Statistica Sinica: Preprint
doi:10.5705/ss.202016.0546

We consider inference for the parameters of a linear model when the covariates are random and the relationship between response and covariates is possibly non-linear. Conventional inference methods such as z intervals perform poorly in these cases. We propose a double bootstrap-based calibrated percentile method, perc-cal, as a general-purpose CI method which performs very well relative to alternative methods in challenging situations such as these. The superior performance of perc-cal is demonstrated by a thorough, full factorial design synthetic data study as well as a real data example involving the length of criminal sentences. We also provide theoretical justification for the perc-cal method under mild conditions. The method is implemented in the R package `perccal', available through CRAN and coded primarily in C++, to make it easier for practitioners to use.