betaMC: Internal Tests

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Tests

```
#> test-betaMC-beta-mc-est-mi
#> Call:
#> BetaMC(object = mc)
#>
#> Standardized regression slopes
#> type = "mvn"
#>            est     se R  0.05%   0.5%   2.5%  97.5%  99.5% 99.95%
#> NARTIC  0.4951 0.0701 5 0.3652 0.3657 0.3678 0.5235 0.5250 0.5254
#> PCTGRT  0.3915 0.0558 5 0.3502 0.3517 0.3585 0.4947 0.4976 0.4982
#> PCTSUPP 0.2632 0.0931 5 0.1234 0.1247 0.1305 0.3566 0.3630 0.3645
#> Call:
#> BetaMC(object = mc)
#>
#> Standardized regression slopes
#> type = "mvn"
#> Test passed
#> Call:
#> BetaMC(object = mc)
#>
#> Standardized regression slopes
#> type = "mvn"
#>          est     se R  0.05%   0.5%   2.5%  97.5%  99.5% 99.95%
#> NARTIC 0.7622 0.0402 5 0.7083 0.7085 0.7093 0.8037 0.8092 0.8105
#> Call:
#> BetaMC(object = mc)
#>
#> Standardized regression slopes
#> type = "mvn"

#> test-betaMC-beta-mc-est

#> Call:
#> BetaMC(object = mc)
#>
#> Standardized regression slopes
```

```
#> type = "mvn"
#>          est     se R  0.05%   0.5%   2.5%  97.5%  99.5% 99.95%
#> NARTIC  0.4951 0.0701 5 0.3652 0.3657 0.3678 0.5235 0.5250 0.5254
#> PCTGRT  0.3915 0.0558 5 0.3502 0.3517 0.3585 0.4947 0.4976 0.4982
#> PCTSUPP 0.2632 0.0931 5 0.1234 0.1247 0.1305 0.3566 0.3630 0.3645
#> Call:
#> BetaMC(object = mc)
#>
#> Standardized regression slopes
#> type = "mvn"
#> Test passed
#> Call:
#> BetaMC(object = mc)
#>
#> Standardized regression slopes
#> type = "mvn"
#>          est     se R  0.05%   0.5%   2.5%  97.5%  99.5% 99.95%
#> NARTIC 0.7622 0.0402 5 0.7083 0.7085 0.7093 0.8037 0.8092 0.8105
#> Call:
#> BetaMC(object = mc)
#>
#> Standardized regression slopes
#> type = "mvn"
```

#> *test-betaMC-delta-r-sq-mc-est-mi*

```
#> Call:
#> DeltaRSqMC(object = mc)
#>
#> Improvement in R-squared
#> type = "mvn"
#>          est     se R  0.05%   0.5%   2.5%  97.5%  99.5% 99.95%
#> NARTIC  0.1859 0.0584 5 0.0450 0.0460 0.0505 0.1960 0.2004 0.2014
#> PCTGRT  0.1177 0.0355 5 0.0870 0.0879 0.0916 0.1754 0.1758 0.1759
#> PCTSUPP 0.0569 0.0440 5 0.0106 0.0107 0.0113 0.1125 0.1185 0.1199
#> Call:
#> DeltaRSqMC(object = mc)
#>
#> Improvement in R-squared
#> type = "mvn"
#> Test passed
#> Test passed
```

#> *test-betaMC-delta-r-sq-mc-est*

```
#> Call:
#> DeltaRSqMC(object = mc)
```

```
#>
#> Improvement in R-squared
#> type = "mvn"
#>            est     se R  0.05%   0.5%   2.5%  97.5%  99.5% 99.95%
#> NARTIC  0.1859 0.0584 5 0.0450 0.0460 0.0505 0.1960 0.2004 0.2014
#> PCTGRT  0.1177 0.0355 5 0.0870 0.0879 0.0916 0.1754 0.1758 0.1759
#> PCTSUPP 0.0569 0.0440 5 0.0106 0.0107 0.0113 0.1125 0.1185 0.1199
#> Call:
#> DeltaRSqMC(object = mc)
#>
#> Improvement in R-squared
#> type = "mvn"
#> Test passed
#> Test passed

#> test-betaMC-diff-beta-mc-est-mi

#> Call:
#> DiffBetaMC(object = mc)
#>
