

metaVAR: Internal Tests

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Tests

```
#> test-metaVAR-fit-ct-var-id-mx-theta-null
#> Running CTVAR with 12 parameters
#>
#> Beginning initial fit attempt
#> Running CTVAR with 12 parameters
#>
#> Lowest minimum so far:   -2707.31197426421
#>
#> Solution found
```

```
#>
#> Solution found!   Final fit=-2707.312 (started at -2583.5637)   (1 attempt(s):   1
valid, 0 errors)
#> Start values from best fit:
#> -0.545410808015616,0.655791704057053,-0.4319181053049,0.0684713570989829,-0.1952231790709,0.85913
#> Running CTVAR with 12 parameters
#>
#> Beginning initial fit attempt
#> Running CTVAR with 12 parameters
#>
#> Lowest minimum so far:   -2726.62588111983
#>
#> Solution found
```

```
#>
#> Solution found!   Final fit=-2726.6259 (started at -2584.9163)   (1 attempt(s):
1 valid, 0 errors)
#> Start values from best fit:
#> -0.213900151770005,0.861186849501166,-0.405561461480421,-0.131907517647472,-0.523808720935904,0.8
#> Running Model with 90 parameters
#>
#> Beginning initial fit attempt
#> Running Model with 90 parameters
```

```

#>
#> Lowest minimum so far: -253.096313795113
#>
#> Solution found

#>
#> Solution found! Final fit=-253.09631 (started at 11.090095) (1 attempt(s): 1
valid, 0 errors)
#> Start values from best fit:
#> 0.201437063405138,0.0854390456636383,0.010230187048902,-0.112588179410761,-0.135600574443815,0.0
#> $estimates
#>


|                          | est     | se     | z        | p      | 2.5%    | 97.5%   |
|--------------------------|---------|--------|----------|--------|---------|---------|
| #> mu_phi_11             | -0.3797 | 0.1007 | -3.7695  | 0.0002 | -0.5771 | -0.1823 |
| #> mu_phi_21             | 0.7585  | 0.0773 | 9.8155   | 0.0000 | 0.6070  | 0.9099  |
| #> mu_phi_31             | -0.4187 | 0.0571 | -7.3377  | 0.0000 | -0.5306 | -0.3069 |
| #> mu_phi_12             | -0.0317 | 0.0680 | -0.4665  | 0.6409 | -0.1650 | 0.1015  |
| #> mu_phi_22             | -0.3595 | 0.0947 | -3.7972  | 0.0001 | -0.5451 | -0.1739 |
| #> mu_phi_32             | 0.8622  | 0.0469 | 18.3837  | 0.0000 | 0.7703  | 0.9541  |
| #> mu_phi_13             | 0.0220  | 0.0591 | 0.3716   | 0.7102 | -0.0938 | 0.1378  |
| #> mu_phi_23             | -0.0862 | 0.0949 | -0.9084  | 0.3637 | -0.2721 | 0.0997  |
| #> mu_phi_33             | -0.8663 | 0.0790 | -10.9646 | 0.0000 | -1.0211 | -0.7114 |
| #> mu_sigma_11           | 0.0972  | 0.0027 | 35.7297  | 0.0000 | 0.0919  | 0.1025  |
| #> mu_sigma_22           | 0.1021  | 0.0036 | 28.2121  | 0.0000 | 0.0950  | 0.1092  |
