



Contribution ID: 25

Type: **not specified**

How should we teach (frequentist) statistics? Coverage and interval estimation

Tuesday, June 28, 2022 5:55 PM (20 minutes)

The use of “Null hypothesis significance testing” and p -values in empirical work has come in for widespread criticism from many directions in recent years. Nearly all this commentary has, understandably, focused on research practice, and less attention has been devoted to how we should teach econometrics (my home discipline) and applied statistics generally. I suggest that it is possible to teach students how to practice frequentist statistics sensibly if the core concepts they are taught at the start are coverage and interval estimation. Teaching interval estimation rather than point estimation as the main objective automatically emphasises uncertainty. The key concept of coverage can be taught by analogy with the well-known children’s game Pin-the-Tail-on-the-Donkey. In “Pin-the-Ring-on-the-Donkey”, the point estimator of the donkey’s tail is replaced by a ring, and coverage probability is the probability that the ring will contain the correct location for the donkey’s tail. The simplest version of the game is analogous to a prediction interval in a time-series setting, where taking off the blindfold and seeing if the tail is in the ring to corresponds to waiting a period to see if the realised outcome lies in the interval. The “Mystery-Pin-the-Ring-on-the-Donkey” version of the game is analogous to a confidence interval for a parameter: when we play the game, the image of donkey is removed before we take off the blindfold, so we never find out if we won. The analogy can also be used to illustrate the difference between CIs and realised CIs and other subtleties.

Keywords

statistics; coverage; intervals

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