#> Differences of standardized regression slopes
#> type = "mvn"
#>                   est     se R    0.05%    0.5%    2.5%  97.5%  99.5% 99.95%
#> NARTIC-PCTGRT  0.1037 0.1073 5 -0.1330 -0.1319 -0.1269 0.1136 0.1157 0.1161
#> NARTIC-PCTSUPP 0.2319 0.1332 5  0.1016  0.1017  0.1021 0.3930 0.4003 0.4020
#> PCTGRT-PCTSUPP 0.1282 0.1350 5 -0.0142 -0.0107  0.0046 0.3101 0.3110 0.3112
#> Call:
#> DiffBetaMC(object = mc)
#>
#> Differences of standardized regression slopes
#> type = "mvn"
#> Test passed
#> Test passed

#> test-betaMC-diff-beta-mc-est

#> Call:
#> DiffBetaMC(object = mc)
#>
#> Differences of standardized regression slopes
#> type = "mvn"
#>                   est     se R    0.05%    0.5%    2.5%  97.5%  99.5% 99.95%
#> NARTIC-PCTGRT  0.1037 0.1073 5 -0.1330 -0.1319 -0.1269 0.1136 0.1157 0.1161
#> NARTIC-PCTSUPP 0.2319 0.1332 5  0.1016  0.1017  0.1021 0.3930 0.4003 0.4020
#> PCTGRT-PCTSUPP 0.1282 0.1350 5 -0.0142 -0.0107  0.0046 0.3101 0.3110 0.3112
#> Call:
#> DiffBetaMC(object = mc)
```

```
#> 
#> Differences of standardized regression slopes
#> type = "mvn"
#> Test passed
#> Test passed

#> test-betaMC-mc-fixed-x-mi

#> MCMI(object = object, mi = mi, R = R, type = "mvn", fixed_x = TRUE)
#> MCMI(object = object, mi = mi, R = R, type = "adf", fixed_x = TRUE)
#> MCMI(object = object, mi = mi, R = R, type = "hc0", fixed_x = TRUE)
#> MCMI(object = object, mi = mi, R = R, type = "hc1", fixed_x = TRUE)
#> MCMI(object = object, mi = mi, R = R, type = "hc2", fixed_x = TRUE)
#> MCMI(object = object, mi = mi, R = R, type = "hc3", fixed_x = TRUE)
#> MCMI(object = object, mi = mi, R = R, type = "hc4", fixed_x = TRUE)
#> MCMI(object = object, mi = mi, R = R, type = "hc4m", fixed_x = TRUE)
#> MCMI(object = object, mi = mi, R = R, type = "hc5", fixed_x = TRUE)
#> Test passed
#> Test passed
#> Test passed
#> Test passed
#> Test passed
#> Test passed
#> Test passed
#> Test passed
#> Test passed
#> Test passed

#> test-betaMC-mc-fixed-x

#> MC(object = object, R = R, type = "mvn", fixed_x = TRUE)
#> MC(object = object, R = R, type = "adf", fixed_x = TRUE)
#> MC(object = object, R = R, type = "hc0", fixed_x = TRUE)
#> MC(object = object, R = R, type = "hc1", fixed_x = TRUE)
#> MC(object = object, R = R, type = "hc2", fixed_x = TRUE)
#> MC(object = object, R = R, type = "hc3", fixed_x = TRUE)
#> MC(object = object, R = R, type = "hc4", fixed_x = TRUE)
#> MC(object = object, R = R, type = "hc4m", fixed_x = TRUE)
#> MC(object = object, R = R, type = "hc5", fixed_x = TRUE)
#> Test passed
#> Test passed
#> Test passed
#> Test passed
#> Test passed
#> Test passed
#> Test passed
#> Test passed
```

```
#> Test passed
#> Call:
#> MC(object = object, R = 5L, decomposition = "chol", fixed_x = TRUE)
#> The first set of simulated parameter estimates
#> and model-implied covariance matrix.