| #> mu_sigma_33           | 0.1005  | 0.0043 | 23.5161  | 0.0000 | 0.0922  | 0.1089  |
| #> sigma_phi_11_phi_11   | 0.0406  | 0.0287 | 1.4142   | 0.1573 | -0.0157 | 0.0968  |
| #> sigma_phi_21_phi_11   | 0.0172  | 0.0178 | 0.9676   | 0.3332 | -0.0177 | 0.0521  |
| #> sigma_phi_31_phi_11   | 0.0021  | 0.0115 | 0.1786   | 0.8583 | -0.0206 | 0.0247  |
| #> sigma_phi_12_phi_11   | -0.0227 | 0.0178 | -1.2755  | 0.2021 | -0.0575 | 0.0122  |
| #> sigma_phi_22_phi_11   | -0.0273 | 0.0235 | -1.1644  | 0.2442 | -0.0733 | 0.0187  |
| #> sigma_phi_32_phi_11   | 0.0006  | 0.0095 | 0.0604   | 0.9519 | -0.0180 | 0.0191  |
| #> sigma_phi_13_phi_11   | 0.0165  | 0.0145 | 1.1385   | 0.2549 | -0.0119 | 0.0449  |
| #> sigma_phi_23_phi_11   | 0.0273  | 0.0235 | 1.1636   | 0.2446 | -0.0187 | 0.0734  |
| #> sigma_phi_33_phi_11   | -0.0209 | 0.0190 | -1.0989  | 0.2718 | -0.0583 | 0.0164  |
| #> sigma_sigma_11_phi_11 | -0.0006 | 0.0006 | -1.0039  | 0.3154 | -0.0019 | 0.0006  |
| #> sigma_sigma_22_phi_11 | -0.0009 | 0.0009 | -1.0612  | 0.2886 | -0.0026 | 0.0008  |
| #> sigma_sigma_33_phi_11 | 0.0012  | 0.0010 | 1.1408   | 0.2539 | -0.0009 | 0.0033  |
| #> sigma_phi_21_phi_21   | 0.0239  | 0.0169 | 1.4142   | 0.1573 | -0.0092 | 0.0570  |
| #> sigma_phi_31_phi_21   | 0.0013  | 0.0088 | 0.1520   | 0.8792 | -0.0160 | 0.0187  |
| #> sigma_phi_12_phi_21   | -0.0105 | 0.0118 | -0.8968  | 0.3698 | -0.0336 | 0.0125  |
| #> sigma_phi_22_phi_21   | -0.0231 | 0.0186 | -1.2388  | 0.2154 | -0.0596 | 0.0134  |
| #> sigma_phi_32_phi_21   | 0.0003  | 0.0072 | 0.0356   | 0.9716 | -0.0140 | 0.0145  |
| #> sigma_phi_13_phi_21   | 0.0078  | 0.0099 | 0.7824   | 0.4340 | -0.0117 | 0.0272  |
| #> sigma_phi_23_phi_21   | 0.0212  | 0.0181 | 1.1734   | 0.2406 | -0.0142 | 0.0567  |
| #> sigma_phi_33_phi_21   | -0.0129 | 0.0138 | -0.9333  | 0.3507 | -0.0399 | 0.0142  |
| #> sigma_sigma_11_phi_21 | -0.0003 | 0.0004 | -0.7099  | 0.4778 | -0.0012 | 0.0006  |


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#> sigma_sigma_22_phi_21 -0.0005 0.0006 -0.8200 0.4122 -0.0017 0.0007
#> sigma_sigma_33_phi_21 0.0007 0.0008 0.9760 0.3291 -0.0007 0.0022
#> sigma_phi_31_phi_31 0.0130 0.0092 1.4142 0.1573 -0.0050 0.0311
#> sigma_phi_12_phi_31 -0.0011 0.0078 -0.1448 0.8849 -0.0164 0.0141
#> sigma_phi_22_phi_31 -0.0022 0.0109 -0.2055 0.8372 -0.0235 0.0191
#> sigma_phi_32_phi_31 -0.0061 0.0062 -0.9872 0.3235 -0.0181 0.0060
#> sigma_phi_13_phi_31 0.0007 0.0068 0.1065 0.9152 -0.0125 0.0140
#> sigma_phi_23_phi_31 0.0023 0.0109 0.2091 0.8344 -0.0191 0.0236
