

# ACMS Statistics Seminar

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**Tues, April 18, 2017**  
**154 Hurley Hall**  
**4:00 – 5:00 PM**



## **Empirically Corrected Test Statistics for Structural Equation Modeling with Large $p$ and Small $N$**

Survey data typically contain many variables. Structural equation modeling (SEM) is commonly used in analyzing such data. The most widely used statistic for evaluating the adequacy of a SEM model is the likelihood ratio statistic  $T_{ml}$  and a rescaled statistic  $Tr_{ml}$ . When the number of observations ( $N$ ) is large and the number of items or variables ( $p$ ) is small, these two statistics perform reasonably well for normally distributed data or with certain violation to normality. However, in practice,  $p$  can be rather large while  $N$  is always limited due to not having enough participants. Even with normally distributed data and relatively large  $N$ , empirical results show that  $T_{ml}$  and  $Tr_{ml}$  rejected the correct model close to 100% when  $p$  is relatively large. Better statistics are needed for SEM with large  $p$  and/or small  $N$ . Parallel to Bartlett correction, we propose an empirical approach to correct  $T_{ml}$  and  $Tr_{ml}$  so that the mean of the resulting statistics approximately equals the degrees of freedom of the nominal chi-square distribution. Results show that empirically corrected statistics follow the nominal chi-square distribution much more closely than previously proposed corrections to  $T_{ml}$  and  $Tr_{ml}$ , and they control type I errors reasonably well whenever  $N$  is greater than 50 or  $2p$ .

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