#>
#> $coef
#> [1] 0.4811796 0.5247135
#>
#> $sigmasq
#> [1] 0.5564911
#>
#> $vechsigmacapx
#> [1] 1.000000e+00 5.848434e-17 1.000000e+00
#>
#> $sigmacapx
#>              [,1]         [,2]
#> [1,] 1.000000e+00 5.848434e-17
#> [2,] 5.848434e-17 1.000000e+00
#>
#> $sigmaysq
#> [1] 1.063349
#>
#> $sigmayx
#> [1] 0.4811796 0.5247135
#>
#> $sigmacap
#>            [,1]         [,2]         [,3]
#> [1,] 1.0633492 4.811796e-01 5.247135e-01
#> [2,] 0.4811796 1.000000e+00 5.848434e-17
#> [3,] 0.5247135 5.848434e-17 1.000000e+00
#>
#> $pd
#> [1] TRUE
#>
#> Call:
#> MC(object = object, R = 5L, decomposition = "svd", fixed_x = TRUE)
#> The first set of simulated parameter estimates
#> and model-implied covariance matrix.
#>
#> $coef
#> [1] 0.4971297 0.5092979
#>
#> $sigmasq
#> [1] 0.5110473
#>
```

```
#> $vechsigmacapx
#> [1] 1.000000e+00 5.848434e-17 1.000000e+00
#>
#> $sigmacapx
#>              [,1]         [,2]
#> [1,] 1.000000e+00 5.848434e-17
#> [2,] 5.848434e-17 1.000000e+00
#>
#> $sigmaysq
#> [1] 1.01757
#>
#> $sigmayx
#> [1] 0.4971297 0.5092979
#>
#> $sigmacap
#>           [,1]         [,2]         [,3]
#> [1,] 1.0175696 4.971297e-01 5.092979e-01
#> [2,] 0.4971297 1.000000e+00 5.848434e-17
#> [3,] 0.5092979 5.848434e-17 1.000000e+00
#>
#> $pd
#> [1] TRUE

#> test-betaMC-mc-mi

#> MCMI(object = object, mi = mi, R = R, type = "mvn")
#> MCMI(object = object, mi = mi, R = R, type = "adf")
#> MCMI(object = object, mi = mi, R = R, type = "hc0")
#> MCMI(object = object, mi = mi, R = R, type = "hc1")
#> MCMI(object = object, mi = mi, R = R, type = "hc2")
#> MCMI(object = object, mi = mi, R = R, type = "hc3")
#> MCMI(object = object, mi = mi, R = R, type = "hc4")
#> MCMI(object = object, mi = mi, R = R, type = "hc4m")
#> MCMI(object = object, mi = mi, R = R, type = "hc5")
#> Test passed
#> Test passed
#> Test passed
#> Test passed
#> Test passed
#> Test passed
#> Test passed
#> Test passed
#> Test passed

#> test-betaMC-mc

#> MC(object = object, R = R, type = "mvn")
```

```
#> MC(object = object, R = R, type = "adf")
#> MC(object = object, R = R, type = "hc0")
#> MC(object = object, R = R, type = "hc1")
#> MC(object = object, R = R, type = "hc2")
#> MC(object = object, R = R, type = "hc3")
#> MC(object = object, R = R, type = "hc4")
#> MC(object = object, R = R, type = "hc4m")
#> MC(object = object, R = R, type = "hc5")
#> Test passed
#> Test passed
#> Test passed
#> Test passed
#> Test passed
#> Test passed
#> Test passed
#> Test passed
#> Test passed
#> Call:
#> MC(object = object, R = 5L, decomposition = "chol")
#> The first set of simulated parameter estimates
#> and model-implied covariance matrix.
