betaMC: Staging

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Staging...

References

R Core Team. (2022). *R: A language and environment for statistical computing*. R Foundation for Statistical Computing. Vienna, Austria. https://www.R-project.org/

1 Standardized Slopes

```
df <- nas1982
object <- lm(QUALITY ~ NARTIC + PCTGRT + PCTSUPP, data = df)
mvn <- BetaMC(object, type = "mvn")
adf <- BetaMC(object, type = "adf")
hc3 <- BetaMC(object, type = "hc3")
summary(mvn)

#> Call:
#> BetaMC(object = object, type = "mvn")
#>
#> Standardized regression slopes
#> type = "mvn"
#>            est     se     R  0.05%   0.5%   2.5%  97.5%  99.5% 99.95%
#> NARTIC  0.4951 0.0756 20000 0.2374 0.2912 0.3379 0.6332 0.6771 0.7274
#> PCTGRT  0.3915 0.0766 20000 0.1406 0.1955 0.2387 0.5379 0.5859 0.6431
#> PCTSUPP 0.2632 0.0744 20000 0.0217 0.0723 0.1186 0.4092 0.4596 0.5121

summary(adf)

#> Call:
#> BetaMC(object = object, type = "adf")
#>
#> Standardized regression slopes
#> type = "adf"
#>            est     se     R   0.05%   0.5%   2.5%  97.5%  99.5% 99.95%
#> NARTIC  0.4951 0.0683 20000  0.2487 0.3095 0.3518 0.6170 0.6571 0.6977
```

```
#> PCTGRT  0.3915 0.0708 20000  0.1273 0.1932 0.2426 0.5212 0.5657 0.6117
#> PCTSUPP 0.2632 0.0773 20000 -0.0141 0.0527 0.1052 0.4098 0.4549 0.5234

summary(hc3)

#> Call:
#> BetaMC(object = object, type = "hc3")
#>
#> Standardized regression slopes
#> type = "hc3"
#>            est     se     R   0.05%   0.5%   2.5%  97.5%  99.5% 99.95%
#> NARTIC  0.4951 0.0807 20000  0.1588 0.2590 0.3184 0.6327 0.6777 0.7193
#> PCTGRT  0.3915 0.0817 20000  0.0930 0.1644 0.2203 0.5396 0.5877 0.6431
#> PCTSUPP 0.2632 0.0865 20000 -0.0414 0.0325 0.0852 0.4267 0.4799 0.5317

coef(mvn)

#>    NARTIC    PCTGRT   PCTSUPP
#> 0.4951451 0.3914887 0.2632477

coef(adf)

#>    NARTIC    PCTGRT   PCTSUPP
#> 0.4951451 0.3914887 0.2632477

coef(hc3)

#>    NARTIC    PCTGRT   PCTSUPP
#> 0.4951451 0.3914887 0.2632477

vcov(mvn)

#>               NARTIC       PCTGRT      PCTSUPP
#> NARTIC   0.005721991 -0.003258840 -0.002174588
#> PCTGRT  -0.003258840  0.005863111 -0.001686572
#> PCTSUPP -0.002174588 -0.001686572  0.005539462

vcov(adf)

#>               NARTIC       PCTGRT      PCTSUPP
#> NARTIC   0.004658223 -0.002543718 -0.001726625
#> PCTGRT  -0.002543718  0.005019087 -0.001850859
#> PCTSUPP -0.001726625 -0.001850859  0.005981650

vcov(hc3)

#>               NARTIC       PCTGRT      PCTSUPP
#> NARTIC   0.006512147 -0.003533191 -0.001980817
#> PCTGRT  -0.003533191  0.006681111 -0.002383179
#> PCTSUPP -0.001980817 -0.002383179  0.007484112
```

```
confint(mvn)

#>              2.5%     97.5%
#> NARTIC  0.3379451 0.6331824
#> PCTGRT  0.2386895 0.5378764
#> PCTSUPP 0.1185726 0.4092395

confint(adf)

#>              2.5%     97.5%
#> NARTIC  0.3518447 0.6170385
#> PCTGRT  0.2426426 0.5212011
#> PCTSUPP 0.1051597 0.4098068

confint(hc3)

#>               2.5%     97.5%
#> NARTIC  0.31839345 0.6326590
#> PCTGRT  0.22025257 0.5395537
#> PCTSUPP 0.08519573 0.4267479
```