#> sigma_phi_33_phi_31 0.0027 0.0091 0.3011 0.7633 -0.0151 0.0206
#> sigma_sigma_11_phi_31 0.0000 0.0003 -0.1102 0.9123 -0.0006 0.0006
#> sigma_sigma_22_phi_31 -0.0001 0.0004 -0.1764 0.8600 -0.0009 0.0007
#> sigma_sigma_33_phi_31 0.0000 0.0005 0.0989 0.9212 -0.0009 0.0010
#> sigma_phi_12_phi_12 0.0185 0.0131 1.4142 0.1573 -0.0071 0.0441
#> sigma_phi_22_phi_12 0.0166 0.0153 1.0824 0.2791 -0.0134 0.0466
#> sigma_phi_32_phi_12 -0.0004 0.0064 -0.0628 0.9499 -0.0129 0.0121
#> sigma_phi_13_phi_12 -0.0141 0.0107 -1.3166 0.1880 -0.0350 0.0069
#> sigma_phi_23_phi_12 -0.0166 0.0153 -1.0806 0.2799 -0.0466 0.0135
#> sigma_phi_33_phi_12 0.0127 0.0125 1.0174 0.3090 -0.0118 0.0372
#> sigma_sigma_11_phi_12 0.0004 0.0004 0.8923 0.3723 -0.0004 0.0012
#> sigma_sigma_22_phi_12 0.0005 0.0006 0.9752 0.3294 -0.0006 0.0017
#> sigma_sigma_33_phi_12 -0.0007 0.0007 -1.0589 0.2896 -0.0021 0.0006
#> sigma_phi_22_phi_22 0.0359 0.0254 1.4142 0.1573 -0.0138 0.0855
#> sigma_phi_32_phi_22 -0.0004 0.0089 -0.0446 0.9644 -0.0178 0.0170
#> sigma_phi_13_phi_22 -0.0122 0.0127 -0.9573 0.3384 -0.0372 0.0128
#> sigma_phi_23_phi_22 -0.0340 0.0247 -1.3749 0.1692 -0.0825 0.0145
#> sigma_phi_33_phi_22 0.0206 0.0182 1.1343 0.2567 -0.0150 0.0562
#> sigma_sigma_11_phi_22 0.0005 0.0006 0.8788 0.3795 -0.0006 0.0016
#> sigma_sigma_22_phi_22 0.0008 0.0008 1.0258 0.3050 -0.0007 0.0024
#> sigma_sigma_33_phi_22 -0.0012 0.0010 -1.1792 0.2383 -0.0031 0.0008
#> sigma_phi_32_phi_32 0.0088 0.0062 1.4142 0.1573 -0.0034 0.0210
#> sigma_phi_13_phi_32 0.0003 0.0055 0.0629 0.9498 -0.0105 0.0112
#> sigma_phi_23_phi_32 0.0003 0.0089 0.0388 0.9690 -0.0171 0.0178
#> sigma_phi_33_phi_32 -0.0075 0.0083 -0.9003 0.3680 -0.0237 0.0088
#> sigma_sigma_11_phi_32 0.0000 0.0003 -0.0494 0.9606 -0.0005 0.0005
#> sigma_sigma_22_phi_32 0.0000 0.0003 -0.0499 0.9602 -0.0007 0.0006
#> sigma_sigma_33_phi_32 0.0001 0.0004 0.2303 0.8178 -0.0007 0.0009
#> sigma_phi_13_phi_13 0.0140 0.0099 1.4142 0.1573 -0.0054 0.0333
#> sigma_phi_23_phi_13 0.0122 0.0128 0.9555 0.3393 -0.0128 0.0372
#> sigma_phi_33_phi_13 -0.0094 0.0104 -0.8982 0.3691 -0.0299 0.0111
#> sigma_sigma_11_phi_13 -0.0003 0.0003 -0.7757 0.4379 -0.0010 0.0004
#> sigma_sigma_22_phi_13 -0.0004 0.0005 -0.8556 0.3922 -0.0013 0.0005
#> sigma_sigma_33_phi_13 0.0005 0.0006 0.9379 0.3483 -0.0006 0.0017
#> sigma_phi_23_phi_23 0.0360 0.0254 1.4142 0.1573 -0.0139 0.0859
#> sigma_phi_33_phi_23 -0.0206 0.0182 -1.1331 0.2572 -0.0563 0.0150
#> sigma_sigma_11_phi_23 -0.0005 0.0006 -0.8773 0.3803 -0.0016 0.0006
#> sigma_sigma_22_phi_23 -0.0008 0.0008 -1.0445 0.2962 -0.0024 0.0007