#>
#> $coef
#> [1] 0.4948543 0.5180275
#>
#> $sigmasq
#> [1] 0.5517818
#>
#> $vechsigmacapx
#> [1]   0.94325321 -0.01001239   1.00981987
#>
#> $sigmacapx
#>              [,1]         [,2]
#> [1,]   0.94325321 -0.01001239
#> [2,]  -0.01001239  1.00981987
#>
#> $sigmaysq
#> [1] 1.048621
#>
#> $sigmayx
#> [1] 0.4615862 0.5181598
#>
#> $sigmacap
#>            [,1]        [,2]        [,3]
#> [1,] 1.0486207  0.46158623  0.51815979
```

```
#> [2,] 0.4615862  0.94325321 -0.01001239
#> [3,] 0.5181598 -0.01001239  1.00981987
#>
#> $pd
#> [1] TRUE
#>
#> Call:
#> MC(object = object, R = 5L, decomposition = "svd")
#> The first set of simulated parameter estimates
#> and model-implied covariance matrix.
#>
#> $coef
#> [1] 0.4873036 0.5138718
#>
#> $sigmasq
#> [1] 0.519847
#>
#> $vechsigmacapx
#> [1] 0.92654372 0.01659553 1.01126328
#>
#> $sigmacapx
#>            [,1]       [,2]
#> [1,] 0.92654372 0.01659553
#> [2,] 0.01659553 1.01126328
#>
#> $sigmaysq
#> [1] 1.015218
#>
#> $sigmayx
#> [1] 0.4600361 0.5277467
#>
#> $sigmacap
#>           [,1]       [,2]       [,3]
#> [1,] 1.0152184 0.46003610 0.52774671
#> [2,] 0.4600361 0.92654372 0.01659553
#> [3,] 0.5277467 0.01659553 1.01126328
#>
#> $pd
#> [1] TRUE
#> test-betaMC-p-cor-mc-est-mi
#> Call:
#> PCorMC(object = mc)
#>
#> Squared partial correlations
#> type = "mvn"
```

```
#>            est     se R  0.05%   0.5%   2.5% 97.5%  99.5% 99.95%
#> NARTIC  0.4874 0.1162 5 0.2344 0.2354 0.2401 0.5105 0.5169 0.5184
#> PCTGRT  0.3757 0.0736 5 0.3104 0.3122 0.3203 0.4926 0.4933 0.4934
#> PCTSUPP 0.2254 0.1260 5 0.0543 0.0553 0.0598 0.3601 0.3785 0.3826
#> Call:
#> PCorMC(object = mc)
#>
#> Squared partial correlations
#> type = "mvn"
#> Test passed
#> Test passed

#> test-betaMC-p-cor-mc-est

#> Call:
#> PCorMC(object = mc)
#>
#> Squared partial correlations
#> type = "mvn"
#>            est     se R  0.05%   0.5%   2.5% 97.5%  99.5% 99.95%
#> NARTIC  0.4874 0.1162 5 0.2344 0.2354 0.2401 0.5105 0.5169 0.5184
#> PCTGRT  0.3757 0.0736 5 0.3104 0.3122 0.3203 0.4926 0.4933 0.4934
#> PCTSUPP 0.2254 0.1260 5 0.0543 0.0553 0.0598 0.3601 0.3785 0.3826
#> Call:
#> PCorMC(object = mc)
#>
#> Squared partial correlations
#> type = "mvn"
#> Test passed
#> Test passed

#> test-betaMC-r-sq-mc-est-mi

#> Call:
#> RSqMC(object = mc)
#>
#> R-squared and adjusted R-squared
#> type = "mvn"
#>        est     se R  0.05%   0.5%   2.5% 97.5%  99.5% 99.95%
#> rsq 0.8045 0.0346 5 0.7565 0.7574 0.7614 0.8496 0.8526 0.8533
#> adj 0.7906 0.0371 5 0.7391 0.7401 0.7444 0.8388 0.8421 0.8428
