betaMC: Internal Tests

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Tests

```
#> test-betaMC-beta-mc-est-mi
#> Call:
#> BetaMC(object = mc)
#>
#> Standardized regression slopes
#> type = ""
#>             est     se R  0.05%    0.5%    2.5%  97.5%   99.5% 99.95%
#> NARTIC   0.4951 0.0112 5 0.4315 0.4317 0.4322 0.4567 0.4568 0.4568
#> PCTGRT   0.3915 0.0521 5 0.3199 0.3210 0.3260 0.4501 0.4511 0.4514
#> PCTSUPP  0.2632 0.0599 5 0.2648 0.2660 0.2714 0.4228 0.4272 0.4282
#> Call:
#> BetaMC(object = mc)
#>
#> Standardized regression slopes
#> type = ""
#> Test passed
#> Call:
#> BetaMC(object = mc)
#>
#> Standardized regression slopes
#> type = ""
#>           est     se R  0.05%    0.5%    2.5% 97.5% 99.5% 99.95%
#> NARTIC 0.7622 0.0327 5 0.7242 0.7244 0.7251 0.802 0.805 0.8057
#> Call:
#> BetaMC(object = mc)
#>
#> Standardized regression slopes
#> type = ""

#> test-betaMC-beta-mc-est

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

```
#> type = ""
#>             est      se R   0.05%    0.5%    2.5%   97.5%   99.5%  99.95%
#> NARTIC   0.4951 0.1378 5 0.1828 0.1869 0.2048 0.5389 0.5437 0.5447
#> PCTGRT   0.3915 0.0759 5 0.3132 0.3141 0.3186 0.5005 0.5040 0.5048
#> PCTSUPP  0.2632 0.0711 5 0.2187 0.2198 0.2243 0.3932 0.3965 0.3972
#> Call:
#> BetaMC(object = mc)
#>
#> Standardized regression slopes
#> type = ""
#> Test passed
#> Call:
#> BetaMC(object = mc)
#>
#> Standardized regression slopes
#> type = ""
#>           est      se R   0.05%    0.5%    2.5%   97.5%   99.5%  99.95%
#> NARTIC 0.7622 0.0472 5 0.6949 0.6956 0.6985 0.8151 0.8213 0.8227
#> Call:
#> BetaMC(object = mc)
#>
#> Standardized regression slopes
#> type = ""

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

#> Call:
#> DeltaRSqMC(object = mc)
#>
#> Improvement in R-squared
#> type = ""
#>             est      se R   0.05%    0.5%    2.5%   97.5%   99.5%  99.95%
#> NARTIC   0.1859 0.0506 5 0.1755 0.1759 0.1777 0.2993 0.3056 0.3070
#> PCTGRT   0.1177 0.0281 5 0.0679 0.0682 0.0696 0.1380 0.1398 0.1402
#> PCTSUPP  0.0569 0.0183 5 0.0183 0.0186 0.0198 0.0652 0.0666 0.0669
#> Call:
#> DeltaRSqMC(object = mc)
#>
#> Improvement in R-squared
#> type = ""
#> Test passed
#> Test passed