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#> sigma_sigma_33_phi_23      0.0012 0.0010      1.1789 0.2384 -0.0008 0.0032
#> sigma_phi_33_phi_33        0.0250 0.0177      1.4142 0.1573 -0.0096 0.0596
#> sigma_sigma_11_phi_33      0.0004 0.0005      0.8219 0.4111 -0.0005 0.0013
#> sigma_sigma_22_phi_33      0.0007 0.0007      1.0399 0.2984 -0.0006 0.0020
#> sigma_sigma_33_phi_33     -0.0010 0.0008     -1.1882 0.2347 -0.0026 0.0006
#> sigma_sigma_11_sigma_11     0.0000 0.0000      1.4142 0.1573  0.0000 0.0001
#> sigma_sigma_22_sigma_11     0.0000 0.0000      0.7857 0.4321  0.0000 0.0001
#> sigma_sigma_33_sigma_11     0.0000 0.0000     -0.8567 0.3916 -0.0001 0.0000
#> sigma_sigma_22_sigma_22     0.0001 0.0000      1.4142 0.1573  0.0000 0.0001
#> sigma_sigma_33_sigma_22     0.0000 0.0000     -1.0815 0.2795 -0.0001 0.0000
#> sigma_sigma_33_sigma_33     0.0001 0.0001      1.4142 0.1573  0.0000 0.0002
#>
#> $heterogeneity
#>   phi_11   phi_21   phi_31   phi_12   phi_22   phi_32   phi_13   phi_23
#>   0.6076   0.4724   0.3363   0.5224   0.6692   0.3336   0.4502   0.6691
#>   phi_33 sigma_11 sigma_22 sigma_33
#>   0.5786   0.4221   0.5449   0.6321
#>
#> Test passed

#> test-metaVAR-fit-dt-var-id-mx-theta-null
#> Running DTVAR with 12 parameters
#>
#> Beginning initial fit attempt
#> Running DTVAR with 12 parameters
#>
#> Lowest minimum so far:    741.858019666399
#>
#> Solution found

```

```

#>
#> Solution found!    Final fit=741.85802 (started at 3195.3436) (1 attempt(s): 1
valid, 0 errors)
#> Start values from best fit:
#> 0.744102359401248,0.471983549669145,-0.123485840970363,-0.00232191598171461,0.652661527232958,0.
#> Running DTVAR with 12 parameters
#>
#> Beginning initial fit attempt
#> Running DTVAR with 12 parameters
#>
#> Lowest minimum so far:    823.404995013856
#>
#> Solution found

```

```

#>
#> Solution found! Final fit=823.405 (started at 2764.6005) (1 attempt(s): 1 valid,
0 errors)
#> Start values from best fit:
#> 0.654633086676883,0.509278984394305,-0.134962902847776,0.0271964367580654,0.606323423068992,0.42
#> Running Model with 90 parameters
#>
#> Beginning initial fit attempt
#> Running Model with 90 parameters
#>
#> Lowest minimum so far: -351.37166864254
#>
#> Solution found

```

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#>
#> Solution found! Final fit=-351.37167 (started at 6.4476168) (1 attempt(s): 1
valid, 0 errors)
#> Start values from best fit:
#> 0.05126020815179,-0.0162567742096582,0.00501256863277252,-0.017243672575867,0.0202067158778894,0.