#> Call:
#> RSqMC(object = mc)
#>
#> R-squared and adjusted R-squared
#> type = "mvn"
#> Test passed
```

```
#> Call:
#> RSqMC(object = mc)
#>
#> R-squared and adjusted R-squared
#> type = "mvn"
#>        est     se R  0.05%   0.5%   2.5%  97.5%  99.5% 99.95%
#> rsq 0.5809 0.0613 5 0.5017 0.5020 0.5031 0.6463 0.6549 0.6569
#> adj 0.5714 0.0627 5 0.4904 0.4907 0.4918 0.6383 0.6471 0.6491
#> Call:
#> RSqMC(object = mc)
#>
#> R-squared and adjusted R-squared
#> type = "mvn"
#> Test passed

#> test-betaMC-r-sq-mc-est

#> Call:
#> RSqMC(object = mc)
#>
#> R-squared and adjusted R-squared
#> type = "mvn"
#>        est     se R  0.05%   0.5%   2.5%  97.5%  99.5% 99.95%
#> rsq 0.8045 0.0346 5 0.7565 0.7574 0.7614 0.8496 0.8526 0.8533
#> adj 0.7906 0.0371 5 0.7391 0.7401 0.7444 0.8388 0.8421 0.8428
#> Call:
#> RSqMC(object = mc)
#>
#> R-squared and adjusted R-squared
#> type = "mvn"
#> Test passed
#> Call:
#> RSqMC(object = mc)
#>
#> R-squared and adjusted R-squared
#> type = "mvn"
#>        est     se R  0.05%   0.5%   2.5%  97.5%  99.5% 99.95%
#> rsq 0.5809 0.0613 5 0.5017 0.5020 0.5031 0.6463 0.6549 0.6569
#> adj 0.5714 0.0627 5 0.4904 0.4907 0.4918 0.6383 0.6471 0.6491
#> Call:
#> RSqMC(object = mc)
#>
#> R-squared and adjusted R-squared
#> type = "mvn"
#> Test passed

#> test-betaMC-s-cor-mc-est-mi
```

```
#> Call:
#> SCorMC(object = mc)
#>
#> Semipartial correlations
#> type = "mvn"
#>            est     se R  0.05%   0.5%   2.5%  97.5%  99.5% 99.95%
#> NARTIC  0.4312 0.0892 5 0.2120 0.2139 0.2224 0.4423 0.4476 0.4487
#> PCTGRT  0.3430 0.0497 5 0.2950 0.2963 0.3019 0.4187 0.4193 0.4194
#> PCTSUPP 0.2385 0.0944 5 0.1029 0.1035 0.1061 0.3329 0.3438 0.3462
#> Call:
#> SCorMC(object = mc)
#>
#> Semipartial correlations
#> type = "mvn"
#> Test passed
#> Test passed

#> test-betaMC-s-cor-mc-est

#> Call:
#> SCorMC(object = mc)
#>
#> Semipartial correlations
#> type = "mvn"
#>            est     se R  0.05%   0.5%   2.5%  97.5%  99.5% 99.95%
#> NARTIC  0.4312 0.0892 5 0.2120 0.2139 0.2224 0.4423 0.4476 0.4487
#> PCTGRT  0.3430 0.0497 5 0.2950 0.2963 0.3019 0.4187 0.4193 0.4194
#> PCTSUPP 0.2385 0.0944 5 0.1029 0.1035 0.1061 0.3329 0.3438 0.3462
#> Call:
#> SCorMC(object = mc)
#>
#> Semipartial correlations
#> type = "mvn"
#> Test passed
#> Test passed

#> test-zzz-coverage

#>              beta1     beta2     beta3 sigmasq  sigmax1x1  sigmax2x1  sigmax3x1
#> sigmaysq   909.1981  257.2976  276.0367       1 0.007091036 0.03637752 0.01896371
#> sigmayx1  3507.1691  471.2058  510.5430       0 0.084208291 0.21599726 0.11260003
