

Challenges for Imputing Missing Covariates in Meta-Regression

A common issue in meta-regression is that for some effects, certain covariates may not be collected or reported. Precisely how to handle this issue depends on the reason that covariates are missing from the data. If they are missing at random, one potential solution is multiple imputation (MI), where several different plausible values are imputed for the covariates that are missing. While MI methods and software have found wide use in other fields, methodological work suggests that great care should be taken with how imputations are generated, since generating imputations based on inaccurate or inappropriate models can lead to inaccurate inferences. This presents something of a problem for meta-regression, since the type of data and resulting models encountered in meta-regression is somewhat unique. For example, much of the existing MI theory and software focuses on basic linear regression models, however the variance structure in a meta-regression is considerably more complex than those models. Thus, it stands to reason that the models for generating imputations in a meta-regression would differ from those in a standard linear regression. Unfortunately, there is scant literature on the proper way to do generate imputations for a meta-regression, and few (if any) software offer any implementation or guidance. In this paper, I highlight how the factors that can affect imputation accuracy for meta-regression, and show that ignoring those factors can lead to inaccurate estimation of meta-regression models. I then discuss potential corrections using iterative conditional specifications of the imputation models.