#> $estimates
#>

```

| | est | se | z | p | 2.5% | 97.5% |
|--------------------------|---------|--------|----------|--------|---------|---------|
| #> mu_beta_11 | 0.6994 | 0.0256 | 27.2870 | 0.0000 | 0.6491 | 0.7496 |
| #> mu_beta_21 | 0.4906 | 0.0160 | 30.6265 | 0.0000 | 0.4592 | 0.5220 |
| #> mu_beta_31 | -0.1292 | 0.0128 | -10.0622 | 0.0000 | -0.1544 | -0.1041 |
| #> mu_beta_12 | 0.0124 | 0.0126 | 0.9874 | 0.3235 | -0.0123 | 0.0371 |
| #> mu_beta_22 | 0.6295 | 0.0157 | 40.0718 | 0.0000 | 0.5987 | 0.6603 |
| #> mu_beta_32 | 0.4391 | 0.0117 | 37.5811 | 0.0000 | 0.4162 | 0.4620 |
| #> mu_beta_13 | 0.0087 | 0.0108 | 0.8092 | 0.4184 | -0.0124 | 0.0298 |
| #> mu_beta_23 | -0.0205 | 0.0158 | -1.3004 | 0.1935 | -0.0515 | 0.0104 |
| #> mu_beta_33 | 0.4874 | 0.0150 | 32.5839 | 0.0000 | 0.4580 | 0.5167 |
| #> mu_psi_11 | 0.0958 | 0.0044 | 21.8756 | 0.0000 | 0.0872 | 0.1043 |
| #> mu_psi_22 | 0.1039 | 0.0024 | 42.7682 | 0.0000 | 0.0991 | 0.1087 |
| #> mu_psi_33 | 0.0959 | 0.0023 | 42.1489 | 0.0000 | 0.0914 | 0.1004 |
| #> sigma_beta_11_beta_11 | 0.0026 | 0.0019 | 1.4142 | 0.1573 | -0.0010 | 0.0063 |
| #> sigma_beta_21_beta_11 | -0.0008 | 0.0009 | -0.9050 | 0.3655 | -0.0026 | 0.0010 |
| #> sigma_beta_31_beta_11 | 0.0003 | 0.0007 | 0.3831 | 0.7017 | -0.0011 | 0.0016 |
| #> sigma_beta_12_beta_11 | -0.0009 | 0.0008 | -1.1297 | 0.2586 | -0.0024 | 0.0006 |
| #> sigma_beta_22_beta_11 | 0.0010 | 0.0010 | 1.0819 | 0.2793 | -0.0008 | 0.0029 |
| #> sigma_beta_32_beta_11 | 0.0005 | 0.0007 | 0.7807 | 0.4350 | -0.0008 | 0.0018 |
| #> sigma_beta_13_beta_11 | 0.0003 | 0.0006 | 0.4990 | 0.6177 | -0.0008 | 0.0014 |
| #> sigma_beta_23_beta_11 | 0.0010 | 0.0010 | 1.0705 | 0.2844 | -0.0009 | 0.0029 |
| #> sigma_beta_33_beta_11 | -0.0010 | 0.0009 | -1.0600 | 0.2892 | -0.0027 | 0.0008 |
| #> sigma_psi_11_beta_11 | -0.0003 | 0.0003 | -1.2108 | 0.2260 | -0.0009 | 0.0002 |
| #> sigma_psi_22_beta_11 | 0.0001 | 0.0001 | 0.4881 | 0.6255 | -0.0002 | 0.0003 |
| #> sigma_psi_33_beta_11 | -0.0001 | 0.0001 | -0.5554 | 0.5786 | -0.0003 | 0.0002 |

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#> sigma_beta_21_beta_21 0.0010 0.0007 1.4142 0.1573 -0.0004 0.0024
#> sigma_beta_31_beta_21 -0.0001 0.0004 -0.2573 0.7970 -0.0009 0.0007
#> sigma_beta_12_beta_21 0.0003 0.0004 0.6432 0.5201 -0.0006 0.0011
#> sigma_beta_22_beta_21 -0.0007 0.0006 -1.1133 0.2656 -0.0019 0.0005
#> sigma_beta_32_beta_21 -0.0002 0.0004 -0.5438 0.5866 -0.0010 0.0006
#> sigma_beta_13_beta_21 -0.0001 0.0003 -0.2804 0.7791 -0.0008 0.0006
#> sigma_beta_23_beta_21 -0.0004 0.0005 -0.6950 0.4871 -0.0014 0.0007
#> sigma_beta_33_beta_21 0.0004 0.0005 0.7687 0.4420 -0.0006 0.0014
#> sigma_psi_11_beta_21 0.0001 0.0002 0.9045 0.3657 -0.0002 0.0005
#> sigma_psi_22_beta_21 0.0000 0.0001 -0.3313 0.7404 -0.0002 0.0001
#> sigma_psi_33_beta_21 0.0000 0.0001 0.3784 0.7051 -0.0001 0.0002