#> sigmayx2   471.2058  333.2295  150.9121       0 0.000000000 0.08420829 0.00000000
#> sigmayx3   510.5430  150.9121  554.4386       0 0.000000000 0.00000000 0.08420829
#> sigmax1x1    0.0000    0.0000    0.0000       0 1.000000000 0.00000000 0.00000000
#> sigmax2x1    0.0000    0.0000    0.0000       0 0.000000000 1.00000000 0.00000000
#> sigmax3x1    0.0000    0.0000    0.0000       0 0.000000000 0.00000000 1.00000000
#> sigmax2x2    0.0000    0.0000    0.0000       0 0.000000000 0.00000000 0.00000000
```

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```
#> sigmax3x2    0.0000    0.0000    0.0000       0 0.000000000 0.00000000 0.00000000
#> sigmax3x3    0.0000    0.0000    0.0000       0 0.000000000 0.00000000 0.00000000
#>            sigmax2x2 sigmax3x2  sigmax3x3
#> sigmaysq  0.04665482 0.0486426 0.01267877
#> sigmayx1  0.00000000 0.0000000 0.00000000
#> sigmayx2  0.21599726 0.1126000 0.00000000
#> sigmayx3  0.00000000 0.2159973 0.11260003
#> sigmax1x1 0.00000000 0.0000000 0.00000000
#> sigmax2x1 0.00000000 0.0000000 0.00000000
#> sigmax3x1 0.00000000 0.0000000 0.00000000
#> sigmax2x2 1.00000000 0.0000000 0.00000000
#> sigmax3x2 0.00000000 1.0000000 0.00000000
#> sigmax3x3 0.00000000 0.0000000 1.00000000
#>                beta1     beta2     beta3 sigmasq
#> sigmaysq   909.1981 257.2976 276.0367       1
#> sigmayx1  3507.1691 471.2058 510.5430       0
#> sigmayx2   471.2058 333.2295 150.9121       0
#> sigmayx3   510.5430 150.9121 554.4386       0
#> sigmax1x1    0.0000    0.0000    0.0000       0
#> sigmax2x1    0.0000    0.0000    0.0000       0
#> sigmax3x1    0.0000    0.0000    0.0000       0
#> sigmax2x2    0.0000    0.0000    0.0000       0
#> sigmax3x2    0.0000    0.0000    0.0000       0
#> sigmax3x3    0.0000    0.0000    0.0000       0
#>                beta1     beta2     beta3       rsq   sigmax1x1  sigmax2x1
#> sigmaysq   909.1981 257.2976 276.0367 -126.0843 0.007091036 0.03637752
#> sigmayx1  3507.1691 471.2058 510.5430    0.0000 0.084208291 0.21599726
#> sigmayx2   471.2058 333.2295 150.9121    0.0000 0.000000000 0.08420829
#> sigmayx3   510.5430 150.9121 554.4386    0.0000 0.000000000 0.00000000
#> sigmax1x1    0.0000    0.0000    0.0000    0.0000 1.000000000 0.00000000
#> sigmax2x1    0.0000    0.0000    0.0000    0.0000 0.000000000 1.00000000
#> sigmax3x1    0.0000    0.0000    0.0000    0.0000 0.000000000 0.00000000
#> sigmax2x2    0.0000    0.0000    0.0000    0.0000 0.000000000 0.00000000