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

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

```
#>
#> Improvement in R-squared
#> type = ""
#>           est     se R  0.05%   0.5%   2.5%  97.5%  99.5% 99.95%
#> NARTIC  0.1859 0.0408 5 0.1091 0.1101 0.1143 0.2094 0.2097 0.2097
#> PCTGRT  0.1177 0.0272 5 0.0593 0.0595 0.0604 0.1167 0.1171 0.1172
#> PCTSUPP 0.0569 0.0084 5 0.0287 0.0289 0.0298 0.0508 0.0512 0.0513
#> Call:
#> DeltaRSqMC(object = mc)
#>
#> Improvement in R-squared
#> type = ""
#> Test passed
#> Test passed

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

#> Call:
#> DiffBetaMC(object = mc)
#>
#> Differences of standardized regression slopes
#> type = ""
#>                  est     se R   0.05%    0.5%    2.5%  97.5%  99.5% 99.95%
#> NARTIC-PCTGRT  0.1037 0.0550 5 -0.0119 -0.0118 -0.0118 0.0987 0.0996 0.0998
#> NARTIC-PCTSUPP 0.2319 0.0899 5  0.0174  0.0189  0.0259 0.2478 0.2527 0.2538
#> PCTGRT-PCTSUPP 0.1282 0.0960 5  0.0280  0.0281  0.0287 0.2489 0.2624 0.2655
#> Call:
#> DiffBetaMC(object = mc)
#>
#> Differences of standardized regression slopes
#> type = ""
#> Test passed
#> Test passed

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

#> Call:
#> DiffBetaMC(object = mc)
#>
#> Differences of standardized regression slopes
#> type = ""
#>                  est     se R   0.05%    0.5%    2.5%  97.5%  99.5% 99.95%
#> NARTIC-PCTGRT  0.1037 0.0805 5 -0.0131 -0.0125 -0.0100 0.1713 0.1748 0.1755
#> NARTIC-PCTSUPP 0.2319 0.1271 5  0.0964  0.0973  0.1017 0.3993 0.4076 0.4094
#> PCTGRT-PCTSUPP 0.1282 0.0478 5  0.1094  0.1098  0.1117 0.2280 0.2328 0.2339
#> Call:
#> DiffBetaMC(object = mc)
```

```
#>
#> Differences of standardized regression slopes
#> type = ""
#> 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] 0.5305679 0.5128414
#>
#> $sigmasq
#> [1] 0.52399
#>
#> $vechsigmacapx
#> [1] 1.000000e+00 2.496804e-16 1.000000e+00
#>
#> $sigmacapx
#>              [,1]         [,2]
#> [1,] 1.000000e+00 2.496804e-16
#> [2,] 2.496804e-16 1.000000e+00
#>
#> $sigmaysq
#> [1] 1.068499
#>
#> $sigmayx
#> [1] 0.5305679 0.5128414
#>
#> $sigmacap
#>           [,1]         [,2]         [,3]
#> [1,] 1.0684987 5.305679e-01 5.128414e-01
#> [2,] 0.5305679 1.000000e+00 2.496804e-16
#> [3,] 0.5128414 2.496804e-16 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] 0.4835585 0.5309536
#>
#> $sigmasq
#> [1] 0.5437547
#>
```

```
#> $vechsigmacapx
#> [1] 1.000000e+00 2.496804e-16 1.000000e+00
#>
#> $sigmacapx
#>              [,1]         [,2]
#> [1,] 1.000000e+00 2.496804e-16
#> [2,] 2.496804e-16 1.000000e+00
#>
#> $sigmaysq
#> [1] 1.059495
#>
#> $sigmayx
#> [1] 0.4835585 0.5309536
#>
#> $sigmacap
#>            [,1]         [,2]         [,3]
#> [1,] 1.0594952 4.835585e-01 5.309536e-01
#> [2,] 0.4835585 1.000000e+00 2.496804e-16
#> [3,] 0.5309536 2.496804e-16 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] 0.5097107 0.4850352
#>
#> $sigmasq
#> [1] 0.5051197
#>
#> $vechsigmacapx
#> [1] 1.03117861 0.01686004 0.94206109
#>
#> $sigmacapx
#>            [,1]       [,2]
#> [1,] 1.03117861 0.01686004
#> [2,] 0.01686004 0.94206109
#>
#> $sigmaysq
#> [1] 1.00299
#>
#> $sigmayx
#> [1] 0.5337805 0.4655265
#>
#> $sigmacap
#>          [,1]       [,2]       [,3]
#> [1,] 1.0029902 0.53378053 0.46552653
```

```
#> [2,] 0.5337805 1.03117861 0.01686004