2 Multiple Correlation

```
df <- nas1982
object <- lm(QUALITY ~ NARTIC + PCTGRT + PCTSUPP, data = df)
std_mvn <- BetaMC(object, type = "mvn")
std_adf <- BetaMC(object, type = "adf")
std_hc3 <- BetaMC(object, type = "hc3")
mvn <- RSqBetaMC(std_mvn)
adf <- RSqBetaMC(std_adf)
hc3 <- RSqBetaMC(std_hc3)
summary(mvn)

#> Multiple correlation
#> type = "mvn"
#>        est     se     R  0.05%   0.5%   2.5%  97.5%  99.5% 99.95%
#> rsq 0.8045 0.0566 20000 0.5174 0.5990 0.6574 0.8820 0.9040 0.9284
#> adj 0.7906 0.0607 20000 0.4829 0.5703 0.6329 0.8736 0.8972 0.9233

summary(adf)

#> Multiple correlation
#> type = "adf"
#>        est    se     R  0.05%   0.5%   2.5%  97.5%  99.5% 99.95%
#> rsq 0.8045 0.055 20000 0.5500 0.6136 0.6663 0.8810 0.9023 0.9273
#> adj 0.7906 0.059 20000 0.5179 0.5860 0.6424 0.8725 0.8953 0.9221
```

```
summary(hc3)

#> Multiple correlation
#> type = "hc3"
#>        est     se     R  0.05%   0.5%   2.5%  97.5%  99.5% 99.95%
#> rsq 0.8045 0.0627 20000 0.4602 0.5799 0.6439 0.8872 0.9099 0.9330
#> adj 0.7906 0.0672 20000 0.4216 0.5499 0.6184 0.8792 0.9035 0.9282

coef(mvn)

#>       rsq       adj
#> 0.8045263 0.7905638

coef(adf)

#>       rsq       adj
#> 0.8045263 0.7905638

coef(hc3)

#>       rsq       adj
#> 0.8045263 0.7905638

vcov(mvn)

#>             rsq         adj
#> rsq 0.003206279 0.003435298
#> adj 0.003435298 0.003680677

vcov(adf)

#>             rsq         adj
#> rsq 0.003030345 0.003246798
#> adj 0.003246798 0.003478713

vcov(hc3)

#>             rsq         adj
#> rsq 0.003928429 0.004209031
#> adj 0.004209031 0.004509676

confint(mvn)

#>          2.5%     97.5%
#> rsq 0.6573811 0.8819935
#> adj 0.6329083 0.8735645

confint(adf)
```

```
#>          2.5%     97.5%
#> rsq 0.6662518 0.8810118
#> adj 0.6424126 0.8725126

confint(hc3)

#>          2.5%     97.5%
#> rsq 0.6438731 0.8872279
#> adj 0.6184354 0.8791728
```

