Wild Bootstrap Simulation Result

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Technique Details of Wild bootstrap algorithm.

a) choice of distributions used to perturb the residuals,

Both two-point distribution (Rademacher distribution) and six-point distribution (from Webb's Reworking Wild Bootstrap Based Inference for Clustered Errors) are implemented in function roub_Wild().

b) form of correction to the residuals.

MBB adjustment matrix from Professor Tipton's paper: Small Sample Adjustment for Robust Variance Estimation With Meta-Rgression.

This is the default of robumeta package.

c) what version of RVE to use in calculating the test statistic.

t-test with small sample correction on both v-cov matrices and degrees of freedom.

d) whether to use residuals based on a restricted model or from the full model.

Restricted model.

I used full model at first, but it does not perform very well. It tends to over-reject when null hypothesis is true.

Single covariate model with different degrees of freedom (corrected).

The single covariate in the model is a categorical variable. It's distribution is changed to get different degrees of freedom values.

Number of groups m = 20

Number of SMDs in each group k = 5

Pre-group sample size n = 30

Correction of outcomes r = .5

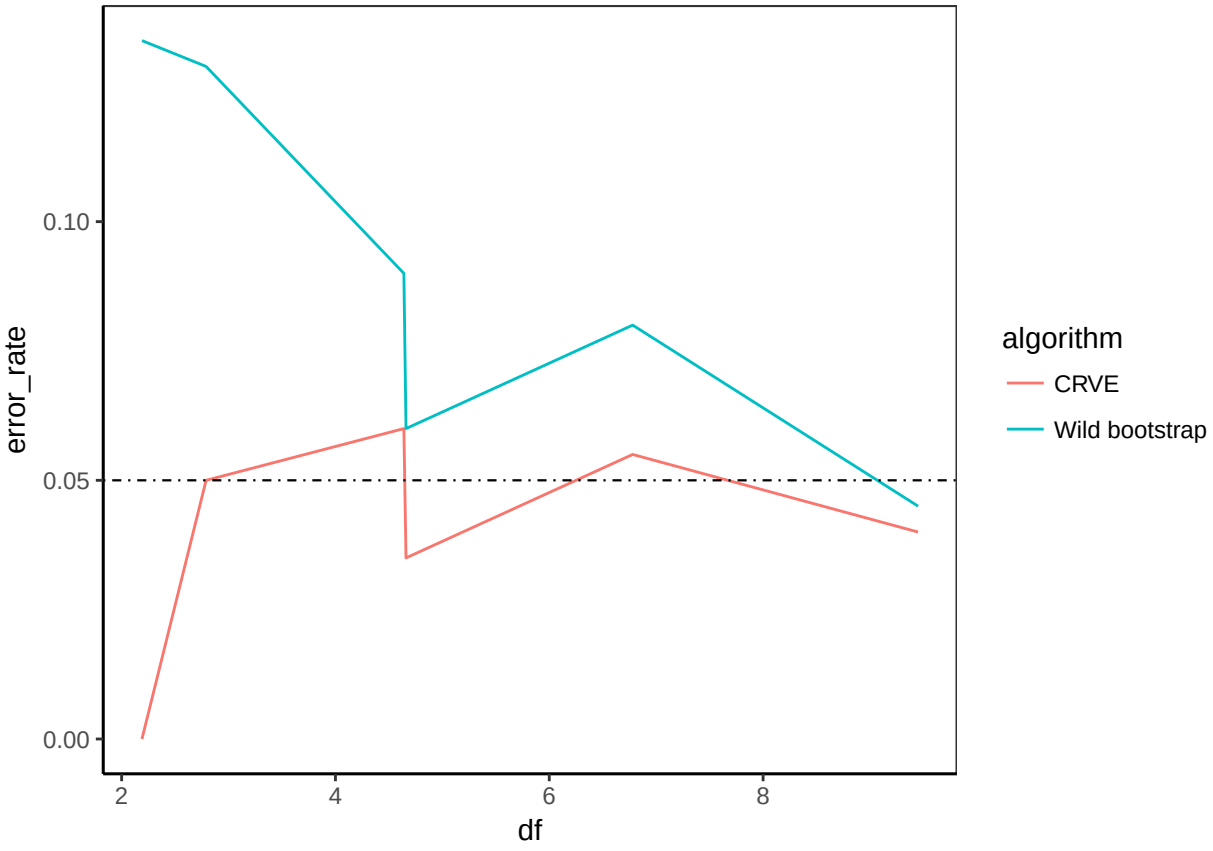
Isq = 1/3

Number of replications of each bootstrap procedure: 1000.

Number of simulation datasets: 200. (This decides the precision of error rate calculation. Maximum precision is 1/200 = 0.005)

two-point distribution

	df =2.19	2.79	4.64	4.66	6.78	9.45
Wild Bootstrap Error Rate	0.135	0.13	0.09	0.06	0.08	0.045
CRVE (fixed weights) Error Rate	0	0.05	0.06	0.035	0.055	0.04



six-point distribution

	df =1.25	2.72	4.61	4.7	NA	NA
Wild Bootstrap Error Rate	0.13	0.09	0.06	0.065	NA	NA
CRVE (fixed weights) Error Rate	0	0.03	0.035	0.04	NA	NA

Single covariate model with different covariate type

X1a: 0,1 categorical variable. unbalanced

X2a: 0,1 categorical variable. balanced

X3a: numeric variable, balanced

X4a: numeric variable, balanced

X5.10: numeric variable, skewed

Number of SMDs in each group k = 10

Number of simulation datasets: 80. (This decides the precision of error rate calculation. Maximum precision is 1/80 = 0.0125)

Other parameters are identical to the previous section.

Without small sample correction + fixed weights

(df = 18, uncorrected)

	X1a	X2a	X3a	X4a	X5.10
Wild Bootstrap Error Rate	0.125	0.05	0.025	0.0625	0.1875
CRVE (fixed weights) Error Rate	0.15	0.0375	0.0375	0.05	0.175

With small sample correction + fixed weights

	X1a(df = 2.77)	X2a(13.7)	X3a(9.41)	X4a(16.6)	X5.10(2.42)
Wild Bootstrap Error Rate	0.1	0.0375	0.0125	0.05	0.2
CRVE (fixed weights) Error Rate	0.0375	0.0375	0.0125	0.05	0.0125

With small sample correction + "CORR" weights

	X1a (df = 2.75)	X2a(13.5)	X3a(9.5)	X4a(16.5)	X5.10(2.44)
Wild Bootstrap Error Rate	0.1	0.0375	0.025	0.0625	0.2
CRVE (CORR weights) Error Rate	0.0375	0.0375	0.0125	0.05	0.0125