#> [3,] 0.4655265 0.01686004 0.94206109
#>
#> $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] 0.5415884 0.4948544
#>
#> $sigmasq
#> [1] 0.5366199
#>
#> $vechsigmacapx
#> [1] 1.03074525 0.03639888 0.97021948
#>
#> $sigmacapx
#>            [,1]       [,2]
#> [1,] 1.03074525 0.03639888
#> [2,] 0.03639888 0.97021948
#>
#> $sigmaysq
#> [1] 1.096055
#>
#> $sigmayx
#> [1] 0.5762518 0.4998306
#>
#> $sigmacap
#>           [,1]       [,2]       [,3]
#> [1,] 1.0960546 0.57625181 0.49983064
#> [2,] 0.5762518 1.03074525 0.03639888
#> [3,] 0.4998306 0.03639888 0.97021948
#>
#> $pd
#> [1] TRUE
#> test-betaMC-p-cor-mc-est-mi

#> Call:
#> PCorMC(object = mc)
#>
#> Squared partial correlations
#> type = ""
```

```
#>             est      se R   0.05%    0.5%    2.5%  97.5%   99.5% 99.95%
#> NARTIC   0.4874 0.0954 5 0.4733 0.4734 0.4736 0.6822 0.6864 0.6873
#> PCTGRT   0.3757 0.0580 5 0.2868 0.2874 0.2898 0.4322 0.4382 0.4396
#> PCTSUPP 0.2254 0.1105 5 0.0559 0.0575 0.0642 0.3129 0.3135 0.3136
#> Call:
#> PCorMC(object = mc)
#>
#> Squared partial correlations
#> type = ""
#> Test passed
#> Test passed

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

#> Call:
#> PCorMC(object = mc)
#>
#> Squared partial correlations
#> type = ""
#>             est      se R   0.05%    0.5%    2.5%  97.5%   99.5% 99.95%
#> NARTIC   0.4874 0.1286 5 0.3064 0.3066 0.3073 0.6048 0.6168 0.6195
#> PCTGRT   0.3757 0.1050 5 0.1543 0.1548 0.1566 0.3875 0.3905 0.3912
#> PCTSUPP 0.2254 0.0914 5 0.0876 0.0879 0.0889 0.2855 0.2882 0.2888
#> Call:
#> PCorMC(object = mc)
#>
#> Squared partial correlations
#> type = ""
#> Test passed
#> Test passed

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

#> Call:
#> RSqMC(object = mc)
#>
#> R-squared and adjusted R-squared
#> type = ""
#>        est      se R   0.05%    0.5%    2.5%  97.5%   99.5% 99.95%
#> rsq 0.8045 0.0491 5 0.7373 0.7377 0.7395 0.8534 0.8553 0.8557
#> adj 0.7906 0.0526 5 0.7186 0.7190 0.7209 0.8429 0.8450 0.8454
#> Call:
#> RSqMC(object = mc)
#>
#> R-squared and adjusted R-squared
#> type = ""
#> Test passed
```

```
#> Call:
#> RSqMC(object = mc)
#>
#> R-squared and adjusted R-squared
#> type = ""
#>        est     se R  0.05%   0.5%   2.5%  97.5%  99.5% 99.95%
#> rsq 0.5809 0.1104 5 0.3799 0.383 0.3966 0.6584 0.6610 0.6616
#> adj 0.5714 0.1129 5 0.3658 0.369 0.3828 0.6506 0.6533 0.6539
#> Call:
#> RSqMC(object = mc)
#>
#> R-squared and adjusted R-squared
#> type = ""
#> Test passed

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

#> Call:
#> RSqMC(object = mc)
#>
#> R-squared and adjusted R-squared
#> type = ""
#>        est     se R  0.05%    0.5%   2.5%  97.5%  99.5% 99.95%
#> rsq 0.8045 0.0512 5 0.7182 0.7185 0.7199 0.8408 0.8449 0.8458
#> adj 0.7906 0.0549 5 0.6981 0.6984 0.6999 0.8294 0.8338 0.8348
#> Call:
#> RSqMC(object = mc)
#>
#> R-squared and adjusted R-squared
#> type = ""
#> Test passed
#> Call:
#> RSqMC(object = mc)
#>
#> R-squared and adjusted R-squared
#> type = ""
#>        est     se R  0.05%    0.5%   2.5%  97.5%  99.5% 99.95%
#> rsq 0.5809 0.0644 5 0.4658 0.4660 0.4670 0.6054 0.6066 0.6068
#> adj 0.5714 0.0659 5 0.4537 0.4539 0.4549 0.5964 0.5976 0.5979
#> Call:
#> RSqMC(object = mc)
#>
#> R-squared and adjusted R-squared
#> type = ""
#> Test passed

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