#> sigma_beta_31_beta_31 0.0007 0.0005 1.4142 0.1573 -0.0003 0.0016
#> sigma_beta_12_beta_31 -0.0001 0.0003 -0.2586 0.7959 -0.0007 0.0006
#> sigma_beta_22_beta_31 0.0001 0.0004 0.3242 0.7458 -0.0007 0.0009
#> sigma_beta_32_beta_31 -0.0002 0.0003 -0.5122 0.6085 -0.0008 0.0004
#> sigma_beta_13_beta_31 0.0000 0.0003 0.1074 0.9144 -0.0005 0.0006
#> sigma_beta_23_beta_31 0.0001 0.0004 0.3207 0.7484 -0.0007 0.0009
#> sigma_beta_33_beta_31 -0.0001 0.0004 -0.1908 0.8487 -0.0008 0.0007
#> sigma_psi_11_beta_31 0.0000 0.0001 -0.3820 0.7025 -0.0003 0.0002
#> sigma_psi_22_beta_31 0.0000 0.0001 0.1283 0.8979 -0.0001 0.0001
#> sigma_psi_33_beta_31 0.0000 0.0001 -0.1495 0.8811 -0.0001 0.0001
#> sigma_beta_12_beta_12 0.0006 0.0004 1.4142 0.1573 -0.0002 0.0015
#> sigma_beta_22_beta_12 -0.0003 0.0004 -0.7905 0.4292 -0.0012 0.0005
#> sigma_beta_32_beta_12 -0.0002 0.0003 -0.5494 0.5828 -0.0008 0.0004
#> sigma_beta_13_beta_12 -0.0003 0.0003 -0.9025 0.3668 -0.0009 0.0003
#> sigma_beta_23_beta_12 -0.0003 0.0004 -0.7842 0.4329 -0.0012 0.0005
#> sigma_beta_33_beta_12 0.0003 0.0004 0.7747 0.4385 -0.0005 0.0011
#> sigma_psi_11_beta_12 0.0001 0.0001 0.9094 0.3631 -0.0001 0.0004
#> sigma_psi_22_beta_12 0.0000 0.0001 -0.3324 0.7396 -0.0001 0.0001
#> sigma_psi_33_beta_12 0.0000 0.0001 0.3811 0.7032 -0.0001 0.0001
#> sigma_beta_22_beta_22 0.0010 0.0007 1.4142 0.1573 -0.0004 0.0024
#> sigma_beta_32_beta_22 0.0003 0.0004 0.6761 0.4989 -0.0005 0.0010
#> sigma_beta_13_beta_22 0.0001 0.0003 0.3520 0.7249 -0.0006 0.0008
#> sigma_beta_23_beta_22 0.0003 0.0005 0.6095 0.5422 -0.0007 0.0013
#> sigma_beta_33_beta_22 -0.0005 0.0005 -0.9346 0.3500 -0.0015 0.0005
#> sigma_psi_11_beta_22 -0.0002 0.0002 -1.0811 0.2796 -0.0005 0.0001
#> sigma_psi_22_beta_22 0.0000 0.0001 0.4162 0.6773 -0.0001 0.0002
#> sigma_psi_33_beta_22 0.0000 0.0001 -0.4747 0.6350 -0.0002 0.0001
#> sigma_beta_32_beta_32 0.0005 0.0004 1.4142 0.1573 -0.0002 0.0013
#> sigma_beta_13_beta_32 0.0001 0.0003 0.2394 0.8108 -0.0004 0.0006
#> sigma_beta_23_beta_32 0.0003 0.0004 0.6632 0.5072 -0.0005 0.0010
#> sigma_beta_33_beta_32 -0.0004 0.0004 -1.0677 0.2857 -0.0013 0.0004
#> sigma_psi_11_beta_32 -0.0001 0.0001 -0.7797 0.4355 -0.0003 0.0001
#> sigma_psi_22_beta_32 0.0000 0.0001 0.2785 0.7806 -0.0001 0.0001
#> sigma_psi_33_beta_32 0.0000 0.0001 -0.3174 0.7510 -0.0001 0.0001
#> sigma_beta_13_beta_13 0.0005 0.0003 1.4142 0.1573 -0.0002 0.0011

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#> sigma_beta_23_beta_13  0.0001 0.0003   0.3519 0.7249 -0.0006 0.0008
#> sigma_beta_33_beta_13 -0.0001 0.0003  -0.3473 0.7284 -0.0008 0.0005
#> sigma_psi_11_beta_13   0.0000 0.0001  -0.4168 0.6768 -0.0002 0.0001
#> sigma_psi_22_beta_13   0.0000 0.0001   0.1396 0.8890 -0.0001 0.0001
#> sigma_psi_33_beta_13   0.0000 0.0000  -0.1615 0.8717 -0.0001 0.0001
