SENSITIVITY TESTING FOR NON-IDENTIFIABLE MODELS, WITH APPLICATION TO LONGITUDINAL DATA WITH NON-INFORMATIVE DROPOUT

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I consider the problem of evaluating a statistical hypothesis when some model characteristics are non-identifiable from observed data. Such scenario is common in meta-analysis for assessing publication bias and in longitudinal studies for evaluating a covariate effect when dropouts are likely to be informative. One possible approach to this problem is to fix a minimal set of sensitivity parameters conditional upon which hypothesized parameters are identifiable. I discuss existing approaches to inference derived by assessing the sensitivity of parameter estimates to the sensitivity parameter. I propose to formally evaluate the hypothesis of interest using an infimum statistic over the whole support of the sensitivity parameter, along with the associated inferential challenges. I characterize the limiting distribution of the statistic as a process in the sensitivity parameter, which involves a careful theoretical analysis of its behavior under model misspecification. In practice, I suggest a nonparametric bootstrap procedure to implement this infimum test as well as to construct confidence bands for simultaneous pointwise tests across all values of the sensitivity parameter, adjusting for multiple testing. The methodology's practical utility is illustrated in an analysis of a longitudinal psychiatric study.