#> sigmax3x2    0.0000    0.0000    0.0000    0.0000 0.000000000 0.00000000
#> sigmax3x3    0.0000    0.0000    0.0000    0.0000 0.000000000 0.00000000
#>            sigmax3x1  sigmax2x2 sigmax3x2  sigmax3x3
#> sigmaysq  0.01896371 0.04665482 0.0486426 0.01267877
#> sigmayx1  0.11260003 0.00000000 0.0000000 0.00000000
#> sigmayx2  0.00000000 0.21599726 0.1126000 0.00000000
#> sigmayx3  0.08420829 0.00000000 0.2159973 0.11260003
#> sigmax1x1 0.00000000 0.00000000 0.0000000 0.00000000
#> sigmax2x1 0.00000000 0.00000000 0.0000000 0.00000000
#> sigmax3x1 1.00000000 0.00000000 0.0000000 0.00000000
#> sigmax2x2 0.00000000 1.00000000 0.0000000 0.00000000
#> sigmax3x2 0.00000000 0.00000000 1.0000000 0.00000000
#> sigmax3x3 0.00000000 0.00000000 0.0000000 1.00000000
```

```
#>              beta1    beta2    beta3      rsq
#> sigmaysq   909.1981 257.2976 276.0367 -126.0843
#> sigmayx1  3507.1691 471.2058 510.5430    0.0000
#> sigmayx2   471.2058 333.2295 150.9121    0.0000
#> sigmayx3   510.5430 150.9121 554.4386    0.0000
#> sigmax1x1    0.0000   0.0000   0.0000    0.0000
#> sigmax2x1    0.0000   0.0000   0.0000    0.0000
#> sigmax3x1    0.0000   0.0000   0.0000    0.0000
#> sigmax2x2    0.0000   0.0000   0.0000    0.0000
#> sigmax3x2    0.0000   0.0000   0.0000    0.0000
#> sigmax3x3    0.0000   0.0000   0.0000    0.0000
#> [[1]]
#> [[1]][[1]]
#> [[1]][[1]]$value
#> [[1]][[1]]$value[[1]]
#>            2.5 %    97.5 %
#> NARTIC 0.7093103 0.8036672
#>
#>
#> [[1]][[1]]$visible
#> [1] TRUE
#>
#>
#> [[1]][[2]]
#> [[1]][[2]]$value
#> [[1]][[2]]$value[[1]]
#>            2.5 %    97.5 %
#> NARTIC 0.7093103 0.8036672
#>
#>
#> [[1]][[2]]$visible
#> [1] TRUE
#>
#>
#> [[1]][[3]]
#> [[1]][[3]]$value
#> [[1]][[3]]$value[[1]]
#> [1] TRUE
#>
#>
#> [[1]][[3]]$visible
#> [1] TRUE
#>
#>
#> [[1]][[4]]
#> [[1]][[4]]$value
```

```
#> [[1]][[4]]$value[[1]]
#> [1] TRUE
#>
#>
#> [[1]][[4]]$visible
#> [1] TRUE
#>
#>
#> [[1]][[5]]
#> [[1]][[5]]$value
#> [[1]][[5]]$value[[1]]
#> [1] TRUE
#>
#>
#> [[1]][[5]]$visible
#> [1] TRUE
#>
#>
#> [[1]][[6]]
#> [[1]][[6]]$value
#> [[1]][[6]]$value[[1]]
#> [1] TRUE
#>
#>
#> [[1]][[6]]$visible
#> [1] TRUE
#>
#>
#> [[1]][[7]]
#> [[1]][[7]]$value
#> [[1]][[7]]$value[[1]]
#> [1] TRUE
#>
#>
#> [[1]][[7]]$visible
#> [1] TRUE
#>
#>
#> [[1]][[8]]
#> [[1]][[8]]$value
#> [[1]][[8]]$value[[1]]
#> [[1]][[8]]$value[[1]]$coef
#> [1] 0.4971297 0.5092979
#>
#> [[1]][[8]]$value[[1]]$sigmasq
```

```
#> [1] 0.5110473
#>
#> [[1]][[8]]$value[[1]]$vechsigmacapx
#> [1] 1.000000e+00 5.848434e-17 1.000000e+00
#>
#> [[1]][[8]]$value[[1]]$sigmacapx