#> sigma_beta_23_beta_23  0.0010 0.0007   1.4142 0.1573 -0.0004 0.0024
#> sigma_beta_33_beta_23 -0.0005 0.0005  -0.9215 0.3568 -0.0015 0.0006
#> sigma_psi_11_beta_23  -0.0002 0.0002  -1.0691 0.2850 -0.0005 0.0001
#> sigma_psi_22_beta_23   0.0000 0.0001   0.4101 0.6817 -0.0001 0.0002
#> sigma_psi_33_beta_23   0.0000 0.0001  -0.4675 0.6401 -0.0002 0.0001
#> sigma_beta_33_beta_33  0.0009 0.0006   1.4142 0.1573 -0.0003 0.0021
#> sigma_psi_11_beta_33   0.0002 0.0002   1.0589 0.2896 -0.0001 0.0005
#> sigma_psi_22_beta_33   0.0000 0.0001  -0.4052 0.6853 -0.0002 0.0001
#> sigma_psi_33_beta_33   0.0000 0.0001   0.4616 0.6444 -0.0001 0.0002
#> sigma_psi_11_psi_11    0.0001 0.0001   1.4142 0.1573  0.0000 0.0002
#> sigma_psi_22_psi_11    0.0000 0.0000  -0.4874 0.6259 -0.0001 0.0000
#> sigma_psi_33_psi_11    0.0000 0.0000   0.5546 0.5791  0.0000 0.0001
#> sigma_psi_22_psi_22    0.0000 0.0000   1.4142 0.1573  0.0000 0.0001
#> sigma_psi_33_psi_22    0.0000 0.0000  -0.1903 0.8491  0.0000 0.0000
#> sigma_psi_33_psi_33    0.0000 0.0000   1.4142 0.1573  0.0000 0.0000
#>
#> $heterogeneity
#> beta_11 beta_21 beta_31 beta_12 beta_22 beta_32 beta_13 beta_23 beta_33 psi_11
#> 0.6771 0.4306 0.3448 0.4322 0.5229 0.3956 0.3472 0.5140 0.5067 0.6747
#> psi_22 psi_33
#> 0.3529 0.3597
#>
#> Test passed

#> test-meta-default
#> Running Model with 5 parameters
#>
#> Beginning initial fit attempt
#> Running Model with 5 parameters
#>
#> Lowest minimum so far:  -6611.68427517362
#> OpenMx status code 6 not in list of acceptable status codes, (0,0)
#>
#> Beginning fit attempt 1 of at maximum 1000 extra tries
#> Running Model with 5 parameters
#>
#> Lowest minimum so far:  -6611.68431201128
#>
#> Solution found

```

```

#>
#> Solution found! Final fit=-6611.6843 (started at -6610.7136) (2 attempt(s):
2 valid, 0 errors)
#> Start values from best fit:
#> 0.313147152480532,7.99374649342459e-05,0.313092317860277,0.0997566705402282,0.100057277862812

#> Test passed

#> Running Model with 4 parameters
#>
#> Beginning initial fit attempt
#> Running Model with 4 parameters
#>
#> Lowest minimum so far: -6611.68411208592
#> OpenMx status code 6 not in list of acceptable status codes, (0,0)
#>
#> Beginning fit attempt 1 of at maximum 1000 extra tries
#> Running Model with 4 parameters
#>
#> Lowest minimum so far: -6611.6841490558
#>
#> Solution found

#>
#> Solution found! Final fit=-6611.6841 (started at -6610.7136) (2 attempt(s):
2 valid, 0 errors)
#> Start values from best fit:
#> 0.313147151408939,0.313092327206126,0.099756670717787,0.100057277834488

#> Test passed
#> [[1]]
#> [[1]] [[1]]
#> [[1]] [[1]]$value
#> [[1]] [[1]]$value[[1]]
#> [1] TRUE
#>
#>
#> [[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
```

Environment

```
ls()  
#> [1] "root"
```

Class

```
#> [[1]]  
#> [1] "root_criterion"
```

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/>