betaMC: Internal Tests

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Tests

```
#> 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 0.0453 5 0.3631 0.3642 0.3692 0.4846 0.4882 0.4891
#> PCTGRT  0.3915 0.0538 5 0.3430 0.3447 0.3524 0.4806 0.4826 0.4831
#> PCTSUPP 0.2632 0.0758 5 0.1744 0.1752 0.1789 0.3512 0.3538 0.3544
#> 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 0.0396 5 0.6868 0.6874 0.6902 0.7886 0.7911 0.7917
#> Call:
#> BetaMC(object = mc)
#>
#> Standardized regression slopes
#> type = "mvn"

#> 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 0.0710 5 0.1298 0.1320 0.1417 0.3098 0.3112 0.3116
#> PCTGRT  0.1177 0.0573 5 0.0507 0.0508 0.0511 0.1731 0.1826 0.1847
#> PCTSUPP 0.0569 0.0319 5 0.0206 0.0210 0.0227 0.1002 0.1020 0.1024
#> Call:
#> DeltaRSqMC(object = mc)
#>
#> Improvement in R-squared
#> 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 0.1911 5 -0.1786 -0.1744 -0.1556 0.2789 0.2805 0.2809
#> NARTIC-PCTSUPP  0.2319 0.1006 5  0.0796  0.0831  0.0984 0.3146 0.3149 0.3149
#> PCTGRT-PCTSUPP  0.1282 0.1163 5  0.0313  0.0315  0.0325 0.2588 0.2589 0.2589
#> Call:
#> DiffBetaMC(object = mc)
#>
#> Differences of standardized regression slopes
#> type = "mvn"
#> 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 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] 1.063349
#>
#> $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 2.496804e-16
#> [3,] 0.5247135 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] 0.4971297 0.5092979
```

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```
#>
#> $sigmasq
#> [1] 0.5110473
#>
#> $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] 1.01757
#>
#> $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 2.496804e-16
#> [3,] 0.5092979 2.496804e-16 1.000000e+00
#>
#> $pd
#> [1] TRUE

#> 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

#> 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 0.1197 5 0.3909 0.3944 0.4102 0.7020 0.7066 0.7077
#> PCTGRT   0.3757 0.0738 5 0.2227 0.2244 0.2320 0.4171 0.4218 0.4229
#> PCTSUPP  0.2254 0.1142 5 0.1042 0.1056 0.1117 0.3799 0.3836 0.3844
#> Call:
#> PCorMC(object = mc)
#>
#> Squared partial correlations
#> type = "mvn"
#> Test passed
#> 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 0.0164 5 0.7652 0.7658 0.7680 0.8072 0.8076 0.8077
#> adj 0.7906 0.0176 5 0.7485 0.7490 0.7515 0.7934 0.7939 0.7940
#> 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 0.2369 5 0.3418 0.3427 0.3464 0.8905 0.9060 0.9095
#> adj 0.5714 0.2423 5 0.3269 0.3277 0.3315 0.8880 0.9039 0.9074
#> Call:
#> RSqMC(object = mc)
#>
#> R-squared and adjusted R-squared
#> type = "mvn"
#> 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 0.0692 5 0.3679 0.3681 0.3687 0.5200 0.5226 0.5231
#> PCTGRT  0.3430 0.0783 5 0.2287 0.2290 0.2303 0.4159 0.4254 0.4275
#> PCTSUPP 0.2385 0.0191 5 0.1771 0.1774 0.1786 0.2229 0.2232 0.2233
#> Call:
#> SCorMC(object = mc)
#>
#> Semipartial correlations
#> type = "mvn"
#> Test passed
#> Test passed
#> [[1]]
#> [[1]][[1]]
#> [[1]][[1]]$value
#> [[1]][[1]]$value[[1]]
```

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```
#>       2.5%      97.5%
#> 0.6902367 0.7886095
#>
#>
#> [[1]][[1]]$visible
#> [1] TRUE
#>
#>
#> [[1]][[2]]
#> [[1]][[2]]$value
#> [[1]][[2]]$value[[1]]
#> [1] TRUE
#>
#>
#> [[1]][[2]]$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]]$value[[1]]
#> [[1]][[4]]$value[[1]]$coef
#> [1] 0.4971297 0.5092979
#>
#> [[1]][[4]]$value[[1]]$sigmasq
#> [1] 0.5110473
#>
#> [[1]][[4]]$value[[1]]$vechsigmacapx
#> [1] 1.000000e+00 2.496804e-16 1.000000e+00
#>
#> [[1]][[4]]$value[[1]]$sigmacapx
#>               [,1]          [,2]
#> [1,] 1.000000e+00 2.496804e-16
#> [2,] 2.496804e-16 1.000000e+00
#>
```

```
#> [[1]][[4]]$value[[1]]$sigmaysq
#> [1] 1.01757
#>
#> [[1]][[4]]$value[[1]]$sigmayx
#> [1] 0.4971297 0.5092979
#>
#> [[1]][[4]]$value[[1]]$sigmacap
#>           [,1]          [,2]          [,3]
#> [1,] 1.0175696 4.971297e-01 5.092979e-01
#> [2,] 0.4971297 1.000000e+00 2.496804e-16
#> [3,] 0.5092979 2.496804e-16 1.000000e+00
#>
#> [[1]][[4]]$value[[1]]$pd
#> [1] TRUE
#>
#>
#>
#> [[1]][[4]]$visible
#> [1] TRUE
#>
#>
#> [[1]][[5]]
#> [[1]][[5]]$value
#> [[1]][[5]]$value[[1]]
#>          beta1 beta2 rsq sigmax1x1 sigmax2x1 sigmax2x2
#> sigmaysq      1     1  -2      0.25       0.5      0.25
#> sigmayx1      1     0   0      0.50       0.5      0.00
#> sigmayx2      0     1   0      0.00       0.5      0.50
#> sigmax1x1     0     0   0      1.00       0.0      0.00
#> sigmax2x1     0     0   0      0.00       1.0      0.00
#> sigmax2x2     0     0   0      0.00       0.0      1.00
#>
#>
#> [[1]][[5]]$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]]$value[[1]]
#> [1] TRUE
#> 
#> 
#> [[1]][[8]]$visible
#> [1] TRUE
```

Environment

```
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/