3 Differences of Standardized Slopes

```
df <- nas1982
object <- lm(QUALITY ~ NARTIC + PCTGRT + PCTSUPP, data = df)
std_mvn <- BetaMC(object, type = "mvn")
std_adf <- BetaMC(object, type = "adf")
std_hc3 <- BetaMC(object, type = "hc3")
mvn <- DiffBetaMC(std_mvn)
adf <- DiffBetaMC(std_adf)
hc3 <- DiffBetaMC(std_hc3)
summary(mvn)

#> Difference between standardized regression coefficients
#> type = "mvn"
#>                    est     se     R   0.05%    0.5%    2.5%  97.5%  99.5% 99.95%
#> NARTIC-PCTGRT  0.1037 0.1355 20000 -0.3565 -0.2467 -0.1692 0.3635 0.4471 0.5316
#> NARTIC-PCTSUPP 0.2319 0.1242 20000 -0.1976 -0.1019 -0.0205 0.4665 0.5328 0.6190
#> PCTGRT-PCTSUPP 0.1282 0.1217 20000 -0.2760 -0.1835 -0.1140 0.3641 0.4321 0.5118

summary(adf)

#> Difference between standardized regression coefficients
#> type = "adf"
#>                    est     se     R   0.05%    0.5%    2.5%  97.5%  99.5% 99.95%
#> NARTIC-PCTGRT  0.1037 0.1216 20000 -0.2965 -0.2049 -0.1315 0.3388 0.4224 0.4952
#> NARTIC-PCTSUPP 0.2319 0.1171 20000 -0.1540 -0.0683 -0.0004 0.4591 0.5337 0.6139
#> PCTGRT-PCTSUPP 0.1282 0.1200 20000 -0.2761 -0.1825 -0.1096 0.3588 0.4264 0.5056

summary(hc3)

#> Difference between standardized regression coefficients
#> type = "hc3"
#>                    est    se     R   0.05%    0.5%    2.5%  97.5%  99.5% 99.95%
#> NARTIC-PCTGRT  0.1037 0.142 20000 -0.3518 -0.2618 -0.1790 0.3796 0.4664 0.5502
#> NARTIC-PCTSUPP 0.2319 0.133 20000 -0.2408 -0.1254 -0.0397 0.4785 0.5625 0.6556
#> PCTGRT-PCTSUPP 0.1282 0.137 20000 -0.3314 -0.2370 -0.1455 0.3884 0.4657 0.5501
```

```
coef(mvn)

#>  NARTIC-PCTGRT NARTIC-PCTSUPP PCTGRT-PCTSUPP
#>      0.1036564      0.2318974      0.1282410

coef(adf)

#>  NARTIC-PCTGRT NARTIC-PCTSUPP PCTGRT-PCTSUPP
#>      0.1036564      0.2318974      0.1282410

coef(hc3)

#>  NARTIC-PCTGRT NARTIC-PCTSUPP PCTGRT-PCTSUPP
#>      0.1036564      0.2318974      0.1282410

vcov(mvn)

#>                NARTIC-PCTGRT NARTIC-PCTSUPP PCTGRT-PCTSUPP
#> NARTIC-PCTGRT    0.018366155    0.009488876   -0.008877280
#> NARTIC-PCTSUPP   0.009488876    0.015419359    0.005930483
#> PCTGRT-PCTSUPP  -0.008877280    0.005930483    0.014807762

vcov(adf)

#>                NARTIC-PCTGRT NARTIC-PCTSUPP PCTGRT-PCTSUPP
#> NARTIC-PCTGRT    0.014778985    0.007051926   -0.007727059
#> NARTIC-PCTSUPP   0.007051926    0.013715615    0.006663689
#> PCTGRT-PCTSUPP  -0.007727059    0.006663689    0.014390748

vcov(hc3)

#>                NARTIC-PCTGRT NARTIC-PCTSUPP PCTGRT-PCTSUPP
#> NARTIC-PCTGRT    0.020175690    0.009548035   -0.010627655
#> NARTIC-PCTSUPP   0.009548035    0.017695864    0.008147829
#> PCTGRT-PCTSUPP  -0.010627655    0.008147829    0.018775484

confint(mvn)

#>                        2.5%     97.5%
#> NARTIC-PCTGRT  -0.16923127 0.3634683
#> NARTIC-PCTSUPP -0.02046257 0.4664633
#> PCTGRT-PCTSUPP -0.11400331 0.3640609

confint(adf)

#>                          2.5%     97.5%
#> NARTIC-PCTGRT  -0.1315315191 0.3388444
#> NARTIC-PCTSUPP -0.0004386233 0.4591069
#> PCTGRT-PCTSUPP -0.1096437605 0.3587911
```

```r
confint(hc3)

#>                          2.5%     97.5%
#> NARTIC-PCTGRT  -0.17903056 0.3796273
#> NARTIC-PCTSUPP -0.03965774 0.4785250
#> PCTGRT-PCTSUPP -0.14551066 0.3884464
```