, a large deviation result holds for Student's t-statistic without any moment condition and an exceptional non-uniform Berry-Essen bound is achievable under finite third moments. Our focus will be on the Student t-statistic, Hotelling's T^2 statistic, the largest eigenvalue of sample correlation matrices and the Wald t-ratio statistic in unit root test. Some related topics will also be discussed.

Speaker Biography

Qi-Man Shao is a professor at Hong Kong University of Science and Technology. He is an associate editor of The Annals of Statistics and The Annals of Applied Probability. He has coauthored two books entitled "Monte Carlo Methods In Bayesian Computation" (Springer 2000) and "Self-normalized Processes: Theory and Statistical Applications" (Springer 2008), and published over 100 articles in probability and statistics. He is an elected fellow of the Institute of Mathematical Statistics.

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