```
#> Call:
#> SCorMC(object = mc)
#>
#> Semipartial correlations
#> type = ""
#>              est      se R   0.05%    0.5%    2.5%   97.5%   99.5%  99.95%
#> NARTIC   0.4312  0.0669 5  0.2885  0.2894  0.2934  0.4470  0.4481  0.4483
#> PCTGRT   0.3430  0.0497 5  0.2522  0.2525  0.2539  0.3623  0.3637  0.3641
#> PCTSUPP  0.2385  0.0836 5  0.1710  0.1722  0.1777  0.3859  0.3973  0.3998
#> Call:
#> SCorMC(object = mc)
#>
#> Semipartial correlations
#> type = ""
#> Test passed
#> Test passed

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

#> Call:
#> SCorMC(object = mc)
#>
#> Semipartial correlations
#> type = ""
#>              est      se R   0.05%    0.5%    2.5%   97.5%   99.5%  99.95%
#> NARTIC   0.4312  0.0686 5  0.3547  0.3549  0.3556  0.5168  0.5245  0.5263
#> PCTGRT   0.3430  0.0550 5  0.2548  0.2548  0.2549  0.3707  0.3796  0.3816
#> PCTSUPP  0.2385  0.0825 5  0.1378  0.1389  0.1435  0.3446  0.3517  0.3533
#> Call:
#> SCorMC(object = mc)
#>
#> Semipartial correlations
#> type = ""
#> 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
```

```
#> 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 0.7251114 0.8020404
#>
#>
#> [[1]][[1]]$visible
#> [1] TRUE
#>
#>
#> [[1]][[2]]
#> [[1]][[2]]$value
#> [[1]][[2]]$value[[1]]
#>            2.5 %    97.5 %
#> NARTIC 0.6984556 0.8151496
#>
#>
#> [[1]][[2]]$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]]$coef
#> [1] 0.4835585 0.5309536
#>
#> [[1]][[8]]$value[[1]]$sigmasq
```

```
#> [1] 0.5437547
#>
#> [[1]][[8]]$value[[1]]$vechsigmacapx
#> [1] 1.000000e+00 2.496804e-16 1.000000e+00
#>
#> [[1]][[8]]$value[[1]]$sigmacapx
#>              [,1]         [,2]
#> [1,] 1.000000e+00 2.496804e-16
#> [2,] 2.496804e-16 1.000000e+00
#>
#> [[1]][[8]]$value[[1]]$sigmaysq
#> [1] 1.059495
#>
#> [[1]][[8]]$value[[1]]$sigmayx
#> [1] 0.4835585 0.5309536
#>
#> [[1]][[8]]$value[[1]]$sigmacap
#>            [,1]         [,2]         [,3]
#> [1,] 1.0594952 4.835585e-01 5.309536e-01
#> [2,] 0.4835585 1.000000e+00 2.496804e-16
#> [3,] 0.5309536 2.496804e-16 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

```r
ls()

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

Class

```
#> [[1]]
#> [1] "data.frame"
#>
#> [[2]]
#> [1] "root_criterion"
#>
#> [[3]]
#> [1] "character"
```

References

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