#>              [,1]         [,2]
#> [1,] 1.000000e+00 5.848434e-17
#> [2,] 5.848434e-17 1.000000e+00
#>
#> [[1]][[8]]$value[[1]]$sigmaysq
#> [1] 1.01757
#>
#> [[1]][[8]]$value[[1]]$sigmayx
#> [1] 0.4971297 0.5092979
#>
#> [[1]][[8]]$value[[1]]$sigmacap
#>             [,1]         [,2]         [,3]
#> [1,] 1.0175696 4.971297e-01 5.092979e-01
#> [2,] 0.4971297 1.000000e+00 5.848434e-17
#> [3,] 0.5092979 5.848434e-17 1.000000e+00
#>
#> [[1]][[8]]$value[[1]]$pd
#> [1] TRUE
#>
#>
#>
#> [[1]][[8]]$visible
#> [1] TRUE
#>
#>
#> [[1]][[9]]
#> [[1]][[9]]$value
#> [[1]][[9]]$value[[1]]
#> [1] TRUE
#>
#>
#> [[1]][[9]]$visible
#> [1] TRUE
#>
#>
#> [[1]][[10]]
#> [[1]][[10]]$value
#> [[1]][[10]]$value[[1]]
#>         beta1 beta2 rsq sigmax1x1 sigmax2x1 sigmax2x2
```

```
#> sigmaysq      1     1  -2     0.25      0.5      0.25
#> sigmayx1      1     0   0     0.50      0.5      0.00
#> sigmayx2      0     1   0     0.00      0.5      0.50
#> sigmax1x1     0     0   0     1.00      0.0      0.00
#> sigmax2x1     0     0   0     0.00      1.0      0.00
#> sigmax2x2     0     0   0     0.00      0.0      1.00
#>
#>
#> [[1]][[10]]$visible
#> [1] TRUE
#>
#>
#> [[1]][[11]]
#> [[1]][[11]]$value
#> [[1]][[11]]$value[[1]]
#> [1] TRUE
#>
#>
#> [[1]][[11]]$visible
#> [1] TRUE
#>
#>
#> [[1]][[12]]
#> [[1]][[12]]$value
#> [[1]][[12]]$value[[1]]
#> [1] TRUE
#>
#>
#> [[1]][[12]]$visible
#> [1] TRUE
#>
#>
#> [[1]][[13]]
#> [[1]][[13]]$value
#> [[1]][[13]]$value[[1]]
#> [1] TRUE
#>
#>
#> [[1]][[13]]$visible
#> [1] TRUE
#>
#>
#> [[1]][[14]]
#> [[1]][[14]]$value
#> [[1]][[14]]$value[[1]]
#> [1] TRUE
```

```
#>
#>
#> [[1]][[14]]$visible
#> [1] TRUE
#>
#>
#> [[1]][[15]]
#> [[1]][[15]]$value
#> [[1]][[15]]$value[[1]]
#> [1] TRUE
#>
#>
#> [[1]][[15]]$visible
#> [1] TRUE
#>
#>
#> [[1]][[16]]
#> [[1]][[16]]$value
#> [[1]][[16]]$value[[1]]
#> [1] TRUE
#>
#>
#> [[1]][[16]]$visible
#> [1] TRUE
#>
#>
#> [[1]][[17]]
#> [[1]][[17]]$value
#> [[1]][[17]]$value[[1]]
#> [1] FALSE
#>
#>
#> [[1]][[17]]$visible
#> [1] TRUE
```

Environment

```
ls()

#> [1] "nas1982" "root"
```

Class

```
#> [[1]]
#> [1] "data.frame"
#>
#> [[2]]
#> [1] "root_criterion"
```

References

Pesigan, I. J. A., & Cheung, S. F. (2023). Monte Carlo confidence intervals for the indirect effect with missing data. *Behavior Research Methods*. https://doi.org/10.3758/s13428-023-02114-4

R Core Team. (2023). *R: A language and environment for statistical computing*. R Foundation for Statistical Computing. Vienna, Austria. https://www.R-project.org/